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PROCEEDING

INNOVATION OF COMMUNITY PHYSIOTHERAPY ON INCREASING PHYSICAL ACTIVITY DURING PANDEMIC COVID-19

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PREFACE

Assalamualaikum Wr.Wb.

One of the most important excellence of the Physiotherapy Universitas Muhammadiyah Surakarta is community physiotherapy can be expanded to boost the physical therapy profession. There is a need for opportunities for students, teachers and physiotherapists to share information, disseminate science, and create an international research collaboration network.

In 2021, Department of Physiotherapy, Faculty of Health Sciences, Universitas Muhammadiyah Surakarta is proud to host a virtual symposium and call for paper called the Academic Physiotherapy Conferences 2021 (APC 2021). The theme of this symposium is "Innovation of Community Physiotherapy on Increasing Physical Activity during Pandemic Covid-19". We hope such work will be an essential mechanism for the innovation of research. This symposium should provide a forum for graduate students, teachers, and physical therapist to disseminate the information obtained from research and to create a further national and international research network in the field of physical therapy.

The aims of this virtual symposium are (1) to create a forum for the dissemination to the attendees of information from innovation of community physiotherapy and related science, (2) to create partnerships, communication and information networks between attendees, (3) to build a forum to share academic learning and research experience in physiotherapy for students, graduate students, graduate alumni and (4)to strengthen the ability of attendees for presenting research findings, both verbal and poster, in international language at the academic conference.

The speakers of this symposium are (1) Pramono Dwi Putro, F.Tr., MM (Indonesia), (2) Prof. Bhisma Murti, dr., MPH., M.Sc., PhD (Indonesia), (3) Assoc. Prof. Dr. Chutima Jalayondeja (Thailand), (4) Prof. Hwang Seongsoo, PT. PhD (South Korea) and (Assist. Prof. Ryuichi Sawa, PhD (Japan).

Wassalamualaikum Wr.Wb.

CONTENT

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MANAGEMENT PHYSIOTHERAPY FOR BELL'S PALSY DEXTRA WITH CHEMOTHERAPY TUMOR'S NEUROENDOKRIN ON *CAVUM NASI* IN RSUD KRMT WONGSONEGORO SEMARANG : A CASE STUDY

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Abstract

Introduction**:* Physiotherapy for *Bell's Palsy Dextra* with chemotherapy Tumors Neuroendocrine on *cavum nasi*. Implementation of therapy with modalities infra- red , massage and Propiceptif Neuro Facilitation / PNF face. ***Case Presentation**:* To report the results of a program of physiotherapy on the bell's palsy dextra with chemotherapy tumors of neuroendocrine on *cavum nasi*. The patient was a woman aged 57 years with a primary diagnosis of *Bell's palsy Dextra* the moment is undergoing chemotherapy for tumors of neuroendocrine on *cavum nasi* . Physiotherapy was done as much as 12 times the detail infra- red on the face side of the right for 10 minutes , massage performed for 5 minutes , exercise with techniques Propioceptif Neuro Facilitation / PNF. Implementation of therapy 2 times a week . ***Management and Outcome: Having done 12 times therapeutic obtained results occurs increase the value that is measured by the scale of Ugo Fisch from 0 becomes 18 ***Discussion**:* therapy for 1.5 months is still with a score scale ugo fisch 18, while the evidence of clinical improvement occurs in spontaneously in a time of three weeks in 85 percent of cases , and most great people eventually recover the function of the face are normal ***Conclusion**:* In case this does not happen an increase in the significant value of the Scale Ugo Fisch . It is the possibility because the patient still undergo chemotherapy so that the immune patients disturbed.

Keyword: Physiotherapy, Bell's Palsy, PNF, Cemotherapy , Neuroendocrine Tumor

Introduction

Paralysis of the nerves of the facial peripheral (Bell's Palsy) is a lesion idiopathic nerve cranial VII which cause disruption in the muscles of the face . The term Bell's Palsy first time used by Sir Charles Bell, an expert surgeon origin Scotland in the year 1830 in order to describe the condition resembles a stroke occurs suddenly with symptoms of clinical paralysis of the face of unilateral [(1)] Symptoms of bell's palsy unable to move the affected side[(2)] occur in eyelids eyes someone so difficult to shut down and when someone trying to close the eyelid eyes then the eye will be rotated to the top , the eye is not able close and remain visible[(3)] . Symptoms of this so-called phenomenon of bell. Signs and symptoms of others are marked with attraction of the mouth of the weak to the direction of the mouth are healthy , food collected in between the cheeks , gums and loss of taste sensation on the face , the folds of skin forehead disappeared, water eyes will continue to come out if the part the eye that is affected is not able to close [(2)] Cause certainly paralysis of nerve facial peripheral yet unknown , but associated with pathogenic infection when the onset of symptoms . Etiology who allegedly is a pathogen causes syphilis, herpes zoster, Lyme disease, human immunodeficiency virus (HIV), influenza, herpes simplex, and otitis media acute . The cause of the other may be abnormalities of metabolic , trauma, tumors, or abnormalities of congenital [(4)] .In the case of this Bell's Palsy with diseases concomitant tumor endocrine Most large tumors Neuroendocrine occurred on channel gastrointestinal (67.5%) and in the system of the respiratory (25.3%). In line gastrointestinal , mostly Nets found on intestinal smooth (41 , 8 %), rectum (27.4%) and stomach (8.7%). Data from The Suveveillence Epidemiology and End Results (SEER) and the National Cancer Institute showed that happening increase dramatically from incidents Nets from 1973 to 2014 [(5)]

Case Presentation

Patients a policewoman (Ny S) were aged 57 years who currently is suffering from Bell's Palsy Dextra In dated 3 May 2021 after conducted the chemotherapy (the seventh) suddenly felt face drooping/"merot" to the left . The next day the patient checked himself into the KRMT Wongsonegoro Hospital and was advised for physiotherapy . At home often to use fan winds are directly routed to the agency . When this patien feel the

complaint has not been able to lift the eyebrows right , eyes right has not been able to shut up , and when talking , smiling, movement " mecucu " still looks face drooping/"merot" to the left . If for gargling , still leaking . When eating also gather on one side . The right side of the face feels thick . Air eyes still out themselves . To the senses of taste normal. Not there is a sense of pain in mastoideusnya . If calculated by the Ugo Fisch scale the score is 0 (heavy category). When it is given a program of physiotherapy a week 2 times with modalities infra- red , massage, exercise PNF face . In addition to the patient is undergoing chemotherapy at the Hospital Dr Karyadi Semarang for tumors of neuroendocrine on *cavum nasi* .

Management and Outcome

In the implementation of physiotherapy given modality infra- red [(7)] on the face side of the right for 10 minutes , do massage [(8)]for 5 minutes and are given exercises PNF[(9)] face for 5 minutes . Physiotherapy done a week 2 times per day Monday and Thursday . As a home program, family members (husbands) are asked to do exercises at home .

At the initial examination using scale ugo fisch [(10)] obtained a score of 0, as do therapy as much as 12 times (week 2 times) obtained a score of 18. The results which are subjectively : the patient had not felt thick on the face side of the right, and also if the meal is already not too accumulate in right side . To water the eyes also had not come out again .

		T 1	T 4	T 7	T 10	T 12
1	Rest	20 x 0% = 0	20 x 0% = 0	20 x 0% = 0	20 x 0% = 0	20 x 0% = 0
2	wrinkled forehead	10 x 0% = 0	10 x 0% = 0	10 x 0% = 0	10 x 0% = 0	10 x 0% = 0
3	Close your eyes	30 x 0% = 0	30 x 0% = 0	30 x 0% = 0	30x30% = 9	30x30% = 9
4	Whistling	10 x 0% = 0	10 x 0% = 0	10 x 0% = 0	10 x 0% = 0	10 x 0% = 0
5	Smile	30 x 0% = 0	30 x 0% = 0	30 x 0% = 0	30x30% = 9	30x30% = 9
Amount		0	0	0	18	18

Table 1. Results of the Ugo Fisch Scale

Discussion

The prognosis is generally very good . The severity of nerve damage determines the healing process . The improvement is gradual and the length of time it takes varies . With or without treatment , most large individuals improved in the period of two weeks after the

onset of symptoms and improved in full , function returned to normal in the period of 3-6 months . But for some patients it can take longer. In some cases , interference may appear back in place the same or on the other face [11] will be but in case it can be said results were obtained not as the expected . With therapy for 1.5 months is still with a score scale ugo fisch 18, while the evidence of clinical improvement occurs in spontaneously in a time of three weeks in 85 percent of cases , and most great people eventually recover the function of the face are normal. Some individuals may have mild residual facial weakness or exhibit moderate to severe deficits . Bell's palsy can have the consequence of an injury or condition previously , such as the movement of the mouth that is not intentional when trying to blink the eyes or recovery weakness of muscles face that did not complete that lead to difficulty speaking or forming words [(11)] . A pakah case is Bells palsy greatly influenced by the power of the immune / immune someone , remember when this Mrs. S undergoing chemotherapy for tumors of neuroendocrine , that the system is immune associated closely with the pathogenesis and treatment of cancer . On the one hand , the cancer is a manifestation of a malfunctioning immune , because the cells are malignant managed to escape from the recognition and elimination by the system immune . Infection Chronic and inflammation that is associated with the response of the immune limited or polarized also contribute to carcinogenesis and the development of Tumor [(12)]

Report of a case is among other sample that only one thus not be used to generalize the case of the others. The author has not found literature that states the right dose for the implementation of massage and PNF exercises . Implementation of the home program has not been able to do as that expected for husband / family sometimes forget to give a massage and exercise , and also the author is not able to control the family to provide therapy at home .

Conclusion

Bell's palsy is a peripheral facial nerve palsy due to acute edema of the facial nerve in the *stylomastoid* foramen . The exact pathophysiology of *Bell's palsy is* still debated . A theory suspect edema and *ischemia* derived from the compression of nerves *in the facial* in the canal bone it . Disruption of nerve *facial* at the foramen *stylomastoid* can cause paralysis of the whole muscle expression of the face , Angle 's mouth fell , lines and folds of skin are also affected , the line of the forehead disappeared , the folds of *the eyelid* wide , and the *lid margin* eyes are not closed . with Bell's Palsy is also greatly affected by the virus, immune , power resistant patients . With the presence of tumors of neuroendocrine on cavum nasi and does chemotherapy that would impede on the success of the program of physiotherapy , so as to Mrs S requires a time that is long in mencapi

healing .

The severity of nerve damage determines the healing process . The improvement is gradual and the length of time it takes varies

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References

1. Djordjevic G dan Djuric S. Early prognostic value of electrophysiological tests in Bell's Palsy- Estimating the duration of clinical recovery. *Medicine and Biology*. 2005;12(1):47-54.
2. Mujaddidah, N. (2017) Tinjauan Anatomi Klinik dan Manajemen Bell' S Palsy. Quanun Medika, I(2), 1-11.
3. Bahrudin, M. (2011). Bell's Palsy(BP). Jurnal Ilmu Kesehatan dan Kedokteran Keluarga. Vol.7 (2), 1-6
4. Moala H, Ahmed S, Yousif Y. Etiology and clinical presentations of lower motor neuron facial nerve palsy in Khartoum, Sudan. *J Ear Nose Throat Disord*. 2017;2(1):1017.
5. Yao JC, Hassan M, Phan A, et al. One hundreds years after "carcinoid" epidemiology of and prognostic factor for neuroendocrine tumors in 35,825 cases in the United State. *J Clin Oncol*.2008;26:3063-72.
6. Tiemstra JD and Khatkhate N, 2007. Bell's palsy: diagnosis and management. Am Fam Physician. 76(7):997-1002.
7. R.T Shang et al. Biological effect and Medical of Infra Red Radiationat Journal of Photochemistry and Photobiology B. Elsevier. May 2017
8. Wiyoto, Bambang. T. 2011. Remedial *Massage*. Nuha Medika. Yogyakarta
9. Propioceptive Neuromuscular Facilitation in LMN Facial. Indian Journal of Physiotherapy and Occupational Therapy, July-September 2020
10. Bambang. Instrumen Pemeriksaan Fisioterapi dan Penelitian Kesehatan.Nuha Medika. Yogyakarta
11. NINDS, 2014. Bell's palsy Fact Sheet, http://www.ninds.nih.gov/disorders/bells/detail_bells.htm
12. Shurin MR, Cancer as an immune-mediated disease ImmunoTargets and Therapy, Published : Dove Press jurnal 2012, Departments of Pathology and Immunology, University of Pittsburgh Medical Center, Pittsburgh, PA, USA

PHYSIOTHERAPHY MANAGEMENT ON PES ANSERINE BURSITIS CASE: A CASE STUDY

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ABSTRACT

Introduction: Pes Anserine Bursitis (PAB) is an inflammation of pes anserine with the prevalence of this condition is 2.5% during 1998 to 2004 at a tertiary orthopaedic centre in United Kingdom. But, there is no exact number of pes anserine bursitis worldwide. The study cases of PAB with history of post knee arthroscopic surgery is limited. Moreover, PAB without any symptoms of inflammation except pain.

Clinical Presentation: A man, 28 years old, actives in futsal and diagnosed with pes anserine bursitis, having only one session.of physiotherapy for 30 minutes by given therapy with an ice pack, ultrasound, gun massage, isometric exercise, and TENS. It is given once a week for one week only.

Management and Oucome: Physiotherapy management such as ultrasound, gun massage, isometric exercise, and TENS could reduce pain on pens anserine bursitis problems. After follow 7 days of physiotherapy's session, The NRS scale reduce from 4 to 0.

Discussion: In this case, due to the patient's sport activities, it could affect the perform of pes anserine-forming muscle. It could make the bursa inflammation and pain in the medial knee. After seventh day treatment, the pain was disappeared. Moreover, the patient did not have any functional limitation, decrease on strength muscle and range of motion, or any change of gait. A case study of a 79-year-old female with pes anserines bursitis who had undergone knee arthroplasty 13 years prior. She had knee pain for a year without any symptoms of infection, inflammation or history of trauma. She was treated with a combination of strengthening exercise, stretching exercise, and local steroid injection.

Conclusion: The physiotherapy program could reduce the pain after having one therapy on the pes anserine bursitis problem.

Keyword: *Pes anserine bursitis, physiotherapy, pain*

Background

Pes Anserine Bursitis (PAB) is an inflammation that occurs in the bursa at the insertio of sartorius, gracilis, and semitendinosus muscle (Rennie and Saifuddin). The three muscles are the main flexor of the knee which has a role in internal rotation and valgus stress (Alvarez-Nemegyei and Canoso).

The exact number of pes anserine bursitis worldwide is unknown because studies on its prevalence is limited. But in a retrospective review, pes anserine bursitis has prevalence of 2.5% in symptomatic adults on MRI at a tertiary orthopaedic centre in United Kingdom (Rennie and Saifuddin). Moreover, PAB is more common in middle-aged women. It is caused that women have wider pelvis so that knee angle in the frontal plane that causes greater pressure on insertio area from pes anserine (Helfenstein and Kuromoto). The etiology of pes anserine bursitis includes trauma, retraction of the posterior lower limb, bone exostosis, irritation of the suprapatellar plica, the injury of medial meniscus, pes planus, genu valgum, an infection, and foreign body reaction (Huang et al.).

The purpose of this article was to report the results of a physiotherapy program to the patient with pes anserine bursitis.

Case Presentation

The patient was a 28 years old man. He works as a physical education (PE) teacher. He also actives in futsal and has a symptom of pain in the right medial knee. The patient feels pain in the medial knee when the knee extension along with dorsiflexion of the ankle from the knee flexion. On the palpation examination, there was pain in the pes anserine. The patient described pain on a scale of 4 out of 10. Previously, the patient had the same pain approximately 5 months after having arthroscopic surgery on the *Anterior Cruciate Ligament* (ACL). At that time, the patient was in rehabilitation for his ACL. After having ACL rehabilitation for one year, the patient could play futsal again. The pain in pes anserine disappeared, yet about 1 year later, the pain in pes anserine was returned. Based on the examination, there was no erythema, oedema, and temperature change. Moreover, there is no limitation of range of motion and decreased muscle strength. On the examination of ligaments or meniscus such as anterior and posterior drawer test, Apley's test, varus or valgus test, and McMurray test on the right knee did not cause any stretch or

tear. The blood pressure was 120/70 mmHg. There was muscle spasm of the adductor knee and hamstring.

Management and Outcome

The patient attended only one physiotherapy session for around 30 minutes. First, the patient was given an ice pack on the medial knee for 10 minutes as a local anesthetic. Then, giving an ultrasound for 5 minutes in pes anserine with the moderate intensity and the frequency is 3 MHz. Afterward, using a gun massage on muscles of the medial knee and hamstring for 10 counts each. It was for reducing spasms on muscle so that it can reduce friction in the pes anserine. Next, giving isometric exercise on the hip adductor, quadriceps, and hamstring. Isometric exercise was done with the ratio of 2:1 or 10 seconds of muscle contraction and 5 seconds of rest. Isometric exercise plays a role in reducing pain and inflammation. Last, giving Transcutaneous electrical nerve stimulation (TENS) in the area of pes anserine for 10 minutes. For a home programme, the patient was asked to do isometric exercise and stretching on the lower extremity.

The result of pain using the Numeric Rating Scale (NRS) was a subjective measuring instrument, which was the individuals rate their pain on 11 points numeric scale. The scale ranges from 0 (no pain at all) up to 10 (very painful) (Jensen et al.). The pain score decreased after one therapy. The previous NRS score was 4. After 7 days of therapy, it was decreased to 0. The patient reported that the pain decreased before day 7. In addition, the pain did not return on day 14.

Table 1. The Pain scale using Numeric Rating Scale

Pre	Post		
	Day 1	Day 7	Day 14
4	4	0	0

Discussion

In this case, the patient initially complained of pain in the medial knee when palpation and knee extension movements along with ankle dorsiflexion movements from knee flexion position. It is most likely because the patient was active in playing futsal so that there was an overuse of the pes anserine-forming muscle. It causes increased friction at the tendon insertion which is covered by the bursa. So, the bursa gets inflammation. The

inflammation causes pain in the medial knee. After the treatment is done, the pain does not decrease immediately, but a few days after treatment, the pain decreased progressively.

On follow-up day 7 after treatment, the scale of pain decreased to 0 out of 10. Even on day 14, the pain did not return. It is probably because the appearing symptom is mild. Moreover, the patient does not experience a functional limitation, decrease on muscle strength and range of motion, or any change of gait.

Kamudin et al. report in his study, a 79-year-old female with pes anserines bursitis who had undergone knee arthroplasty 13 years prior. She had knee pain for a year without any symptoms of infection, inflammation, or history of trauma. She was treated with a combination of strengthening exercise of quadriceps and hamstring muscle, stretching exercise, and steroid local steroid injection. After steroid injection, the pain was reduced immediately. However, she was adviced to continue strengthening and stretching exercise. During follow up at 2 months, 6 months and a year, she was pain free.

In the research of Rio et al., isometric contraction can reduce pain quickly about 45 minutes after intervention in the tendinopathy patellar case. It was probably occurred because of releasing intracortical inhibition which is connected with pain reduction and bounding in the mechanism which is underlying the change of pain.

For TENS and ultrasound, Sarifakioglu et al. studied 60 osteoarthritis patients with pes anserine tendino-bursitis. 30 patients were given hot packs, ultrasound, and TENS meanwhile, other's group were given corticosteroid injection. After 8 weeks, there was a decreased in pain, stiffness, and improvement in functional ability as measured with The Western Ontario and McMaster Universities Arthritis Index (WOMAC) and Up and Go test in both groups. However, there was no significant difference between the two groups.

According to Konrad et al. in his research using handheld percussive massage on plantar flexor mu gastrocnemius in a sitting position and the ankle at 20° plantar flexion. The result showed there was an increase in the range of motion in maximum dorsiflexion of 5.4° on the first group, but there was no Maximum Voluntary Contraction (MVC). The increase in range of motion can be assumed because there is reducing stiffness muscle.

Conclusion

This case shows clinical presentation on pes anserine bursitis case and physiotherapy

treatment using a conventional method such as ultrasound, TENS, and isometric exercise. In addition, giving a gun massage which is quite popular among physiotherapists, especially in Indonesia. Based on the results, physiotherapy management can reduce pain with moderate actuality and there is no functional irritation on pes anserine bursitis case. There are some limitations to this research. First, duration of treatment only one session. Second, there is an inability of the researcher to limit the type of therapy. So, it is difficult to determine which right therapy for pes anserine bursitis case.

REFERENCES

Alvarez-Nemegyei, Jose, and Juan J. Canoso. "Evidence-Based Soft Tissue Rheumatology IV: Anserine Bursitis." *Journal of Clinical Rheumatology*, vol. 10, no. 4, 2004, pp. 205–06, doi:10.1097/01.rhu.0000135561.41660.b0.

Helfenstein, Milton, and Jorge Kuromoto. "Anserine Syndrome." *Revista Brasileira de Reumatologia*, vol. 50, no. 3, 2010, pp. 320–27, https://pubmed.ncbi.nlm.nih.gov/21125167/.

Huang, Ting Wen, et al. "Polyethylene-Induced Pes Anserinus Bursitis Mimicking an Infected Total Knee Arthroplasty: A Case Report and Review of the Literature." *Journal of Arthroplasty*, vol. 18, no. 3, 2003, pp. 383–86, doi:10.1054/arth.2003.50062.

Jensen, Mark P., et al. *Comparative Reliability and Validity of Chronic Pain Intensity Measures*. 1999, https://pubmed.ncbi.nlm.nih.gov/10534586/.

Kamudin, Nur Azree Ferdaus, et al. "Pes Anserine Syndrome in Post Knee Arthroplasty. A Rare Case Report." *Journal of Clinical Orthopaedics and Trauma*, vol. 11, no. 1, Delhi Orthopedic Association, 2020, pp. 171–74, doi:10.1016/j.jcot.2018.11.007.

Konrad, Andreas, et al. "The Acute Effects of a Percussive Massage Treatment with a Hypervolt Device on Plantar Flexor Muscles' Range of Motion and Performance." *Journal of Sports Science and Medicine*, vol. 19, no. 4, 2020, pp. 690–94, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7675623/.

Rennie, W. J., and A. Saifuddin. "Pes Anserine Bursitis: Incidence in Symptomatic Knees and Clinical Presentation." *Skeletal Radiology*, vol. 34, no. 7, 2005, pp. 395–98, doi:10.1007/s00256-005-0918-7.

Rio, Ebonie, et al. "Isometric Exercise Induces Analgesia and Reduces Inhibition in Patellar Tendinopathy." *British Journal of Sports Medicine*, vol. 49, no. 19, 2015, pp. 1277–83, doi:10.1136/bjsports-2014-094386.

Sarifakioglu, Banu, et al. "Comparison of the Efficacy of Physical Therapy and Corticosteroid Injection in the Treatment of Pes Anserine Tendino-Bursitis." *Journal of Physical Therapy Science*, vol. 28, no. 7, 2016, pp. 1993–97, doi:10.1589/jpts.28.1993.

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PHYSOTHERAPY MANAGEMENT IN POST OPERATION SYRINGOMYELIA: A CASE STUDY

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Abstract

Introduction: Syringomyelia is a disorder of the central nervous system, this disorder is often associated with the appearance of cysts (syrinx) in the spinal cord. The presence of this syrinx causes pressure on the spinal cord, thus it is followed by muscle weakness and pain. The incidence of syringomyelia cases is very little, namely 8.4/100,000 or only 2%. Physiotherapy treatment in cases of syringomyelia is usually in postoperative care. Due to the scarcity of this case, there is limited information regarding physiotherapy treatment in cases of syringomyelia.
Case description*:* A 51-year-old woman was diagnosed with syringomyelia through an MRI scan, after undergoing surgery, she complained of silent pain. Following the surgery, the patient underwent rehabilitation by physiotherapy since she complained of silent pain on the upper limb.
Intervention and Outcomes*:* The patient received treatment from physiotherapists in the form of IR and TENS. The intervention was given for 2 weeks, with a 10 minutes duration of IR and 15 minutes duration for TENS. Evaluation was done every week, where every week there was a reduction in pain, which was VDS (Verbal Descriptive Scale) 7/10 to 0/10.
Discussion and Conclusion*:* Physiotherapy can handle the side effects that occurred after syringomyelia surgery 6 months ago, which in this study showed a decrease in the silent pain score. However, the decrease of silent pain is only temporary, because the patient continued to complain of discomfort the next day.

Keyword*: Syringomyelia, Pain, TENS, IR,VDS*

Introduction

Syringomyelia is a disorder of the central nervous system, this disorder is often associated with the appearance of cysts (*syrinx*) in the spinal cord. The existence of this *syrinx* inflicts pressure on the spinal cord, followed by muscle weakness and pain. According to previous studies, *syringomyelia* is defined as a disease that manifests various neurological symptoms, cystic cavities formed in the spinal cord caused by Chiari deformation, spinal cord tumors, spinal cedar, and meninges fibrosis (1). Syringomyelia is defined as the development of cerebrospinal fluid (CSF)-filled cysts in the spinal cord. Syringomyelia is a rare neurological condition with chronic consequences and can cause disability in the patient's life (2), this is supported by previous studies which stated the prevalence of syringomyelia which was only 8.4 cases per 100,000 population, and it was more common in men than women (Mishra, Kimaya & Kanchi, 2019). The prevalence of Syringomyelia is estimated at 8.4/100,000. Syringomyelia cases are reported with an incidence rate of only 2% (4). The pathophysiology of syringomyelia remains idiopathic but is generally associated with an imbalance in fluid pressure that causes fluid outflow into the syrinx (5). There are several symptoms that usually appear in cases of syringomyelia, such as segmental sensory loss (93%), pyramidal signs (82%) and muscle atrophy (60%) (6). TENS delivers an electric current through the skin to reduce pain**,** it is effective in several clinical conditions associated with inflammatory, neuropathic, and non-inflammatory pain (7). Syringomyelia is a condition associated with congenital abnormalities, such as Chiari malformation, but also develops as a sequela of neoplasms, infections, umbilical cord, and trauma (8). Syringomyelia patients usually have several symptoms, such as progressive weakness, back pain, shoulders, arms, legs, loss of temperature sensation, facial pain and numbness, loss of pain sensation, difficulty walking, bowel and bladder dysfunction, and increased spinal curve**.**). In general, syringomyelia is treated with surgery, but it is not uncommon for some patients who undergo surgery to experience some problems as a result of the surgery which has been performed. This is supported by previous studies which mention syrinx management that includes surgical and conservative management, where surgical intervention aims to restore CSF flow**,** several studies have shown that there is a risk of severe and progressive neurological damage following the surgery (9). The role of physiotherapy is **s**ubsequent to the surgery where physiotherapy aims to deal with problems that arise after the surgery is performed**,** which is the pain problem. Thus, this study aims to determine the effect of physiotherapy intervention in patients with syringomyelia with TENS and IR treatment on pain reduction.

Case Presentation

A 51-year-old woman who works as a household assistant came to physiotherapy complaining of pain in her upper shoulder. The patient described silent pain with a score of 7 out of 10. It is known that 6 months ago the patient was washing clothes, and suddenly felt a very excruciating pain, and was examined by a doctor and then was advised for an X-ray, it was found from the results of the MRI that the patient was diagnosed with syringomyelia, thus she was referred for a surgery to be performed. A week after undergoing surgery, the patient attended a physiotherapy program. From the anamnesis, it was found that no family members had the same complaints as the patient. Previous studies have stated that *syringomyelia* patients usually have several symptoms, one of which is upper back pain (3).

Management and Outcome

The measuring instrument used in this patient is the VDS (Visual Descriptive Scale) as a silent pain measurement tool. The pain score consists of a range of 0 to 10, where 0 = no pain, 1-3 = mild pain, 4-6 = moderate pain, 7-9 = severe bearable pain. And 10 = severe unbearable pain. Physiotherapy intervention in the form of treatment using IR (Infra-Red) and TENS (Transcutaneous Electrical Nerve Stimulation) 10-50 Hz modalities with an intensity according to the patient's tolerance, was carried out for 2 weeks by giving the modality 2 times/ week. IR was applied with a distance of 40 cm between the IR and the skin. From the result of the intervention there was a decrease in pain, this was proven by the pain measurement before the intervention which was assessed using a VDS on the scale of 7/10 that decreased to 0/10. It is acknowledged that the patient consistently participated in intervention activities from January to June, at the beginning of the intervention the patient had very disturbing spasms and limitations of motion, and after regularly participating in the intervention there were no more spasms nor limitations of motion. The patient complained of soreness if she did not regularly seek the intervention, so patients consistently came to physiotherapy.

Discussion

Based on the results of the data obtained from research which was conducted for 2 weeks, where evaluation was carried out every week after the patient was intervened, there was a temporary decrease in silent pain because the patient then complained of silent pain the following day. There are several previous studies that mention the treatment of syringomyelia, as in the previous studies (9) which stated that conservative management can reduce pain but cannot reduce the size of

syringomyelia, where in this study patients were given interventions in the form of pain

management, cervical traction, joint mobilization and manual therapy in soft tissue indicated for postural correction and biomechanics in combination with drugs, it was found in this study that patients experienced a decrease in the pain score measured using the VAS (Visual Analog Scale) with a pre value of 90/100mm to 30.100mm and NDI (Neck Disability Index) from 39 to 25, it was concluded in this study that physiotherapy treatment can be an alternative, in addition to syringomyelia surgery for symptomatic management, physiotherapy treatment is incapable of reducing the size of the syrinx. The study of Jugowice D et al (13) in this study examined a 44-year-old man with no history of spinal cord trauma, infection or other pathological processes, the patient came with complaints of progressive chest pain and left leg paresis, from the results of MRI (Magnetic Resonance Imaging) the patient was diagnosed with syringomyelia at T5-T7 and cranial hydromyelia, in this study using a minimally invasive technique, where this technique is effective for the idiopathic syrinx, it was found in the results of the study that it was effective in treating cases of idiopathic syrinx. Vilella's study (14) Idiopathic syringomyelia is a condition in which cystic cavities appear within the spinal cord, the diagnosis of syringomyelia was at C3-C6, 3 years ago, where the patient was a former volleyball athlete with no muscle atrophy or limb paraesthesia, however, he began to experience persistent back and neck pain, restricting his functional abilities in sports (jogging, volleyball) and independent activities. The patient was given physiotherapy treatment in 6 sessions, increasing muscle strength, myofascial release, dry needling, and muscle strengthening exercises, the results showed that physiotherapy intervention can be an effective treatment for syringomyelia which shows symptoms of myofascial pain syndrome. The previous study used a 33-year-old woman with a diagnosis of syringomyelia. The patient was reported to the neurology department for sensory disturbances and shoulder pain for several months. Once admitted, Neurological examination reported a right hand muscle deficit, loss of temperature sensation, and asymmetric tendon reflexes. Several weeks earlier, an MRI of the patient's spine showed Arnold Chiari malformation, syringomyelia and C5/C6 and C6/C7 discopathies. The patient then underwent medial suboccipital craniectomy and a month later was admitted to the neurologic rehabilitation department for paresis and sensory disturbance of the right upper extremity. After being given treatment by physiotherapy, motor function was detected.

TENS (Transcutaneous electrical stimulation) utilizes an external stimulator that delivers high frequencies (10-15 Hz) (conventional) (10). TENS is a self-noninvasive technique that conducts electric current through the skin surface by activating peripheral nerves, where electrophysiology

shows that TENS-induced afferent activity can inhibit the transmission of nociceptive information in the CNS (central nervous system), and produce hypoalgesia, thereby reducing pain (11). Infrared is the emission of electromagnetic waves used for superficial complaints. There is a sedative effect from the infrared where heat stimulation reaches the subcutaneous tissue which will result in vasodilation of blood vessels, so that the flow in blood vessels increases and substance P or metabolic waste will be wasted. In addition, the heating effect will also increase metabolism which will result in an upsurge in the supply of nutrients and oxygen to the tissues hence the pain is reduced. The heat produced by infrared stimulates peripheral nerve endings (neurons) which will activate A alpha and A delta nerve fibers that can activate inhibitory neurons, such as inhibitory amino acids and neuropeptides, these substances bind to primary afferent receptors and dorsal horn neurons. As a result, nociceptive transmission will be inhibited by pre-synaptic and post-synaptic mechanisms and nociceptor transmission will decrease. Therefore, the pain impulses are not sent directly to the brain though are more modulated which results in reduced pain (12).

Conclusion

Syringomyelia is a disorder of the central nervous system, this disorder is often associated with the appearance of cysts (syrinx) in the spinal cord. The existence of this syrinx causes pressure on the spinal cord, followed by muscle weakness and pain. In cases of syringomyelia, it is often treated with surgery. Physiotherapy plays a role in dealing with several complaints that emerge after the patient undergoes surgery, one of the problems that often arises and is complained of is pain. In this study, researchers used IR and TENS as interventions in managing pain in postoperative syringomyelia patients. The results of this study indicate that there is a significant reduction in pain, as indicated by the VDS pain score reduction of 7/10 to 0/10. However, this study has several limitation, such as the pain reduction is only temporary. In addition, there is no long-term follow-up.

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References

1. Choi HY, Jeong JE, Lee JS, Park JM, Lee CK, Lee EY, et al. A Case of Syringomyelia with Back and Shoulder Pain. J Acupunct Res. 2019;36(1):45–9.
2. Smith R, Jones G, Curtis A, Murphy H, Flint G. Are Established Methods of Physiotherapeutic Management for Long-term Neurological Conditions Applicable to "Orphan" Conditions such as Syringomyelia? Physiother Res Int. 2016;21(1):4–21.
3. Mishra SS, Kimaya C, Kanchi V. Effects of Functional Proprioceptive Neuromuscular Facilitation with Mental Practice to Improve Activities of Daily Living in Syringomyelia Patient-A Case Report. Asian J Case Reports Med Heal. 2019;2(2):1–6.
4. Di Lorenzo N, Cacciola F. Adult syringomielia. Classification, pathogenesis and therapeutic approaches. J Neurosurg Sci. 2005;
5. Hudson BR, Cook C, Goode A. Identifying myelopathy caused by thoracic syringomyelia: A case report. J Man Manip Ther. 2008;16(2):82–8.
6. Giner J, Pérez López C, Hernández B, Gómez de la Riva Á, Isla A, Roda JM. Update on the pathophysiology and management of syringomyelia unrelated to Chiari malformation. Neurol (English Ed [Internet]. 2019;34(5):318–25. Available from: http://dx.doi.org/10.1016/j.nrleng.2018.10.004
7. Sato KL, Sanada LS, Da Silva MD, Okubo R, Sluka KA. Transcutaneous electrical nerve stimulation, acupuncture, and spinal cord stimulation on neuropathic, inflammatory and, noninflammatory pain in rat models. Korean J Pain. 2020;33(2):121–30.
8. Hussain I, Greenfield JP. Ultrasound-guided Syringosubarachnoid Shunt Insertion for Cervicothoracic Syringomyelia. Clin Spine Surg. 2019;00(00):1–7.
9. Osama M, Yaqoob F. Cervical Syringomyelia; Conservative Physical Therapy Management of a Patient: a Case Report. Prof Med J. 2017;24(04):627–32.
10. Canavero S, Bonicalzi V. Neuromodulation for central pain. Expert Rev Neurother. 2003;3(5):591–607.
11. Johnson MI, Bjordal JM. Transcutaneous electrical nerve stimulation for the management of painful conditions: Focus on neuropathic pain. Expert Rev Neurother. 2011;11(5):735–53.
12. Sulistyawati D, Wiguna INAP, Aritama IPK, Et.al. Pemberian Ultrasound Lebih Baik Daripada Infrared Terhadap Penurunan Nyeri pada Kasus Nyeri Punggung Bawah Miogenik. 2019;3(2):31–5.
13. Jugović D, Bošnjak R, Rotim K, Feigl GC. Minimally Invasive Treatment of Idiopathic Syringomyelia Using Myringotomy T-Tubes: a Case Report and Technical Note. Acta Clin Croat. 2020;59(1):177–82.
14. Vilella RC. Pain treatment and recovery of functionality in a former athlete diagnosed with myofascial pain syndrome in the course of syringomyelia. Case report. Brazilian J Pain. 2018;1(1):87–9.
15. Ślusarz K, Wierzbicki K, Adamczyk-sowa M. Shoulder pain as one of the symptoms of syringomyelia. 2019;9(9):748–61.

O-10

THE EFFECT OF KINESIO TAPPING TO REDUCE PAIN AND OEDEMA IN ANKLE SPRAIN PATIENTS: A CASE STUDY

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Abstract

Introduction: Sprain Ankleis a sports injury condition that causes problems in ligaments, muscles and joints. This condition causes instability in the ankle joint and causes pain and swelling on the injured side. Giving Kinesio Tapping can reduce pain levels, reduce swelling and can also provide stabilization of the ankle joint.

Case Presentation:The patient came with difficulty walking, there was swelling, pain and the skin looked abnormal on the right ankle.

Management and Outcome: In this case, the administration of kinesio tapping with the AET stretching technique of 30%-40% for two weeks with daily administration for 16 hours can reduce the level of pain as measured by a visual analogue scale and can reduce the size of swelling to its normal condition which is measured using a meterline. .

Discussion:Using this technique for two weeks will help in the natural healing process. Proprioception will detect the location of joints and all moving extremities and help them recover to a normal position, in other studies showing that the application of tapping can improve proprioception by stimulating skin mechanoreceptors. The use of tapping is thought to reduce swelling by stimulating the drainage of edema in the interstitial spaces into less dense lymphatic channels

Conclusion: In the cases and data described above, it has been proven that conventional therapy using kinesio tapping the acute eversion tapping technique in patients with ankle sprain injuries is able to reduce pain values measured using a visual analogue scale and the size of edema measured using a meterline.

Keywords: Sprain ankle, Kinesio Tapping, AET, Oedema, Pain

Introduction

Health is one of the main things that must be maintained by humans in this life so that they are still able to carry out all the activities they want, in maintaining human health, they are given many choices, one of which is by exercising. Besides being able to maintain health, exercise can also be a form of achievement, recreation and education, but the risk that often occurs in sports activities is injury[1]. There are various kinds of injuries that can occur during sports, namely fractures to bones, injuries to muscles, injuries to tendons and injuries to ligaments, in 2013 in the United States there were at least 4.3 million emergency department visits for sports injury conditions each year.[2].

Sprain Ankle is a sports injury condition that causes problems in ligaments, muscles and joints. This condition causes instability in the ankle joint and causes pain and swelling on the injured side[3]. There are several kinds of movements that can cause the risk of ankle sprains during exercise, namely the movement of running, jumping and landing. In the condition of people with a history of ankle sprain injuries, it is reported that they can experience reinjury as much as 52.9% of those who have never experienced an ankle sprain injury.[4]. In ankle sprain conditions, there are several symptoms that can arise, especially in acute conditions, namely the patient feels pain, swelling occurs in the lateral side of the ankle, and there is instability in the ankle joint. The most common treatment for patients with acute ankle injuries is the provision of Protect, Rest, Ice, Compression, and Elevation (PRICE). Giving Kinesio Tapping can reduce pain levels, reduce swelling and can also provide stabilization of the ankle joint[5].

Case Presentation

The patient on behalf of the initials Mr. Fz 19 years old with a job as a student came to a physiotherapy clinic in the metro city. The patient came with difficulty walking, there was swelling, and the skin looked abnormal on the right ankle. From the description of the patient there was pain, the patient explained that he had been injured three days ago while doing futsal sports activities, the injury occurred when the patient jumped into the air and then landed with the wrong foot position when treading, the patient landed using the lateral leg of the ankle that was This causes overstretching of the anterior talofibular ligament (ATFL). There are two special examinations given to patients when they come to the physiotherapy clinic, namely using the anterior drawer test to evaluate the integrity of the ATFL which serves to prevent excessive anterior translation of the talus to the tibia. The second special examination is the talar tilt test to evaluate the calcaneofibular ligament which if there is a tear there will be a gap on the lateral side

of the ankle.

Management and Outcome

Management

This study uses kinesio tapping in its intervention which aims to reduce pain and reduce edema on the ankle side after a sprain injury. Giving this intervention for 2 weeks with every day for 16 hours. The kinesio tapping technique given to the patient is Acute Evers Tapping (AET) with a stretch of 30-40%, in its application the AET consists of 4 steps, namely to maintain the posterior glide and increase the ankle dorsi flexion tapping is applied from the talus to the calcaneus on both side, to maintain eversion of the ankle the ankle is opened until it is painful and the tap is placed on the medial calcaneus below the subtalar joint starting 5 cm above the lateral malleolus and facing the medial side of the instep

Outcome

Evaluation of swelling using the number eight method using a meterline, measurements showed that on the healthy side a measurement of 53 cm was obtained, while on the injured side the swelling was measured with a value of 55 cm on the first day of the meeting. At the final measurement, the measurement value was 53cm/53cm after giving the intervention for 2 weeks.

Evaluation of pain using the Visual Analogue Scale (VAS) with initial measurements showed the value of silent pain 0, motion pain 4.3, and tenderness 3.2. At the final measurement, the VAS value was obtained, namely silent pain 0, motion pain 2.1, and tenderness 1.5.

Picture 1 (Kinesio Tapping with AET)

Item	Diam		Gerak		Tekan	
	Pre	Post	Pre	Post	Pre	Post
Nyeri	0	0	4.3	2.1	3.2	2.1

Data primer 1 (nilai pengukuran nyeri menggunakan VAS)

Item	Pre	Post
Kanan	55	53

Kiri	53	53

Data primer 2 (nilai pengukuran oedema menggunakan meterline)

Discussion

In another study, the continuous AET tapping technique was able to reduce pain and swelling and increase ankle stability. The main intervention strategy in the AET tapping technique is to protect the sprained ankle from further injury and avoid inversion that causes pain through mechanical effects of eversion. The kinesiological elasticity of tapping supports movement of the ankle joint without limiting reach[6]When the ankle joint moves, tapping applied to the peripheral skin of the ankle stretches. As the tapping tension increases, the elasticity aimed at returning it to its original length will return the joint to its normal position and speed up the recovery process[7]. The application of the AET tapping technique on the ankle when the ankle is bent will avoid inversion and dorsiflexion which causes pain in the patient, the use of this technique for two weeks will help in the natural healing process. Proprioception will detect the location of joints and all moving extremities and help them recover to their normal position[8], in another study showed that the application of tapping can increase proprioception by stimulating skin mechanoreceptors [9]Application of tapping with a pull of 30% -40% on the skin around the ankle can stimulate the skin mechanoreceptors and activate the proprioceptors of the ankle joint [10]. According to Melzack and Wall, the use of tapping can cause a stretching effect on the skin which will stimulate mechanoreceptors through the gate control theory so that it can reduce pain and increase soft tissue flexibility in the area and reduce muscle spasm.

The use of tapping is thought to reduce swelling by stimulating the drainage of edema in the interstitial spaces into less dense lymphatic channels[11]. In another study the swelling disappeared after two days and one week, respectively. In patients with first- and second-degree ankle sprains, heat therapy increased the size of the ankle swelling after three days of therapy after an ankle sprain, and cold therapy reduced swelling for three, four, and five days after an ankle sprain.[12].

Conclusion

In the cases and data described above, it has been proven that conventional therapy using kinesio tapping, the acute eversion tapping technique in patients with ankle sprain injuries, is able to reduce pain values measured using a visual analogue scale and the size of edema measured using a meterline. However, this research is still far from perfect, so a comparative study is needed in order to compare it with other intervention.

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References

1. Bahruddin, M. (2013). Penanganan Cedera Olahraga pada Atlet (PPLM) dan (UKM) Ikatan Pencak Silat Indonesia dalam Kegiatan Kejurnas Tahun 2013. *Journal Unesa*, *2*, 1–11. Retrieved from http://ejournal.unesa.ac.id/index.php/jurnal-kesehatan-olahraga/issue/view/633

2. Amoako, A., Amoako, A., & Pujalte, G. (2015). Family medicine residents’ perceived level of comfort in treating common sports injuries across residency programs in the United States. *Open Access Journal of Sports Medicine*, 81. https://doi.org/10.2147/oajsm.s71457

3. Fujiya, H., & Goto, K. (2016). New aspects of microcurrent electrical neuromuscular stimulation in sports medicine. *The Journal of Physical Fitness and Sports Medicine*, *5*(1), 69–72. https://doi.org/10.7600/jpfsm.5.69

4. Lee, A. C., & Kuang, P. F. (2016). The Effectiveness of Sports Specific Balance Training Program in Reducing Risk of Ankle Sprain in Basketball. *International Journal of Physiotherapy*, *3*(6), 731–736. https://doi.org/10.15621/ijphy/2016/v3i6/124745

5. Lee, B. G., & Lee, J. H. (2015). Immediate effects of ankle balance taping with kinesiology tape on the dynamic balance of young players with functional ankle instability. *Technology and Health Care*, *23*(3), 333–341. https://doi.org/10.3233/THC-150902

6. Lee, S. M., & Lee, J. H. (2017). The immediate effects of ankle balance taping with kinesiology tape on ankle active range of motion and performance in the Balance Error Scoring System. *Physical Therapy in Sport*, *25*, 99–105. https://doi.org/10.1016/j.ptsp.2016.08.013

7. Lee, B. G., & Lee, J. H. (2015). Immediate effects of ankle balance taping with kinesiology tape on the dynamic balance of young players with functional ankle instability. *Technology and Health Care*, *23*(3), 333–341. https://doi.org/10.3233/THC-150902

8. Callaghan, M. J., Selfe, J., Bagley, P. J., & Oldman, J. A. (1997). Effects of Patellar Taping on Knee Joint Proprioception Resting and Post-exercise Ankle to

Brachial Pressure Index in Untrained Subjects , Trained Cyclists and Trained Cyclists Complaining of Exercise-induced Leg Pain. *Physiotherapy*, 1997–1997.

9. Chang, H. Y., Chou, K. Y., Lin, J. J., Lin, C. F., & Wang, C. H. (2010). Immediate effect of forearm Kinesio taping on maximal grip strength and force sense in healthy collegiate athletes. *Physical Therapy in Sport*, *11*(4), 122–127. https://doi.org/10.1016/j.ptsp.2010.06.007

10. Chang, H. Y., Chou, K. Y., Lin, J. J., Lin, C. F., & Wang, C. H. (2010). Immediate effect of forearm Kinesio taping on maximal grip strength and force sense in healthy collegiate athletes. *Physical Therapy in Sport*, *11*(4), 122–127. https://doi.org/10.1016/j.ptsp.2010.06.007

11. Analauw, I., Mogi, T., & Damopolii, C. (2018). Efektifitas Kinesio Taping Terhadap Nyeri dan Performa Fungsional Pada Nyeri Punggung Bawah Mekanik. *Jurnal Medik Dan Rehabilitasi*, *1*, 1.

12. Ristow, O., Pautke, C., Kehl, V., Koerdt, S., Schwärzler, K., Hahnefeld, L., & Hohlweg-Majert, B. (2014). Influence of kinesiologic tape on postoperative swelling, pain and trismus after zygomatico-orbital fractures. *Journal of Cranio-Maxillofacial Surgery*, *42*(5), 469–476. https://doi.org/10.1016/j.jcms.2013.05.043

13. Cote, D. J., Prentice, W. E., Hooker, D. N., & Shields, E. W. (1988). Comparison of three treatment procedures for minimizing ankle sprain swelling. *Physical Therapy*, *68*(7), 1072–1076. https://doi.org/10.1093/ptj/68.7.1072

O-

EFFECT OF EARLY MOBILIZATION IN PEDIATRIC PATIENT AFTER ATRIAL SEPTAL DEFECT CLOSURE: A CASE STUDY

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Abstract

Introduction: Congenital Heart Disease (CHD) is a congenital disease since the child was born due to the formation of a less than perfect heart. Atrial Septal Defect (ASD) is one of the common CHD. ASD occurs because the partition separating the right and left atriums is damaged, which causes blood rich in oxygen and carbon dioxide mixed. Valve repair surgery in ASD is recomendation and safe treatment procedure with low mortality rate. Bed rest after surgery can lead to prolonged immobilization according to the recovery period of each individual. The usual treatment for physiotherapy is early mobilization to reduce the disorder.

Case Presentation: A 6-year-old child was referred to RSUP Semarang with complaints of discomfort and dyspnea during activities. In December 2019 the family took the child to one of the doctors in Salatiga, and the doctor diagnosed that the child had congenital heart disease and was advised to have an examination. The results of catheterization and echocardio examination showed that the child had ASD II.

Management and Outcome: Treatments provided such as mobility in bed, range of motion (ROM) exercises, transfers, ambulation and walking exercises. The measuring instrument used is 6 Minute Walk Test (6MWT) which is done when the patient is able to walk and use how long the patient stays in the hospital.

Discussion: Early mobilization following surgery in Intensive Care Unit (ICU) is effective to prevent the risk of bed rest and prolonged stay in ICU as well as prevent deep vein thrombosis, pneumonia, preasure ulcers (decubitus) and can improve functional mobility. An important element for the recovery of patients post-cardiac surgery, is not the type of early mobilization but rather interventions that start from the best time according to the patient's condition to prevent the harmful effects of a long bed rest.

Conclusion : Early mobilization given postoperatively can prevent the risk of worsening due to long bed rest, long stay in the hospital and can improve functional mobility. Early mobilization and breathing exercise can produce positive effects for patients post cardiac surgery.

Keyword: Atrial Septal Defect, early mobilization, physiotherapy, breathing exercise, 6MWT

Introduction

Congenital Heart Disease (CHD) is a congenital disease since the child was born due to the formation of a less than perfect heart. CHD has 2 types: cyanotic and asyanotic. Atrial Septal Defect (ASD) is one of the most common asyanotic CHD [(1)]. ASD is a congenital heart disease that allows blood flow between the two parts of the heart, the right atrium and the left atrium to be mixed. Usually the right atrium and the left atrium are separated by a partition called the interatrial septum. If the septum is damaged or does not exist, then the blood rich Oxygen and Carbon Dioxide will be mixed. ASD is one of common congenital cardiac defects and 6-10% of all congenital cardiac defects [(2)].

Valve repair surgery on ASD is a recomendation and safe treatment procedure with low mortality rate[(3)]. However, the risk factor of bed rest after surgery remains. Prolonged bed rest is a well-established contributor to postoperative complications. Bed rest after surgery contributes to dysfunction of multiple organ systems. Immobility impairs oxygen transport including lung and tissue oxygenation; increases risk of deep vein thrombosis and pulmonary thromboembolism; and contributes to loss of muscle mass and strength [(4), (5)].

Systemic complications that occur in postoperatively can increase the duration of ventilation and sedation mechanisms and can lead to muscle weakness, leading to a long period of treatment in the ICU and decreased mobility. The other effects that can occurs is immobility can lead to decreased protein synthesis, increased proteolysis, and lead to loss of muscle mass and strength, then resulting in decreased ability perform activity daily living is known that the possible consequences of immobility can persist for months or even years after treatment, can prevent the patient from returning fully their activity daily living, as well as may increase the risk of entering the hospital back. Therefore, additional treatment are required after cardiac surgery[(6)]. The physiotherapy treatment is early mobilization and breathing exercise to reduce the disorder[(5)]. In addition, education is provided before surgery.

Early mobilization after surgery has many benefits including increased ventilation, muscle strength and increased functional capacity[(7)]. Treatments provided such as mobility in bed, range of motion (ROM) exercises, transfers, ambulation and walking exercises[(8)]. Measurements taken to determine functional capabilities are 6 Minute Walk Test .

Case Presentation

A 6-year-old child was referred to RSUP Semarang with complaints of discomfort and

dyspnea during activities. In December 2019 the family took the child to one of the doctors in Salatiga, and the doctor diagnosed that the child had congenital heart disease and was advised to have an examination.

The first examination was conducted cardiac catheterization to detect heart conditions with the result that the child had Atrial Septal Defect II. Then a second examination was conducted with echocardiography and the results were obtained that the patient was diagnosed with ASD sekundum with mild mitral regurgitation.

Physical examination obtained anthropometry status, weight 17 kg, height 114 cm, composmentic consciousness, Blood pressure 110/65 mmHg, pulse frequency 110 x / min, breath frequency 20 x / minute, oxygen saturation 98-99 %. Length stay patient in hospital from 07 March 2021 until 15 March 2021 and have operation treatment on 09 March 2021.

Management and Outcome

Physiotherapy begins before surgery or pre-operation treatment where an explanation of the treatment will be given after surgery including breathing exercise and coughing[(9)]. Treatment is given at H+1 after surgery with a record of the patient's condition is stable (postoperative patients are at ICCU)[(10)]. There is no standard treatment or guidelines for patients treated in the ICU. According to Vural et al, chest physiotherapy and pulmonary exercise, ROM exercises, positioning and sitting can be administered immediately to patients in the ICU when the hemodynamic state is stable[(10),(11)].

Table 1 ***treatment goal and physiotherapy plan*** [(12),(13),(14),(15),(16)]

Goal	***Plan***
Clear of exess pulmonary secretion	• Coughing • Cupping
Provide ventilator support	• Breathing exercise Pursed lip breathing
Prevent complication from bed rest	• Passive limb movement • Active assisted limb movement • Active limb movement (active ROM)
Increased functional capacity (functional mobility)	• Gradual mobilization ➢ Right side lying ➢ Left side lying ➢ Sitting with leaning on bed ➢ Sitting on the edge of the bed ➢ Sit to stand ➢ Walking

Table 2 physiotherapy treatment each day pre-operative to post operative

	physiotherapy treatment
Pre-operative	Education to patient and family about effect of surgery and treatment after operation. Education how to breathing for less the pain
Post operative day 1	Passive exercise all of the limb and transfer side lying to left and right Chest physiotherapy (cupping for clear of exess pulmonary secretion) Sitting with head up at less 30^{O}
Post operative day 2	Passive exercise or active assisted exercise for all limb and transfer ambulation Pursed lip breathing Chest physiotherapy Sitting with head up more than 60^{O}
Post operative day 3	Active exercise Pursed lip breathing Chest physiotherapy (if the patient have secret) Sitting out of bed with support
Post operative day 4	Active exercise Pursed lip breathing Sitting out of bed Sitting to stand
Post operative day 5	Active exercise Pursed lip breathing Walk while holding on to something
Post operative day 6	Active exercise Pursed lip breathing Walk alone
Post operative day 7	Active exercise Pursed lip breathing 6 Minute Walk Test for measuring functional ability before discharge form hospital

Treatment given twice a day in the morning and evening with therapist and family. Before doing treatment therapist must check the vital sign of patient. The measuring instrument used is 6MWT[(17),(18)] which is done when the patient is able to walk and use how long the patient stays in the hospital[(7)].

Results

A total of 7 postoperative sessions and 1 preoperative treatment physiotherapy session conducted on H+1 postoperative up to H+7 patients have been allowed home. Treatment is given in the morning with a physiotherapist and in the afternoon with the family for limb movement (twice a day) and every 2 hours changing position to side lying left or right.

6MWT is performed when the patient is able to walk without interruption. Obtained results of 180 meters where the normal value according to Oliveira et al, explained that if the mileage of 6MWT in patients to be performed heart surgery ≥ 300 meters. The result in patients who have

performed heart surgery is ±280 meters where the postoperative heart decreases by 1/2 from before surgery and will slowly increase[17],[18].

Discussion

Based on the treatment obtained results that early mobilization has benefits for patient after cardiac surgery compared to total bed rest as in the study Ramos et al[6]. So that the patient can immediately experience an increase in functional activity. However, there is no definite basis for how long the treatment is administered (the right dose)[19].

Zang et al, found that early mobilization of bed rest in ICU is effective to prevent the risk of worsening and long stay in the ICU as well as prevent deep vein thrombosis, pneumonia, press pain (decubitus) and can improve functional mobility[20]. Zhang et al, reviewing the effects of early mobilization on patients with ventilators found that early mobilization may shorten the duration of ventilator use[21].

Early mobilization contribute to decrease oxidative stress and inflammation. Moderate exercise in limb can increase protein that can against oxidative stress that can make maintaining muscle mass in the critically ill condition[22]. Breathing exercises are a common treatment given at the beginning of the early mobilization protocol. Anaesthesi, types of surgery, surgical trauma and existing health problems play a role in decreased lung volume, decreased cough activity and respiratory muscle fatigue. Changes in lung function above can cause complications as well as atelectasis, which are generally given treatment and prevention with various techniques chest physiotherapy[20].

An important element for the recovery of patients post-cardiac surgery according to Herkner et al, is not the type of early mobilization but rather interventions that start at the best time according to the patient's condition to prevent the harmful effects of a long bed rest[23].In pediatric patients J for H+1 is transferred and breathing due to fever, for the next day the patient is given general ROM exercise, transfer (right tilt, left tilt, sitting leaning, sitting on the edge of the bed with legs swing and standing exercises) as well as ambulation and walking exercises performed gradually.

Length stay at hospital at Almashrafi et al, 30.5% patient stay at hospital ≥11 days after surgery, while 17% experienced prolonged ICU length of stay (≥5 days). The factors associated patient stay long in hospital such as body mass index, the type of surgery, cardiopulmonary bypass machine use, packed red blood cells use, non-elective surgery and number of complications[24]. 6MWT result in patients who have performed heart surgery is ±280 meters where the postoperative heart decreases by 1/2 from before surgery and will slowly increase.

Conclusion

Early mobilization given post operative can prevent the risk of worsening due to bed rest, long stay in the hospital and can improve functional mobility. Early mobilization and breathing exercise can

produce positive effects for patients post cardiac surgery. Early mobilization in the patients with ventilators may shorten the duration of use the ventilator.

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References

1. Asmayadi LA. Assessment of Tricuspid Function Atrial Septal Defect (ASD) in Patient with Echocardiography. ARKAVI Arsip Kardio Vaskular Indones. 2018;3(2):2009–11.
2. Adiele D, Arodiwe I, Chinawa J, Eze J, Gouthami V, Murthy K, et al. Atrial septal defects: Pattern, clinical profile, surgical techniques and outcome at Innova heart hospital: A 4-year review. Niger Med J. 2014;55(2):126.
3. Fraisse A, Latchman M, Sharma SR, Bayburt S, Amedro P, Di Salvo G, et al. Atrial septal defect closure: Indications and contra-indications. J Thorac Dis. 2018;10(5):S2874–81.
4. Perme CS, Southard RE, Joyce DL, Noon GP, Loebe M. Early mobilization of LVAD recipients: Who require prolonged mechanical ventilation. Texas Hear Inst J. 2006;33(2):130–3.
5. Jolley SE, Bunnell AE, Hough CL. ICU-Acquired Weakness. Chest [Internet]. 2016;150(5):1129–40. Available from: http://dx.doi.org/10.1016/j.chest.2016.03.045
6. Ramos dos Santos PM, Aquaroni Ricci N, Aparecida Bordignon Suster, de Moraes Paisani D, Dias Chiavegato L. Effects of early mobilisation in patients after cardiac surgery: a systematic review. Physiother (United Kingdom) [Internet]. 2017;103(1):1–12. Available from: http://dx.doi.org/10.1016/j.physio.2016.08.003
7. Herdy AH, Marcchi PLB, Vila A, Tavares C, Collaço J, Niebauer J, et al. Pre- and postoperative cardiopulmonary rehabilitation in hospitalized patients undergoing coronary artery bypass surgery a randomized controlled trial. Am J Phys Med Rehabil. 2008;87(9):714–9.
8. Dale M. N. Mobilizing patients in the intensive care unit: Improving neuromuscular weakness and physical function. JAMA - J Am Med Assoc. 2008;300(14):1685–90.
9. Krastins I, Corey ML, McLeod A, Edmonds J, Levison H, Moes F. An evaluation of incentive spirometry in the management of pulmonary complications after cardiac surgery in a pediatric population. Vol. 10, Critical care medicine. 1982. p. 525–8.
10. Felcar JM, Guitti JC dos S, Marson AC, Cardoso JR. Preoperative physiotherapy in prevention of pulmonary complications in pediatric cardiac surgery. Rev Bras Cir Cardiovasc [Internet]. 2008;23(3):383–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19082328
11. Vural KM. Ventricular assist device applications. Anadolu Kardiyol Derg. 2008;8 Suppl 2:117–30.
12. Senduran M, Malkoc M, Oto O. Physical Therapy in the Intensive Care Unit in a Patient With Biventricular Assist Device. Cardiopulm Phys Ther J. 2011;22(3):31–4.
13. Zanini M, Nery RM, De Lima JB, Buhler RP, Da Silveira AD, Stein R. Effects of Different Rehabilitation Protocols in Inpatient Cardiac Rehabilitation after Coronary Artery Bypass Graft Surgery: A RANDOMIZED CLINICAL TRIAL. J Cardiopulm Rehabil Prev. 2019;39(6):E19–25.
14. Hirschhorn AD, Richards D, Mungovan SF, Morris NR, Adams L. Supervised Moderate Intensity Exercise Improves Distance Walked at Hospital Discharge Following Coronary Artery Bypass Graft Surgery-A Randomised Controlled Trial.

Hear Lung Circ. 2008;17(2):129–38.

15. Haseba S, Sakakima H, Nakao S, Ohira M, Yanagi S, Imoto Y, et al. Early postoperative physical therapy for improving short-term gross motor outcome in infants with cyanotic and acyanotic congenital heart disease. Disabil Rehabil [Internet]. 2018;40(14):1694–701. Available from: http://dx.doi.org/10.1080/09638288.2017.1309582

16. Overend TJ, Anderson CM, Jackson J, Lucy SD, Prendergast M, Sinclair S. Physical therapy management for adult patients undergoing cardiac surgery: A canadian practice survey. Physiother Canada. 2010;62(3):215–21.

17. Fiorina C, Vizzardi E, Lorusso R, Maggio M, De Cicco G, Nodari S, et al. The 6-min walking test early after cardiac surgery. Reference values and the effects of rehabilitation programme. Eur J Cardio-thoracic Surg. 2007;32(5):724–9.

18. Oliveira GU, Carvalho VO, de Assis Cacau LP, de Araújo Filho AA, de Cerqueira Neto ML, da Silva Junior WM, et al. Determinants of distance walked during the six-minute walk test in patients undergoing cardiac surgery at hospital discharge. J Cardiothorac Surg. 2014;9(1):1–6.

19. Herkner H, Thoennissen J, Nikfardjam M, Koreny M, Laggner AN, Müllner M. Short versus prolonged bed rest after uncomplicated acute myocardial infarction: A systematic review and meta-analysis. J Clin Epidemiol. 2003;56(8):775–81.

20. Zang K, Chen B, Wang M, Chen D, Hui L, Guo S, et al. The effect of early mobilization in critically ill patients: A meta-analysis. Nurs Crit Care. 2020;25(6):360–7.

21. Zhang L, Hu W, Cai Z, Liu J, Wu J, Deng Y, et al. Early mobilization of critically ill patients in the intensive care unit: A systematic review and meta-analysis. PLoS One. 2019;14(10):1–16.

22. Koukourikos K, Kourkouta L, Iliadis C, Diamantidou V, Krepia V, Tsaloglidou A. Early Mobilization of Intensive Care Unit ((ICU) Patients. Int J Caring Sci. 2020;13(3):2269–77.

23. da Costa Torres D, dos Santos PMR, Reis HJL, Paisani DM, Chiavegato LD. Effectiveness of an early mobilization program on functional capacity after coronary artery bypass surgery: A randomized controlled trial protocol. SAGE Open Med. 2016;4:205031211668225.

24. Almashrafi A, Alsabti H, Mukaddirov M, Balan B, Aylin P. Factors associated with prolonged length of stay following cardiac surgery in a major referral hospital in Oman: A retrospective observational study. BMJ Open. 2016;6(6):1–8.

O-10

PHYSIOTHERAPY MANAGEMENT FOR PATELLAR SUBLUXATION/DISLOCATION: A CASE STUDY

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Abstract

Introduction*:* This patellar dislocations have been documented up to 43/100,000 and are more common in women than men. There are many other factors as well that can cause a patellar dislocation involving the hip, knee and ankle.
Case Presentation*:* Patients describe the pain that is felt intensity up to 7 of 10 on a Numeric Rating Scale (NRS) scale accompanied by a leg that is unable to bend or straightened. Before coming to physiotherapy, the patient never been treated anywhere except for taking pain relieve. The patient also belongs to the obese category with a BMI value of 31.25 (weight 85kg and height 165cm), the weight factor is also one of the triggered. From the examination carried out with the patient in the supine position and then on palpation it found that there was tenderness, motion pain, local temperature and limitation of motion in the the patient's right knee, the presence of tightness in the knee stabilizer muscles. Active and passive range of motion of the patient's knee joint range of motion is only 0^o-20^o-35^o measured with a Goniometer. Anthropometry is used to measure the swelling, the ratio between the right and left sides.
Management and Outcome: This case study it can be concluded that icing, isometric exercise on the quadriceps and hamstrings, and mobilization can reduce pain levels in patients. Stretching and strengthening of the stabilizing muscles of the knee joint coupled with pelvic mobility and walking exercises are able to return the patient's functional activities to normal.
Discussion*:* Some of the training methods provided are considered to provide significant results for patients. From the evaluation results, it was found that there was a decrease in pain as reported by the patient, an increase in ROM in the knee joint, and an improvement in functional activity from the analysis of scores on the womac index.
Conclusion*:* Six therapy sessions applied in this case showed significant results in patients with patellar subluxation/dislocation.
Keyword: *Isometric exercise, physiotherapy, patellar dislocation, stretching, strengthening, injury.*

Introduction

Patellar subluxation or dislocation can occur repeatedly, because of daily functional activities or during exercise. This patellar dislocations have been documented up to 43/100,000 and more common in women than men. There are many other factors as well that can cause a patellar dislocation involving the hip, knee and ankle. The position of patellar moving laterally may be indicated because of weakness in the Vastus Medialis Oblique (VMO) and adductor muscles, tightness in the iliotibial band and imbalance in the vastus lateralis. High Body Mass Index (BMI) is one of the most common triggers of patellar dislocation.

Case Presentation

A 25 year old woman comes to the Ibest physiotherapy clinic using 2 crutches. With complaints of pain in the right knee and swelling of the knee. And then patient tell the chronology of the incident, about 3 weeks ago the patient fell or slipped while getting out of the bathroom. Patients describe the pain that is felt to have an intensity 7 of 10 on a Numeric Rating Scale (NRS) scale accompanied by a leg that is unable to bend or straightened. Before coming to physiotherapy, the patient never been treated anywhere except for taking pain relieve. The patient also belongs to the obese category with a BMI value of 31.25 (weight 85kg and height 165cm), most likely the weight factor is also one of the triggered. And patient familys not the same history as the patient. The patient is able to tell in a coherent chronological of the events his experienced, the environmental factors of the house such as slippery floors and rooms with poor lighting are one of the causes of this incident. But the patient is very active and enthusiastic while undergoing a therapy session, the patient also carries out the education given by the therapist exercise at home so that the therapeutic results obtained are also maximal.

Table 1. General Examination

Examination type	Examination Results
1. Palpation	Tighness M. vastus Medial Oblique, Illiotibialband, gluteus and Illiopsoas
2. Knee ROM dextra (goniometer)	S (0°-20°-35°)

3. Pain (NRS)	Static pain: 7 Tenderness Pain: 7 Motion pain: 7
4. Functional (WOMAC Index)	80% (severe category)

Table 2. Specific Knee JointExamination

Test Specific	**Results**
Anterior Drawer Test	-
Posterior Drawer Test	-
Pivot Test	-
Mc Murray	-
Hyperextension	-
Gravitysign	-
Lachman Test	-
Appley Test	-
Ballotement Test	+
Knee Varus Test	-
Knee Valgus Test	+
Patella Compression	+

From the examination with the patient in the supine position and then on palpation be discovered tenderness, motion pain, local temperature and limitation of motion in the the patient's right knee, the presence of tightness in the knee stabilizer muscles. Active and passive range of motion of the patient's knee joint range of motion is only 0^{o}-20^{o}-35^{o} measured with a Goniometer. Anthropometry is used to measure the swelling, the ratio between the right and left sides. Subluxation/dislocation of the patellar also greatly affects the patient's functional activities.

The patient can't squat for too long such as when going to defecate or other daily activities. So that the therapist measures the limitations and dependence of the patient's functional activities with the Womac Index as a reference for assessment. From the calculation of this observation, 80% of the results were obtained, which means that the patient is categorized as having limitations and severe dependence on functional activities. Then the therapist also a specific examination done at the third meeting when the swelling had started to decrease. To support the results of the diagnosis, spesific test with positive (+) results; Knee Valgus Test, Ballotement test and Patella Compression.

Management and Outcome

Table 3. Treatment for Patellar Dislocation Cases

Therapy Sessions	Treatment
Therapy 1 & 2 (Week 1)	Icing, Isometric Exercise and Mobilization With Movement.
Therapy 3 & 4 (Week 2)	Isometric Exercise, Hamstring Stretching, Hamstring Curls, Mobilization With Movement, Pelvic Mobility Exercise, Squat,
Therapy 5 & 6 (Week 3)	Isometric Exercise, Hamstring Stretching, Hamstring Curls, Mobilization With Movement, Pelvic Mobility Exercise, Squats, Walking Exercises.

Patients are scheduled to eight therapy sessions with a duration of twice per week. However, the therapy session was stopped at the sixth meeting when the patient was required to rest by the obstetrician because of the young pregnancy and the condition of the fetus which was still prone to strenuous activities. The patient underwent therapy consisting of icing, isometric quadriceps and hamstring exercise and mobilization at the first and second meetings. The third and fourth meetings or the second week, the therapist gave the same type of exercise in the first week with additional hamstring stretching, hamstring strengthening (using the eccentric type of hamstring curls method and prone lying position), pelvic mobility exercises, squats, and walking exercises.

And then at the fifth and sixth meetings or the third week the icing isn't given, the practice is still the same with second week. In the first week at the second appointment, the patient to walk with one crutch but the knee still swollen and pain. At the fifth meeting the patient reported that the pain completely gone but the knee still swollen and feel hot. The sixth appointment, the patient to walk without crutches. But the results obtained don't maximal, if the patient passes the therapist session, the hamstring muscles still seem a little re-concentric.

Isometric exercise are given to decrease on pain and swollen, increase strength of the hamstring and quadriceps muscle as knee joint stability. Hamstring curls exercise, squats to strengthening for hamstring muscle and leg . And walking exercise for normally functional activity. All the result from examination can be see at Result of Evaluation (table 4).

Discussion

This study case a problem experienced by a patient, that is patellar subluxation/dislocation. Some of the exercise methods provided are considered to provide significant results for the patient. From the evaluation results, it was found that there was a decrease in pain as reported by the patient, increase ROM in the knee joint, and improvement in functional activity from the analysis of scores on the womac index.

Table 4. Results of Evaluation

Examination	Therapy 0 (Initial)	Therapy 6 (Final)
Pain (NRS)	Static Pain: 7 Tenderness Pain : 7 Motion Pain:7:	Static Pain: 0 Tenderness Pain: 0 Motion Pain: 0
ROM (Goniometer)	S (0^o-20^o-35^o)	S (0^o-5^o-110^o)
Functional (WOMAC Index)	80% (severe category)	20% (mild category)

Conclusion

From this case study it can be concluded that icing, isometric exercise the quadriceps and hamstrings, and mobilization can reduce pain levels in patients. Stretching and strengthening of the stabilizing muscles of the knee joint coupled with pelvic mobility and walking exercises to return

the patient's functional activities to normal.

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References

1. Anzari N. An intervention study on the effectiveness of isometric quadriceps hamstrings exercise in the treatment of osteoarthritis, knee joint. International Journal of Orthopedic Sciences. 2018; 4(2): 1010-1014

2. Alghadir AH, Anwer S, Iqbal A, Iqbal ZA. Test–retest reliability, validity, and minimum detectable change of visual analog, numerical rating, and verbal rating scales for measurement of osteoarthritic knee pain. Journal of Pain Research. 2018:11 851-856

3. Alkhaface HA and Alshami AM. The effect of mobilization with movement on pain and function in patients with knee osteoarthritis: a randomized double-blind controlled trial. BMC Musculoskeletal Disorders. 2019. 20:452

4. Ayala A, Bilbao A, Perez SG, Escobar A, Forjaz MJ. Scale invariance and longitudinal stability of the Physical Functioning Western Ontario and MacMaster Universities Osteoarthritis Index using the Rasch model. Rheumatology International. 2017. https://doi.org/10.1007/s00296-017-3901-4

5. Espi-Lopez GV, Arnal-Gomez A, Balasch-Bernat M, Ingles M. Effectiveness of manual therapy combined with physical therapy in the treatment of patellofemoral pain syndrome: a systematic review. J Chiropr Med. 2017;16(2):139–46 https://doi.org/10.1016/j.jcm.2016.10.003.

6. Grimm NL, Levy BJ, Jimenez AE, Crepeau AE, Pace JL. Traumatic Patellar Dislocations in Childhood and Adolescents. Orthop Clin N Am 51. 2020 : 481–491

7. Hsu WH, Fan CH, Yu PA, Chen CL, Kuo LT and Wei Hsu RW. Effect of high body mass index on knee muscle strength and function after anterior cruciate ligament reconstruction using hamstring tendon autografts. BMC Musculoskeletal Disorders. 2018. 19:363

8. Jaquith BP, Parikh SN. Predictors of recurrent patellar instability in children and adolescents after first-time dislocation. J Pediatr Orthop 2017;37(7):484–90

9. Kangeswari P, Murali K and Arulappan J. Effectiveness of Isometric Exercise and Counseling on Level of Pain Among Patients With Knee Osteoarthritis. Sagepub. 2021. DOI: 10.1177/2377960821993515

10. Malanga GA. Patellar Injury and Dislocation. Medscape. 2017. https://references.medscape.com/article/90068-print

11. Sanders TL, Pareek A, Hewett TE, Stuart MJ, Dahm DL and Krych AJ. Incidence of First Time Lateral Patellar Dislocation: A 21-Year Population-Based Study. Department of Orthopedic Surgery. 2017. DOI: 10.1177/1941738117725055

12. Sanders TL, Pareek A, Johnson NR, et al. Patellofemoral arthritis after lateral patellar dislocation: a matched population-based analysis. Am J Sports Med. 2017;45(5):1012–7

13. Scafoglieri A, Broeck JV, Willems S, et al. Effectiveness of local exercise therapy versus spinal manual therapy in patients with patellofemoral pain syndrome: medium term follow up results of a randomized controlled trial. BMC Musculoskeletal Disorders. 2021. 22:446

14. Smith BE, Selfe J, Thacker D, Hendrick P, Bateman M, Moffatt F, et al. Incidence and prevalence of patellofemoral pain: a systematic review andmeta-analysis. PLoS One.2018;13:e0190892.

15. Ye Q, Yu T, Wu Y, et al. Patellar instability: the reliability of magnetic resonance imaging measurement parameters. BMC Musculoskeletal Disorders. 2019;20(1):317

COMPREHENSIVENESS OF PHYSIOTHERAPY INTERVENTION TO PREVENT FALL IN DIABETIC NEUROPATHY PATIENT AT Dr . H ARJONO S PONOROGO HOSPITAL : A CASE REPORT

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Abstract

Introduction*: Diabetic Neuropathy* has a negative impact on leg and ankle function (Strength and flexibility) which in itself affect the patients's physical activity and quality of life. Physiotherapy protocols aimed at increasing intrinsic and extrinsic leg muscle strenght maybe a promosing approach to improve lower extremity function , prevent further complications and improve the patient's activities of dayli living..

Case Presentation*:* A 65-years old patients with diagnosis of *Diabetic N europathy* ,came to the Medical Rehabilitation Installation at RSUD Dr Hardjono Ponorogo with complains of burning sensation,tingling and numbness in both leg. Genu varus was seen in both legs,decreased right leg muscle strength,sensory los on feeling of touch,pain and temperature in both legs from the toes to the lower border of the knee.

Management and Outcome: Aerobic Exercise, flexibility exercise, strengthening and balance exercise as well as gait training are given to patient with Diabetic Neuropathy. Exercise is given 3 times a week for 4 week. The measuring instrument uses Time Up And Go Test where it is reported that after undergoing comprehensive exercise therapy there is decreased in the TUG score from a score 22 second to score 19 second which means there is an increase in the patients static and dinamic's balance.

Discussion*:* **A**nkle exercises theraphy has also shown good results for improving ankle Range Of Motion and Diabetic Neuropathy symptoms as well as for redistributing plantar pressure during movement. Interventions in the form of strengthening, stretching, balance and gait training are very useful in preventing foot ulcers and amputations, reducing the risk of falls, increasing daily physical activity and quality of life, all of which can be beneficial in reducing mortality and comorbidities..

Conclusion*:* Combining Exercise therapy in the form of aerobic exercise, flexibility exercise, strengthening and balance exercise for the lower limbs, and gait training is beneficial in increasing muscle strength, balance and gait so that it can reduce the risk off falling in diabetic neuropathy patient..

Keyword: *Diabetic Neuropathy , Physiotherapy , Exercise therapy , the risk of falling*

Introduction

Diabetes mellitus is a chronic metabolic disease characterized by increased levels of glucose in the blood due to relative insulin deficiency or insulin resistance or both. Risk factors for Diabetes Mellitus include aging, unhealthy eating patterns, obesity and a sedentary lifestyle. Diabetes Mellitus is one of the threats to humans in the century, is also a major cause of complex disease, increased risk of medical comorbidities such as fatigue, weight loss, limitation of motion, decreased muscle strength, and increased risk of falls . Peripheral neuropathy is caused by abnormalities in the capillaries that cause nerve damage. Chronic hyperglycemia impairs microvascular circulation by interfering with normal cell communication and initiating signaling cascades. Chronic hyperglycemia can cause nerve damage through the production of advanced glycation end products and protein kinase C signaling cascades. In particular, it causes thickening of axon and reduced capillary blood flow, leading to nerve perfusion and hypoxia in the endoneurium. Disturbance at the cellular level is manifested as loss of reflex. In addition, because of decrease in nerve conduction velocity, diabetic neuropathy patients usually have a delayed reflex response to postural disturbances, and are subsequently more likely to exhibit impaired balance and an increased risk of falling. *Diabetic neuropathy* is a complication of Diabetes Mellitus experienced by more than 50% -70% of all patients with diabetes. Where this conditions can result in decreased sensory, proprioceptive, reflexes and strength in the lower limbs .Many disorders of the feet and lower legs caused by *Diabetic Neuropathy* such as deformity of the feet, muscle weakness, decreased ROM, tissue stiffness of connective tissue, poor balance and coordination. Various kinds of complaints in the legs and lower legs of people with *Diabetic Neuropathy* will increase the risk of falling. These disorder can be prevented or remedied by the intervention of all kinds of physiotherapy including by exercise therapy.

Case Presentation

Tn . IM age 65 reported having diabetes for the last 4 years. In the last 5 months, the patient said that the feet discomfort in both feet to the soles of the feet. Complains in the form of pain, burning sensation, tingling and numbness in the sole of the feet.The patient feels tired when walking a long distance and fell almost falling. So far the patient has only taken oral drug, etc glikuidon, meloxicam and ranitidine. Finally the patient was referred to the medical rehabilitation installation rsud dr harjono to undergo a physiotherapy program. On examination, it was seen that there was genu varus in both knees, for muscle strengh, there was decrease in muscle strength in the right leg.

In the sensory system there is decrease in the sense of touch,pain an temperature in both legs from the toes to the lower limit of the knee.In the Time Up and Go test, a score of 22 second was obtained, which means that the patient needs external help and further examination and intervention is necessary.

Timed Up And Go Instruction

1.The patient should sit on standart armchair,placing his back against the chair and resting his arms chair's arms.Any assistive device used for walking should be nearby.
2. Regular footwear and customary walking aids should be used
3. The patient should walk to a line that is 3 meters (9,8 feet) away,turn around at the line,walk back to the chair,and sit down
4. The test ends when patient's buttocks touch the seat
5. Patient should be instructed to use a comfortable and safe walking speed.
6. A Stopwatch should be used to time the test (in second)

Set Up

1. Measure and mark 3 meter (9,8 feet) walkway
2. Pleace a standard height chair (seat hight 46 cm, arm height 67 cm) at the beginning of the walkway.

Performance is assessed based on total time required to carry out the task

Time	Intrepretation
<10 second	Normal mobility
11-20 second	Within normal limits
>20 second	Needs outside help and suggest further examination and intervention
>30 second	Vulnerable fall

Management and Outcome

The patient underwent a physiotherapy program 3 times a week for 4 weeks. The physiotherapy program focused on exercise therapy in the form of:

1. Aerobic Exercise

   Aerobic exercise is carried out for at least 30 minutes every day, done 3-5 times in 1 week. Patients need to do physical activity for 10 minutes after eating. Types of aerobic exercise include:

   a. Treadmill workout
   b. Cycling or using static cycle
   c. Participate in low impact exercise

d. Swim or do exercises in water

2. Flexibility Exercise

a. Calf Muscle Stretching Exercises

Picture

Feet are placed front and back. Where the rear leg ends slightly pointing inward. The knee of the front leg is slightly bent with the heel of the back foot flat on the floor. A stretch is felt in the Calf muscles. The movement is held for 10-20 seconds per leg with 3 repetitions per leg

b. Hamstring muscle stretch

Picture

Sit on a chair, one leg straight with a position pointing up. the opposite knee is bent with the feet flat on the floor. The chest is centered on the straight leg and the back is slowly straightened until you feel the stretching of the back leg. The movement is held for 15-20 seconds, 3 repetitions each leg.

c. Plantar fascia stretch

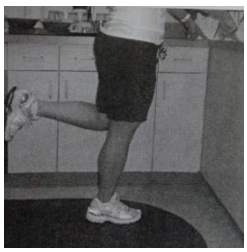
Picture

Lean against a wall with palm s facing thee wall, kness of pain straightened.. Bend the other knee forward. Both feet are kept flat on the ground. Make sure the heel and calf of the sure foot feel the stretch. The movement is held for 15-20 seconds, performed 3

repetitions.

3. Strengthening Exercises
   a. Counter Calf Raises

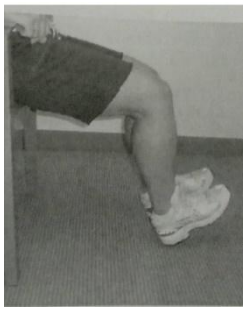
      Picture



      Standing position beside the table, both fingertips are placed on the table. Standing on one foot lifting the heel of the floor,standing on the toes. . Slowly lower the body and repeat. Once on the toes,slowly lower the foot. Repeat 10-15 times, 2 reps each leg.

   b. Dorsi flexion while sitting

      Picture



      Sit on a chair, feet flat on the ground. Gradually raise your toes and ankles as high as possible.Allow the land to be lowered. for maximum results, the feet are positioned close to the body. Repeat 10-15 times, 3 repetitions.

4. Balance training
   a. Hip flexion exercise

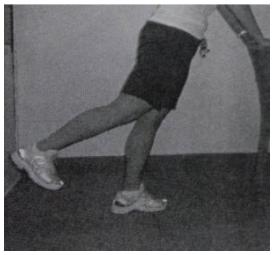
      Picture

      Holds a chair or table with one hand, then another finger without hands. Slowly bend the

knees, one knee is directed to the chest, without bending the waist or hips. Hold the position for 5-10 seconds. Slowly lower the legs down. Repeat 2 times on each leg.

b. Hip extension exercises

Picture



One hands holds a chair or table, then one fingertip, then one fingertip,then without the handle,Standing 12-18 inches from a table or chair. Bend at the hips, holding a chair or table. Slowly lift one leg straight back. Hold position for 10-15 counts. Slowly lower your leg and switch to the other leg.

c. Side leg raise

Picture

Standing position beside the chair with one hand holding the chair, legs slightly spread apart. Lift one leg to the side 6-12 inches slowly. Alternate with the other leg. Each movement is held for 5-10 seconds. Repeat 2 times.

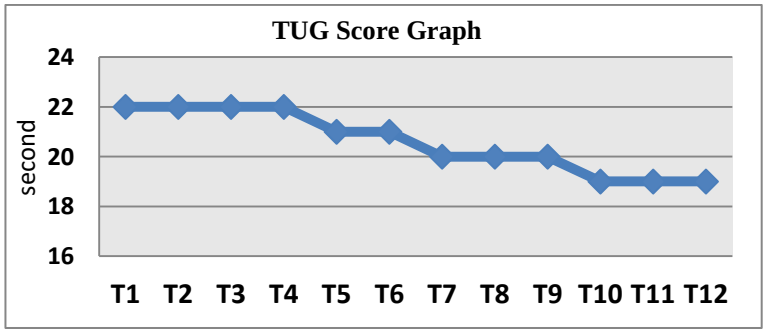
5. Gait training

It's important to give him training that goes his way.Physiotherapists need to identify the missing phase of walking.

Physiotherapy Programs:

Intervention	Dose	Information	Aim
Aerobic Exercise	F: 3-5 times/week I : Patient tolerance T: 30 minutes	Treadmill workout Cycling or using a static cycle Follow low impact exercise Swimming or doing exercises in water	Increase muscle mass Increase resting metabolic rate Increase muscle endurance Improves insulin sensitivity and attenuates loss of muscle mass during calorie restriction and aging
Flexibility Exercise	F: 3-5 times/week I : Patient tolerance T: 5-10 minutes T: Stretch	Calf muscle stretch Sitting hamstring muscle stretch Plantar fascia stretch	To maintain muscle flexibility
Strengthening Exercises	F: 3-5 times/week I: Patient tolerance I:5-10 minutes T: Strengthening	Counter calf raises Chair squats Dorsi flexion when sitting	To strengthen leg muscles
Balance Exercise	F; 3-5 times/week I : Patient tolerance Q: 5-10 minutes T : Balance exc	Counter calf raise Hip exercise flexion Hip exercise extension Side Leg raise	To train the patient's balance when standing and walking
Gait training	F: every day I: Patient tolerance T: gait training		To practice walking according to the phases

After carrying out a comprehensive exercise therapy program for 12 times for *Diabetic Neuropathy* patients , in the form of aerobic exercise, flexibility exercise, strengthening and balance exercises as well as walking exercises, the Time and Up Go Test score decreased from a score of 22 second to 19 second (as shown in the Figure below). The patient has felt a change in him that walking feels more stable and less tired.



Discussion

The development of *Diabetic Neuropathy* affect the integrity of the small joint and intrinsic muscles of the foot. This effect is a major factor in the development of deformity, increased plantar pressure and increased risk of plantar ulceration. These changes affect the dynamic stability of the foot, resulting in inadequate mobility for activities of daily living. Exercise therapy has been shown to result in diabetic foot results, especially in increasing nerve velocity conduction of the lower limbs. Additional benefits induced by exercise therapy in patients with diabetes mellitus, such as skin sensitivity and intraepidermal nerve fiber density, may inhibit the progression of diabetic neuropathy, delay skin breakdown and ulceration. Therapeutic ankle exercises have also shown great results for improving ankle range of motion and diabetic neuropathy symptoms as well as for redistributing plantar pressure during movement. Interventions in the form of strengthening, stretching, balance and gait training are very useful in preventing foot ulcers and amputations, reducing the risk of falls, increasing daily physical activity and quality of life, all of which can be beneficial in reducing mortality and comorbidities.

Conclusion

After patients underwent a physiotherapy program of exercise theraphy in the form of aerobic exercise, flexibility exercise, strenghthening exercise, balance training and gait training, the TUG score was obtained from 22 second to 19 second, there was increase in static and dynamic balance. This means that it can be concluded that the comprehensiveness of exercise is effective in preventing fall in diabetic neuropathy patients.

References

Alya Azzahra dkk. *Faktor Resiko Diabetes Mellitus Tipe 2 ; A Systematic Review.*Jurnal Kajian dan Pengembangan Masyarakat. Vol 1 No 1 Agustus 2020 Hal 44-52.

American College of Rheumatology ,*Time and Up Go test, 16-02-2016*

Azman Yitajeh Gelaw. *Exercice and Diabetes Mellitus,* Intech Open 2018, doi 10.572/Intechopen.71392.

Charlotte,C M et al. *The Effect of Exercise Theraphy Combined With Psychological Theraphy on Physical Activity and Quality Of Live in Patient with Painful Diabetic Neuropathy : A Systematic Review.* Scand J Pain 2019 ; 19:3:433-439.doi 10.1515/sjpain 2019-0001.

Christina D Sartor et al. *Effect of Strengthening, Streching and Functional Training on Foot Function in Patien With Diabetic Neuropathy: Result of Randomized Controlled Trial,* BMC Musculoskeletal Disorders,2014. 15:137

Haimanot Melese, et al. *Effectiveness of Exercise Theraphy on Gait Function in Diabetic Peripherial Neuropathy Patient ; A Sistematic Review of Randomized Controlled Trial*,DovePress Journal, 2020: 13 2733-2764.

Irwansyah, Ilham Syarif Kasim,. *Early Detection of Diabetic Mellitus Risk in Stikes Megarizki Makssar Teachers staff,* Jurnal Ilmiah Kesehatan Stikes Sandi Husada Vol 9 Nomor 1,Juni 2020 pp 512-516.doi 10.35816/jiskh.V.1012.34.

Jaspreet Kaur, Syahlendra Kumar Sigh. *Physiotheraphy and Rehabilitation in the Management of Diabetes Mellitus :* A Review. Indian Journal of Scientif Research.2015.

Katherine I Ites et al. *Balance Intervention for Diabetic Peripherial Neuropathy : A Sistematic Review*. Journal of Geriatri Physical Theraphy.2011.doi 10.1519/jps 0bo13e3182126599.

Renan L Monterio et al. *Protocol For Evaluating the Effect for Foot-Ankle, Therapeutic Exercise Program on Daily Activity, Foot-Ankle Functionality, and Biomechanic in People with Diabetic Polineuropathy : Randomized Controlled Trial* . BMC Musculoskeletal Disorders 2018 Nov 14;19 (1): 400 .doi 10.196/s1291-018-2323-0 in Diabetic Peripherial Neuropathy : A S

Shehil Dixit, Kumar Gular , Faizal Asiri. *Effect Of Diverse Physical Rehabilitative Intervention on Static Postural Control in Diabetic Peripherial Neuropathy : A . Sistematic Review.* An International Journal of Physical Theraphy . 2018, doi 10.1080/0959.3985.2018.14901078.

Surianti,Abdul Majid, Arnis Puspita. *The Effect of Active Range Of Motion Exercixe on Sensory Neurapathy Diabetic Mellitus Patient.* Indonesian Contemporary Nursing Journal, 1 (2),101-109

Umi Budi Rahayu, Arin Supriyadi. *Fisioterapi Neurologi Pada Sistem Syaraf Pusat*,Muhammadiyah University Press.2019.hal 139-155

O-

NEW BOBATH CONCEPT APPROACH IN ADOLESCENT WITH TRAUMATIC INTRACEREBRAL HEMORRHAGE (TICH): A CASE STUDY

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Abstract

Introduction : This case report shows the application of the exercise therapy method with the New Bobath Concept Approach in cases of Traumatic Intracerebral Hemorrhage (TICH) and reports the results of the exercise.
Case presentation: Mr. AR, a 16-year-old student with a clinical diagnosis of Traumatic Intracerebral Hemorrhage (TICH) received an exercise therapy program with a New Bobath Concept Approach consisting of abdominal exercise, facilitate foreward & backward pelvic, bridging exercise, sensibility exercise, sitting and sitting balance exercise, mobilization and facilitation of the scapula and arm, core stability exercise, standing exercise, facilitation of walking patterns and walking exercise.
Management and outcome: Exercise was carried out for 12 weeks with a frequency of twice a week and a duration of 60 minutes per training session.
Discussion: After giving exercise therapy with the New Bobath Concept Approach for 12 weeks, the results showed an increase MMT value in muscles shoulder, elbow, wrist, fingers, hip and knee from 0 to 2 and 3. Meanwhile for the Barthel index from a value of 2 (total dependence) to 10 (moderate dependence).
Conclusion: Mr. AR is able to sit, stand independently and walk 100 meters with assistance.

Keywords: Intracerebral Hemorrhage (ICH), Traumatic Intracerebral Hemorrhage (TICH), New Bobath Concept

Introduction

Intracerebral hemorrhage (ICH) is a sub-type of hemorrhagic stroke as a result of the rupture of a blood vessel in the brain and eventually widens into the surrounding tissue (McGurgan et al., 2021). ICH is the most common type of stroke and accounts for 10-20% in all parts of the world (Madangarli et al., 2019). One of the main complications of traumatic brain injury (TBI) is traumatic intracerebral hemorrhage (TICH) which occurs in 13-35% of patients after a traumatic event (Gabriel et al., 2020). Based on data collected at RSUD dr.Hardjono S Ponorogo, it was found that from January to December 2020 the incidence of non-traumatic ICH was 150 events and ICH due to trauma was 16 events.

There are many training methods for training stroke survivors, each method has its own advantages and disadvantages, and will be useful and effective in certain cases. But more importantly how to examine the problems that occur in stroke patients. Problems that occur can vary depending on a. The degree of damage, b. Topical lesions and comorbidities. Problems with stroke patients include cognitive, psychiatric, and sensory aspects (Shafa & Yanti, 2020). One of the modalities that can be given is the Bobath Concept developed by Berta and Karel Bobath. The Bobath concept is based on recovery as opposed to movement compensation (Graham et al., 2015)

Case Presentation

Mr. AR is a 16 year old student with a diagnosis of Hemiplegia Dextra due to Traumatic Intracerebral Hemorrhage (TICH). AR's family complained that the patient's legs and arms could not be moved. Tuan AR is a grade IX junior high school student who lives with his mother, grandmother and younger brother. Mr. AR was unable to move his right limb after having a single accident due to avoiding a potholed road on March 12, 2021. At that time, Mr. AR was riding a motorcycle after Friday prayers, Mr. AR had a single accident because he avoided a hole and hit a tree so he fell and unconscious. Mr. AR was taken to Dr. Hospital. Harjono S Ponorogo and was in a coma for 4 days. Based on the results of the CT scan, it was found that there was ICH in the left thalamus with a size of 3x3,5x4 (Fig. 1).

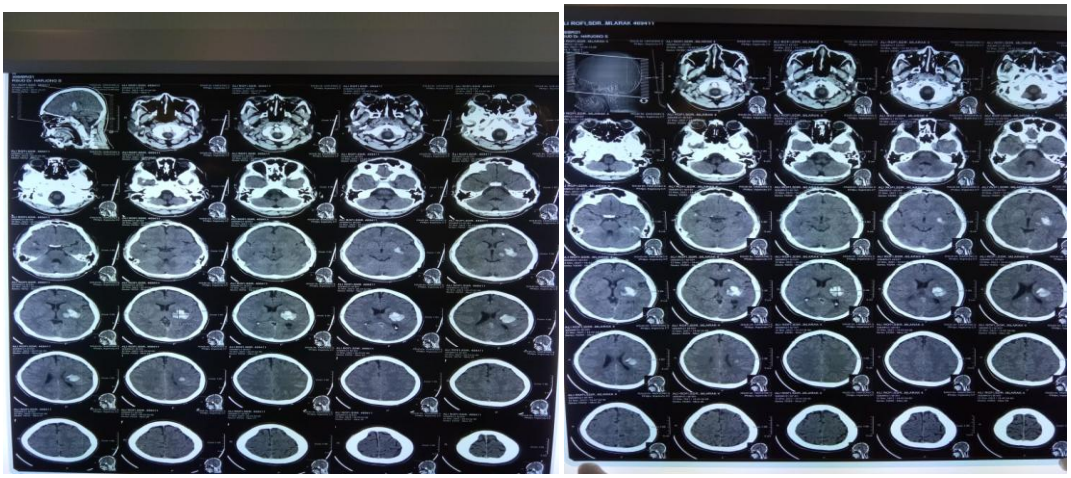

Figure 1. The CT scan of Mr. AR shows that there is bleeding with a size of 3x3,5x4

Mr. AR was transferred from the ICU after one week, when he woke up from his coma. On day 18 Mr AR was referred for physiotherapy. Examinations performed by physiotherapy showed that there was hypotonia in the muscles of the right leg and arm, no patellar and

biceps dextra tendon reflexes were found, the muscle value of the right limb in both legs and arms was 0. Functional examination with the Barthel index showed 2 results, namely total dependence.

Management and Outcome

The exercise therapy used in dealing with the problematic physiotherapy of Mr. AR is the New Bobath Concept where in this exercise therapy model the emphasis is on functional activities and activation of core muscles. The New Bobath Concept is a development of the Bobath Concept. The exercise therapy provided includes abdominal exercise, facilitate forward & backward pelvic, bridging exercise, sensibility exercise, sitting and sitting balance exercise, mobilization and facilitation of the scapula and arm, core stability exercise, standing exercise, facilitation of walking patterns and walking exercise . The exercise was carried out for 12 weeks with a frequency of twice a week and a duration of 60 minutes per training session.

The examination was carried out before and after the AR host was given physiotherapy modalities. The examination includes examination of muscle values with Manual Muscle Testing (MMT), pathological and physiological reflexes, spasticity with the Asworth Scale and the Activity of Daily Living (ADL) index with the Barthel index.

Mr. AR's condition after receiving physiotherapy modalities in the form of the New Bobath Concept for 12 weeks, the results can be seen in the following table:

Week	MMT	Barthel Index
0	Upper & Lower Extremity Muscles Dextra: 0	-Barthel Index: 2 (total dependence)
1 – 4	Upper & Lower Extremity Muscles Dextra: 1 Except: ^Flexor Knee Dextra: 2 ^Flexor Elbow Dextra: 2 ^Flexor Hip Dextra: 2	-Able to sit independently -Barthel Index: 10 (moderate dependence)
5 – 8	Upper & Lower Extremity Muscles Dextra: 1 Except: ^Flexor Extensor Shoulder Dextra: 2 ^Abductor Adductor Shoulder Dextra: 2 ^Flexor & Extensor Elbow Dextra: 2 ^Flexor & Extensor Hip	-Able to sit independently (stable) -Barthel Index: 10 (moderate dependence)

	Dextra: 3 ^Abductor Adductor Hip Dextra: 3 ^Flexor & Extensor Knee Dextra: 3	
9 - 12	AGA & AGB Dextra: 1 Kecuali ^Flexor & Extensor Shoulder Dextra: 2 ^Abductor & Adductor Shoulder Dextra: 2 ^Flexor & Extensor Elbow Dextra: 3 ^Flexor & Extensor Wrist Dextra:2 ^Flexor Fingers Dextra: 2 ^Flexor & Extensor Hip Dextra: 3 ^Abductor & Adductor Hip Dextra: 3 ^Flexor & Extensor Knee Dextra: 3	-Able to sit independently (stable) -Able to stand independently (stable) -Able to walk 100 meters with assistance -Barthel Index: 10 (moderate dependence)

Table 1. MMT & Barthel Index Results

Discussion

Traumatic Intracerebral Hemorrhage (TICH) poses a very complex physiotherapy problem, this is due to the appearance of symptoms such as contralateral hemiplegia and hemihypesthesia. Giving the New Bobath Concept after a stroke is appropriate because in a few days after a stroke, neurons whose damage is not permanent slowly begin to carry out their functions again due to an increase in blood supply and restoration of the metabolic system so that fluid absorption in the brain begins to occur. Neuroplasticity begins to occur because neuroplasticity is a process of taking over the function of neurons whose damage has been permanent. Therefore, the best recovery is done in the early post-stroke period. Plasticity starts from the muscles, because the motor units that work in the muscles change when they receive learning a movement (Hortobágyi & Maffiuletti, 2011). Directly, the motor unit that plays a role increases along with motor learning. After that, a significant increase in the frequency of the motor unit due to continuous practice led to the formation of faster and smoother movements. These all will affect the growth and development of Purkinje cells located in the cerebellum (Irfan, 2012). Currently, the Bobath concept is supported by contemporary theories on motor control, neuromuscular plasticity, biomechanics and motor learning which provide a theoretical basis for posture interpretation, analysis of human

functional movements and recovery of central nervous system lesions (Michielsen et all., 2017)

Giving exercise therapy with the New Bobath Concept method can significantly increase the excitability of alpha motor neurons in post-stroke humans, with this increase, the motor learning process can be formed and the process of adaptation and plasticity in the nerves helps restore movement activity in post-stroke humans (Paci, 2014).).

This is possible because in principle the current Bobath method approach is based on the development of normal motion patterns where the study of normal motion patterns is part of the study of motion science. For every facilitation and mobilization as well as the use of training facilities in the Bobath application, the main target given is the formation of normal movement patterns based on motion analysis of each body member. Likewise in this study, Bobath applications were given not only on the lower limbs or legs, but on other body parts such as the thorax, neck and head, shoulders and arms (Chung, 2014). The expected normal movement in the post-stroke human walking pattern can be obtained with support and facilitation from other body parts, because in the concept of locomotion there is a connection between postural and limb movements that are formed automatically as the basis of movement. Posture and other limbs facilitate the formation of movements with normal patterns in the legs when doing walking activities (Graham et al., 2015).

Conclusion

Based on the results of studies that have been carried out, giving exercise with the New Bobath Concept can increase muscle strength and functional ability in adolescents with Traumatic Intracerebral Hemorrhage (TICH).

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References

Alexander, G. Q-O., Durango-E, Y., Padilla-Z, H., Rafael, L. M-S., Keni, R., Deora, H., & Agrawal, A. (2020). The puzzle of spontaneous versus traumatic intracranial hemorrhages. *Egyptian Journal of Neurosurgery.* 35:13. https://doi.org/10.1186/s41984-020-00084-9

Chung, B. P. H. (2014). Effect of different combinations of physiotherapy treatment approaches on functional outcomes in stroke patients: Aretrospective analysis. *Hong Kong Physiotherapy Journal*, *32*(1), 21–27. https://doi.org/10.1016/j.hkpj.2013.11.001

Graham, J. V., Eustace, C., Brock, K., & Swain, E. (2015). *The Bobath Concept in Contemporary Clinical Practice*. *June*.https://doi.org/10.1310/tsr160157

Hortobágyi, T., & Maffiuletti, N. A. (2011). Neural adaptations to electrical stimulation strength training. *European Journal of Applied Physiology*, *111*(10), 2439–2449. https://doi.org/10.1007/s00421-011-2012-2

Irfan, M. (2012). *APLIKASI TERAPI LATIHAN METODE BOBATH DAN SURFACE ELECTROMYOGRAPHY (SEMG) MEMPERBAIKI POLA JALAN INSAN PASCA STROKE APPLICATION OF EXERCISE THERAPY WITH BOBATH METHOD AND SURFACE ELECTROMYOGRAPHY (SEMG) TO IMPROVE GAIT PATTERN IN STROKE PATIENTS*. *12*(April), 1–20.

Madangarli, N., Bonsack, F., Dasari, R., & Sukumari-Ramesh, S. (2019). Intracerebral hemorrhage: Blood components and neurotoxicity. *Brain Sciences*, *9*(11). https://doi.org/10.3390/brainsci9110316

McGurgan, I. J., Ziai, W. C., Werring, D. J., Al-Shahi Salman, R., & Parry-Jones, A. R. (2021). Acute intracerebral haemorrhage: Diagnosis and management. *Practical Neurology*, *21*(2), 128–136. https://doi.org/10.1136/practneurol-2020-002763

Michelsen, M., Vaughan-G, J., Holland, A., Magri, A & Suzuki, M. (2017). The Bobath concept- a model to illustrate clinical practice. *Disability and Rehabilitation An International Multidisciplinary Journal.* 1-13. https://doi.org/10.1080/09638288.2017.1417496

Paci, M. (2014). *Physiotherapy based on the Bobath Concept for adults with post-stroke hemiplegia : A review of effectiveness studies REVIEW ARTICLE PHYSIOTHERAPY BASED ON THE BOBATH CONCEPT FOR ADULTS WITH POST-STROKE HEMIPLEGIA : A REVIEW OF EFFECTIVENESS STUDIES*. *May*. https://doi.org/10.1080/16501970306106

Shafa, S. I., & Yanti, D. (2020). *Journal of Medical Science Efektifitas New Bobath Concept terhadap Peningkatan Fungsional Pasien Stroke Iskemik dengan Outcome Stroke Diukur Menggunakan Fungsional Independent Measurement (FIM) dan Glasgow Outcome Scale (GOS) di Rumah Sakit Umum Daerah dr. Zaenoel Abidin*.(1), 14–19.

O-1

Efek Electro Therapy Trabert current and Pulse burst Knee Osteoarthritis pain grade II

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ABSTRACT

Background: osteoarthritis has fairly high prevalence of around 2.3% to 11.3%. Osteoarthritis is a degenerative disease which attacks the cartilage to the synovial joint. The problems that rise frequently are pain and discomfort. One of the physiotherapy actions that can be done in cases of osteoarthritis in reducing pain is using Transutaneus Electrical Nerve Stimulation (TENS) flow trabert. To find out the results of reducing pain and activity ability after being given therapy using the WOMAC measuring instrument.

Objectives : (1) determine the effect of TENS trabert current in cases of knee osteoarthritis, (2) find out the results of the effect of reducing pain with the WOMAC measuring instrument for a month.

Method : The research type is using quasi-experimental with pre-post with control group. samples taken by consecutive sampling technique

Research Results: there is an effect between both trabert current and pulse burst on the reduction of knee osteoarthritis pain. However, pulse burst is more effective than trabert current in reducing pain. The sensation feeling in the pulse burst is also more comfortable than the Trabert current.

Conclusion : there is an effect of reducing pain after being given physiotherapy measures in the form of TENS trabert current

Keywords : knee osteoarthritis, pain, TENS, TRABERT CURRENT, WOMAC

PRELIMINARY

According to Abdurrachman et al (2019)The prevalence of knee osteoarthritis cases in the world belong to high category, which is 2.3% to 11.3% and this prevalence will increase in 2020 along with the increasing elderly population in the world. Osteoarthritis of the knee is a degenerative joint disease that attacks the synovial joints up to the cartilage of the knee.Abramoff et al., 2020).

according to Wijaya (2018) The case of knee osteoarthritis, theris severenity degree of severity that can be seen from the classification of the following five grades of osteoarthritis: (0) – normal, no visible signs of radiological disturbance of the knee, grade (1) – doubtful, without osteophyte grade (2) - level mild, there are few osteophytes and no inter-joint space at the knee and grade (3) – moderate osteophytes, marked joint space narrowing, sclerosis seen, possible deformity of bone ends, grade (4) - large osteophytes, marked joint space narrowing, severe sclerosis, the presence of deformity of the ends of the bones.

Many people with osteoarthritis ranging from grades 2 to 4 complain of discomfort such as pain. Pain arises due to inflammation in the joints so people with osteoarthritis experience a decrease in physical function. This will affect limitation of movement, decreased strength and muscle balance (Nurhalimah, 2020).

According to (Surakarta, nd) In terms of decreasing the pain in people with osteoarthritis, there is an electric current method that stimulates the nerves through the skin surface with a tool TENSTrabert current and pulse burst. Trabert currentis modification of IDC dan retangular pulse, current duration 2 mS, 5 mS intervals. Then pulse burst has basic physics frequency 1 – 10 Hz, time duration 200 S.

according to Kim et al (2020)To find out if there is a change after being given therapy, it can be measured with the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) measuring instrument. The WOMAC measurement tool is an assessment in the form of a questionnaire is used to evaluate knee condition and hip OA patients that focuses on assessing pain, stiffness, activity limitations of knee and hip OA patients.(Knee & Indonesia, 2020).

RESEARCH METHODS

Ethical Clearance

This research was obtained approval from the Health Research Ethics Commission, Faculty of Medical Sciences, University of Muhammadiyah Surakarta.

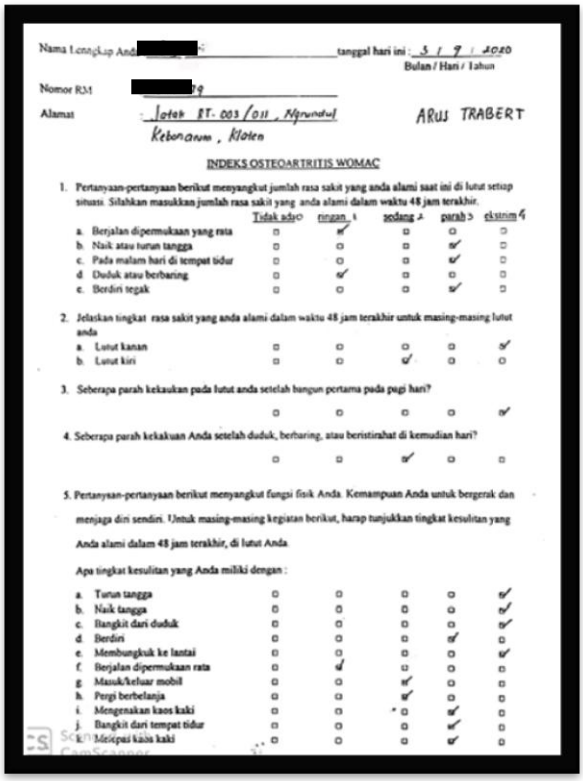
Research methodology

The research type is a quasi-experimental research which aims to to demonstrate the relationship between electric current and pain stimuli involving the Trabert Current group and the Pulse Burst group, the two groups were not selected randomly. The number of respondents who entered was six respondents, of the six respondents there were two respondents who were excluded because they were taking pain medication. while the other 4 respondents who were included in the inclusion criteria were randomly distributed envelopes containing each group. from the randomization, the results were 2 respondents in the pulse burst group and 2 respondents in the trabert current group.

Which includeInclusion criteria in sampling included: (1) patients aged 60-65 years (2) osteoarthritis grade two - three according to the results of clinical records (3) not currently doing strenuous activities (4) not currently taking pain medication (5) never got Hyaluronic acid injection (6) communicates well. While the exclusion criteria included: (1) osteoarthritis grades one and two (2) currently undergoing other treatment (3) having had knee surgery (4) unable to follow a predetermined schedule (5) unable to read and write. The normality test of data is using Shapiro Wilk's test, then to meresearchthe difference in the effect of TENS pulse burst and trabert current using the Wilcoxon non-parametric test method. Then to find out the difference in the effect, the Wilcoxon Non-paramedical test was used to determine the statistical test.

Measurement of pain and functional activity

Examination of pain and functional activity with (WOMAC) (Figure 1). Respondents were asked to fill out a questionnaire every week before doing therapy and how they felt about the respondent during the last 48 hours. Respondents should answer the pain by arisesstarted value 0 does not exist flavor pain, 1 mild, 2 moderate, 3 severe, 4 very severe. Then the total value of the question describes the interpretation of WOMAC. Within 0-20 total value, 24-48 moderate, 48-72 severe/severe and 72-96 very heavy.



Nama Lengkap And[redacted] tanggal hari ini : 5 / 9 / 2020
Bulan / Hari / Tahun

Nomor RM [redacted]9

Alamat : Joten RT. 003 / 011, Ngrundul Kebonarum, Klaten

ARUS TRABERT

INDEKS OSTEOARTRITIS WOMAC

1. Pertanyaan-pertanyaan berikut menyangkut jumlah rasa sakit yang anda alami saat ini di lutut setiap situasi. Silahkan masukkan jumlah rasa sakit yang anda alami dalam waktu 48 jam terakhir.

	Tidak ada 0	ringan 1	sedang 2	parah 3	ekstrim 4
a. Berjalan dipermukaan yang rata	☐	☑	☐	☐	☐
b. Naik atau turun tangga	☐	☐	☐	☑	☐
c. Pada malam hari di tempat tidur	☐	☐	☐	☑	☐
d. Duduk atau berbaring	☐	☑	☐	☐	☐
e. Berdiri tegak	☐	☐	☐	☑	☐

2. Jelaskan tingkat rasa sakit yang anda alami dalam waktu 48 jam terakhir untuk masing-masing lutut anda

a. Lutut kanan	☐	☐	☐	☐	☑
b. Lutut kiri	☐	☐	☑	☐	☐

3. Seberapa parah kekakuan pada lutut anda setelah bangun pertama pada pagi hari?

☐	☐	☐	☐	☑

4. Seberapa parah kekakuan Anda setelah duduk, berbaring, atau beristirahat di kemudian hari?

☐	☐	☑	☐	☐

5. Pertanyaan-pertanyaan berikut menyangkut fungsi fisik Anda. Kemampuan Anda untuk bergerak dan menjaga diri sendiri. Untuk masing-masing kegiatan berikut, harap tunjukkan tingkat kesulitan yang Anda alami dalam 48 jam terakhir, di lutut Anda.

Apa tingkat kesulitan yang Anda miliki dengan :

a. Turun tangga	☐	☐	☐	☐	☑
b. Naik tangga	☐	☐	☐	☐	☑
c. Bangkit dari duduk	☐	☐	☐	☐	☑
d. Berdiri	☐	☐	☐	☑	☐
e. Membungkuk ke lantai	☐	☐	☐	☐	☑
f. Berjalan dipermukaan rata	☐	☑	☐	☐	☐
g. Masuk/keluar mobil	☐	☐	☑	☐	☐
h. Pergi berbelanja	☐	☐	☑	☐	☐
i. Mengenakan kaos kaki	☐	☐	☐	☑	☐
j. Bangkit dari tempat tidur	☐	☐	☐	☑	☐
k. Melepas kaos kaki	☐	☐	☐	☑	☐

Figure 1. WOMAC

RESULTS AND DISCUSSION

The distribution of respondents based on the duration of suffering from knee osteoarthritis was found to have suffered 3 months before therapy (25%), 3.5 months before therapy (25%) and 4 months (50%).

In each meeting the respondent should fill out a questionnaire from the WOMAC measuring instrument. In the first treatment group (Trabert Current) the results were obtained after five meetingsthat is the average level of pain felt 61.00 with a standard deviation of 20.00. Swhile in the second treatment group (pulse burst) the average level of pain feltis 60.90 with deviation standard of 17.08.

The WOMAC measurement data for five meetings was used to determine the effects on the two treatment groups. Obtained normality test results:

Table 1. Shapiro Wilk normality test

Treatment	Statistics	N	P-value	criteria
pulse burst	0.942	10	0.571	>0.05
Trabert current	0.939	9	0.575	>0.05

Obtained existenceeffect of the effectiveness of TENS pulse burst in reducing pain of patients with knee osteoarthritis. there is a probability value (P-value) for pain measurement of 0.571 more than 0.05 compared to TRAbert current TENS with a probability value (P-value) of 0.575. The data is included in distributed data.

Then to test the difference in the effect between Trabert current with pulse burst in drop nyeri osteoarthritis used test *:*

Table 2. Mann Whitney test

Rank			
Treatment	N	Mean Rank	Sum of Rank
Pulse Burst	10	10.70	107.00
Trabert current	10	10.30	103.00

From the data above, there is no significant difference between pulse burst and trabert current to reduce osteoarthritis pain knee.

DISCUSSION

According to Ismaningsih et al .,(2018) conducted states that musculoskeletal disorders often occur in the elderly osteoarthritis. Indonesia prevalence of knee osteoarthritis based on age 5% at age <40 years, 30% age 40 until 60 years and 65% age of >61 years. Osteoarthritisknee cause structural abnormalities such as joints, cartilage, subchondral, synovial fluid, and ligaments in the knee joint area.

according to Jamaludin et al .,(2021) complaint that often arise from this is painful. Taste disappears and appears in the acute phase. One of the treatments to reduce pain is TENS pulse burst or Trabert current.

According to Mi et al .,(2019)Pulse burst has the effect of reducing pain when applied to pain points in osteoarthritis of the knee. Meanwhile, Trabert current also has a good effect on reducing pain in osteoarthritis of the knee when applied properly to the source of pain(Surakarta, nd).

However, from the results of reducing pain and increasing functional activity in WOMAC, there is a comparison between the effectiveness of pulse burst and trabert current. Pulse burts are more effective in reducing knee osteoarthritis pain with P-v of 0.571 which is more than 0.05 while the Trabert Current has a P-v of 0.575 more than 0.05 (Kim et al., 2020).

At the third meeting of the pulse burst procedure, there was a significant reduction in pain when the electrode placement was moved to the lateral and medial sides of the knee, but the same method when applied to the Trabert current had no significant effect on the results of pain reduction. The pulse burst also more comfortable sensation than the trabert current when the current wave started activated in respondents with grade III osteoarthritis.

CONCLUSION

Based on the results of this research concluded There was pain reduction for 5 treatments with the same electrode placement using TENS pulse burst and trabert current when measured using the WOMAC index in grade 3 OA patients. However, pulse burst was more effective in reducing pain measured from the total WOMAC index value at the third meeting when The electrodes are positioned on the lateral and medial sides of the knee and this current also has more comfortable sensation than the Trabert current.

SUGGESTION

Subsequent research can conduct research that can minimize existing deficiencies related to the comparison of Pulse Burst and Trabert Arus Current on Transcutaneous Electrical Nerve Stimulation (TENS) in reducing knee osteoarthritis pain both bilateral and unilateral grade 3.

BIBLIOGRAPHY

Abdurrachman, Nurseptiani, D., & Adani, M. (2019). The Effect of Cycling Exercise on Reducing Pain in Osteoarthritis at the Elderly Posyandu at Kedungwuni II Public Health Center, Pekalongan Regency. Journal of Science and Technology Research, 4(2), 198–208. Retrieved from http://jurnal.unmuhjember.ac.id/index.php/PENELITIAN_IPTEKS/article/viewFile/2458/1921

Abramoff, B., & Caldera, FE (2020). Osteoarthritis: Pathology, Diagnosis, and Treatment Options. Medical Clinics of North America, 104(2), 293–311. https://doi.org/10.1016/j.mcna.2019.10.007

Ismaningsih, & Selviani, I. (2018). Management of Physiotherapy in Cases of Bilateral Genue Osteoarthritis With Neuromuscular Taping Interventions And Strengthening Exercises To Improve Functional Capacity. Scientific Journal of Physiotherapy, 1(2), 38–46.

Jamaludin, U., & Widodo, A. (2021). The Effect of Belt Mobilization Therapy on Pain Reduction in Chronic Knee Osteoarthritis (OA) at RSU 'Aisyiyah Ponorogo, 2(1), 23–29.

Kim, MJ, Kang, BH, Park, SH, Kim, B., Lee, GY, Seo, YM, … Yoo, J. Il. (2020). Association of the western ontario and mcmaster universities osteoarthritis index (WOMAC) with muscle strength in community-dwelling elderly with knee osteoarthritis. International Journal of Environmental Research and Public Health, 17(7), 1–11. https://doi.org/10.3390/ijerph17072260

Knee, O., & Indonesia, I. (2020). 1 2 3 4, 13(2), 131–135.

Mi, Y., Xu, J., Yao, C., Li, C., & Liu, H. (2019). Electroporation modeling of a single cell exposed to high-frequency nanosecond pulse bursts. IEEE Transactions on Dielectrics and Electrical Insulation, 26(2), 461–468. https://doi.org/10.1109/TDEI.2018.007777

Nurhalimah, MM (2020). The relationship between stride length and dynamic balance in elderly patients with knee osteoarthritis (OA) grade II. Scientific Journal of Physiotherapy E-ISSN, 2528, 3235, 20(1), 32–39.

Surakarta, UM (nd). The Effectiveness And Comfort Of Transcutaneous Electrical Nerve Stimulation (Tens) Pulse Burst And Trabert Flow In Reducing Chronic Pain In The Knee In Age.

Wijaya, S. (2018). Knee Osteoarthritis. Ckd, 45(6), 424–429.

CASE STUDY: THE INFLUENCE OF ULTRASOUND AND TENS ON INCREASING THERANGE OF MOTION OF JOINT IN FROZEN SHOULDER DUE TO ROTATOR CUFF

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ABSTRACT

Frozen shoulder is a disorder of the shoulder joint that causes pain and always causes limitation of joint motion in all directions resulting in physical problems and decreased functional activity. Frozen Shoulder due to rotator cuff is caused by inflammation from prolonged tendinitis, characterized by a marked limitation of the glenohumeral joint range of motion, both active and passive. The prevalence of this disease is about 20% of the general population and 10-20% in people with diabetes (Shichling & Walsh, 2001). And often occurs in people above 40 years of age, especially for women aged 50 years. When trauma occurs, it causes a local inflammatory reaction in the joints and causes adhesions to the joint capsule and cartilage, which is characterized by shoulder pain that occurs gradually, sharper pain, stiffness and limitation of motion. Frozen shoulder can be treated with medication and a physiotherapy program. Physiotherapy programs are useful for reducing pain, both pressure and motion, increasing muscle strength, increasing the range of motion of the joints and restoring functional activities/daily activities. The purpose of this study was to determine the effectiveness of the physiotherapy program with Ultrasound, TENS, and Codman Pendular exercise.

Keywords: *Frozen* Shoulder, ultrasound, TENS, Codman pendular exercise

ABSTRACT

Frozen shoulder is a disorder in the joint of shoulder that cause pain and always lead to limitation of motion of the joints to all direction of the movement that led to the problems of physical and decrease the activity of the functional . Frozen Shoulder due to rotator cuff due to inflammation of tendinitis that prolonged , is marked by the limitations of wide motion of the glenohumeral joint are real , good movement of active and passive . The prevalence of this disease is about 20% of the

general population and 10-20% in people with diabetes (Shichling & Walsh, 2001). And often occurs in people over the age of 40 years , especially women aged 50 years . When it happens the trauma it causes a reaction inflammation locally in the joints and cause adhesions capsule joints and bone cartilage, which is characterized by painful shoulder are raised slowly , the pain is getting sharper , stiffness and limitation of motion . Treatment of frozen shoulder can be done with medications and program of physiotherapy. Physiotherapy program is beneficial for reducing pain both press and motion, increasing the strength of muscle, add to the scope of the motion of the joints and restores the activity of functional / activity daily. The aim of study this is to know the effectiveness of a program of physiotherapy with ultrasound, TENS and Codman pendular exercise.

Keywords : *Frozen Shoulder* , Ultrasound, TENS, Codman pendular exercise

INTRODUCTION

Frozen shoulder is a disorder of the shoulder joint that causes pain and limitation of joint motion in all directions of movement resulting in physical problems and decreased functional activity. The prevalence of this disease is about 20% of the general population and 10-20% in people with diabetes (Shichling & Walsh, 2001). Frozen shoulder due to the rotator cuff is pain that results in limited range of motion (LGS) in the shoulder. Occurs due to trauma, develops slowly without signs or history of trauma. Frozen Shoulder due to rotator cuff is caused by inflammation from prolonged tendinitis, characterized by a marked limitation of the glenohumeral joint range of motion, both active and passive. This inflammation causes pain and muscle spasm which causes immobilization of the shoulder causing intra/extra cellular adhesions to the joint capsule. Pain occurs when moving the shoulder and the patient is afraid to move. So that with prolonged immobilization, the muscles strength will decrease (Wijaya, 2015).

Rotator cuff tendinitis occurs due to repeated trauma and pathological changes in the tendons. It was usually occurred due to direct injury to the shoulder or injury caused by excessive work of the rotator cuff muscle. The pathophysiology of frozen shoulder tendinitis rotator cuff occurred with right shoulder pain, limited range of motion of the right shoulder joint, and functional disorders.

Complaints of pain and limited range of motion of the shoulder joint are felt by procurement goods employees who experience interference while working. Meanwhile, activities that are disrupted include not being able to raise the hands up when combing hair and rubbing the back while taking a shower or taking something from behind. Complaints that often occur in motion and function in the shoulder joint are basically pain and stiffness that result in limited movement in the shoulder joint (Morgan & Potthoff, 2012). With a trauma that causes inflammation (pain) and limitation of

movement of the shoulder so that sometimes it cannot be moved at all, it interferes the patient activities, especially when driving, dressing, and sleeping.

Physiotherapy is useful for reducing pain, and increasing joint range of motion and muscle strength using physiotherapy modalities of Ultrasound, TENS, and exercise therapy. And exercise therapy is given to increase the range of joint motion as well as a form of education so that it can be carried out at home to reduce pain and improve the recovery of the limited range of motion.

METHOD

The research method used in this study was a case study. The case study was conducted on the patient Mrs. NS, 49 years old, profession as part of the procurement of goods, and a Muslim.

Case Presentation:

Subjective Examination

The patient complained of pain and limited range of motion of the right shoulder since 2 months ago after an accident (falling from a motorcycle) where the right shoulder was crushed by her body so that the patients felt pain and was afraid to move it. The right shoulder is getting more sore and painful moving. Along with the prolonged immobilization of the right shoulder resulted in limited range of motion of the joint and the supraspinatus and subscapularis muscles spasm.

The patient's personal history, the patient worked in the procurement department and it was related to taking goods and lifting, mostly using the right hand. And the same pattern of movement is repeated every day.

The goals to be achieved are to reduce the pain felt by the patient, and to increase the range of motion of the joints, muscle strength, and daily functional activities in household and work activities.

Physical Examination

Physical examination included the aspects of vital signs, inspection, and palpation. The results on examining the vital signs included blood pressure, pulse, respiration, temperature, height, and weight, were normal. And the next examination was inspection, palpation, percussion, and auscultation. Inspection was carried out statically and dynamically, where on static inspection found the right shoulder was slightly larger than the left shoulder, there was no sign of redness. And on dynamic inspection, it was occurred painful flexion, extension, and abduction movements. On palpation, it was found spasm and tenderness in the supraspinatus and subscapularis muscles, but

without warmness. Meanwhile, percussion and auscultation were not performed because of no patient complaints.

The vital signs examination showed normal conditions of blood pressure, pulse rate, respiratory rate, and temperature.

Table 1 Vital Sign Examination

Vital Sign	Values	Description
Blood pressure	120/80 mmHg	Normal
Pulse rate	84 x / min	Normal
Respiration rate	24 x / minute	Normal
Temperature	36.5ºC	Normal
Height	160 cm	Normal
Weight	60 kg	Normal

Furthermore, physiotherapy examine the patient's range of motion of shoulder joint. In active movement, the patient can move the shoulder in the direction of flexion, extension, and abduction with limited ROM due to painfulness. In passive movement, shoulder movement can be done towards flexion, extension, and abduction with full ROM and painful, isometric movement against resistance in flexion, extension, and abduction due to pain.

Table 2. Examination of Passive Joint Movement

Movements of Shoulder	Pain	ROM	End Feel
Flexion	+	Full	Firm end feel
Extension	+	Full	Firm end feel
Abduction	+	Full	Firm end feel

On examination of the passive range of motion of the shoulder joint, a firm end feel was obtained. To determine and distinguish between physiological and pathological end-feel, it should be examined slowly and carefully to feel the end of joint motion. And this sensation of firm end occurs in joints that usually have soft or hard end feels as result of increased muscle tone or shortening muscles, capsules, and ligaments.

Table 3. Examination of Joint Movements Active

Movements of Shoulder	Pain	ROM
Flexion	+	Limited
Extension	+	Limited
Abduction	+	Limited

The active movement examination of the shoulder carried out by patient herself showed limited range of motion (ROM) due to the painful sensation during flexion, extension, and abduction movements of the shoulder.

Table 4. Examination of Isometric Joint Movement Against Resistance

Movements of Shoulder	Pain	Contraction
Flexion	+	Not Maximum
Extension	+	Not Maximum
Abduction	+	Not Maximum

In the examination of the range of motion of joint in isometric against resistance. This movement was carried out by the patient and therapist where the therapist providing resistance. The resistance given caused contractions that were not maximal because of the pain.

Furthermore, the physiotherapist performed a specific examination for the diagnosis of frozen shoulder tendinitis rotator cuff by drop arm test, supraspinatus test, and crossover impingement test. These three specific examinations showed positive tests, indicating the presence of pain in the shoulder joint, especially in the supraspinatus and subscapularis muscles.

The drop arm test is a test of the shoulder joint to determine the patient's ability to maintain movement of the humeral joint through eccentric contraction of the arm through full adduction. It can also assess for rotator cuff tears. This test is performed with the patient sitting or standing during the test. The therapist is on the lateral side or behind the arm in full adduction. Then the patient is asked to lower her arm slowly. If the patient's arm drops or falls at 90 degrees, this indicates rotator cuff dysfunction. And if the result is positive if it is found that the patient is unable to carry out controlled movements and feels pain when doing the test.

Supraspinatus test is for supraspinatus impingement or supraspinatus muscle and tendon integrity. This test is performed in a sitting or standing position, where the examiner's hands stabilize the shoulder on the side to be tested. The patient's arm is positioned abducted 90º with rotation and angled forward 30º so that the thumb is facing the floor. The examiner gave more pressure on the site and evaluate the findings. If the patient feels pain or there is weakness of contractions indicating abnormalities in the supraspinatus muscle.

The crossover impingement test is a test used to identify possible subacromial impingement syndrome. Where the examiner places the patient's shoulder in 90 degrees of shoulder flexion with the elbow flexed to 90 degrees and then rotates the arm internally. The test is considered positive if the patient experiences pain with internal rotation.

Examination of pain using Verbal Descriptive Scale (VDS) in the condition of resting, motion, and pressure, measurement of muscle strength with Manual Muscle Test (MMT), and measurement of joint range of motion with a goniometer.

Pain measurement was performed using the Verbal Descriptive Scale (VDS). This instrument

provides an opportunity for patients to express pain and complaints. It provides a description of the classification of pain which consists of a score of 1: no pain, 2: slight pain, 3: mild pain, 4: moderate pain, 5: pain quite severe, 6: severe pain, and 7: almost unbearable pain that have made it impossible to carry out activities. On examination of pain, there are resting pain: 1, motion pain: 6, pressure pain: 4.

Table 5. Pain examination with VDS classification

Criteria	Resting pain	Motion pain	Pressure pain
Score	1/7	6/7	4/7

Examination of muscle strength with MMT consisted of 0-5 scores, 0: no palpable or observable contraction, 1: palpable or observable contraction, 2: moves without gravity loading over the full ROM, 3: moves against gravity less over the full ROM, 4: moves against gravity and moderate resistance over the full ROM, 5: moves against gravity and maximal resistance over the full ROM.

The examination of MMT in the patient affected shoulder showed the score of flexion: 3, extension: 3, abduction: 3.

Table 6. Examination of Muscle Strength with MMT

Shoulder Muscle	Score	
	Right	Left
Flexor	3	5
Extensors	3	5
Abductor	3	5

The joint range of motion was evaluated using a goniometer with passive and active motion. On examination of passive range of motion S: 45º-0-105º, F: 98º-0-45º, R: 43º-0-45º and for active joint range of motion S: 43º-0-95º, F:85º-0- 45º, R: 35º-0-40º.

Table 5. Examination of the Scope of Motion

Movement of shoulder muscle	Passive	Active
S	45º-0-105º	43º-0-95º
F	98º-0-45º	85º-0-45º
R	43º-0-45º	35º-0-40º

Functional Activity Examination was conducted using an index measuring instrument of Shoulder Pain and Disability Index (SPADI). The test was carried out by asking and answering the patient for pain and limitations during activities. Type of pain scale: lying on the affected side, reaching for

something on a high shelf, touching the back of the neck, and pushing with the affected hand. Types of disability scale: washing hair, scrubbing back when bathing, putting on and taking off undershirts or clothes, wearing button-down shirts, wearing pants, picking up objects, and lifting heavy objects. The assessment criteria for the pain scale are 0: no pain, and 10: the worst unbearable pain, while the disability scale is 0: no difficulty and 10: very difficult and needs help.

Physiotherapy Program Plan

The physiotherapy process is carried out for the patient as long as the patient follows all treatment sessions at the hospital. And the patient came to the physiotherapy poly, the purpose of the intervention was to reduce pain, increase the range of motion of the joints, increase muscle strength and improve the functional ability of daily activities.

The table below described the interventions performed:

Table 8. Physiotherapy Program

Intervention	Dosage	Description	Purpose
Ultrasound Therapy	F: 2 times a week I : 1 MHz Frequency: 0.8 W/cm²	Continuous	
	Time: 5 minutes		
TENS	F: 2 times a week Frequency: 200 hz Frequency mode : 20 hz Intensity: patient tolerance Duration : 15 minutes	Continuous	
Codman Pendular exercise	F; 2 times a week Performed 8-16 repetitions For 30 seconds in one direction and repeated for 30 seconds in the opposite direction Performed 3 times a day	Education	Removing tissue adhesions Relaxation of muscles Increases range of motion of joints Reduces pain and swelling in the shoulder Improves shoulder flexibility Ability of the patient's functional activities experiencing increased

RESULTS AND DISCUSSION

The Results of Pain Measurement with VDS

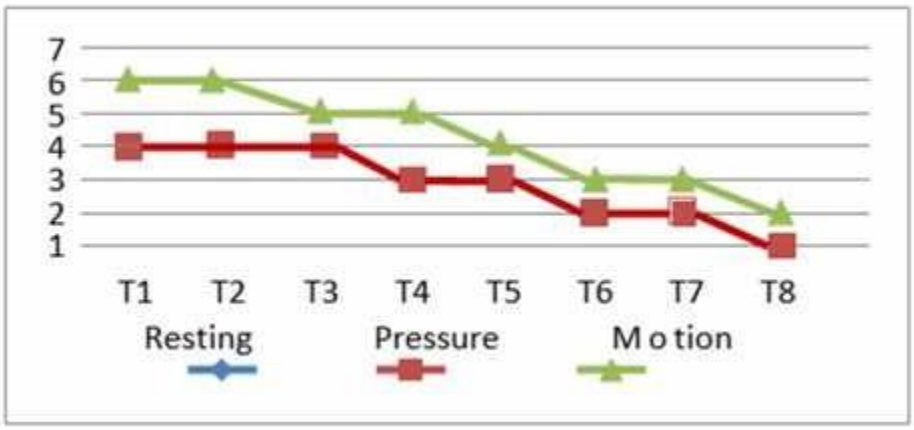

Figure 1. The measurement results of VDS of T1-T8 during therapy T1-T8

VDS pain Inspection obtained the following results:
With the modalities of Ultrasound, TENS, and Exercise Therapy (Codman Pendular exercise) reduced the frequency of pain on T1-T2 with the score of resting pain: 1, motion pain: 6, and pressure pain: 4 in which no change was occurred in motion pain and pressure pain. T3 showed resting pain:
1, motion pain: 5, and pressure pain: 4, and there was a decrease in motion pain at T2-T3. T4 showed resting pain: 1, motion pain: 5, and pressure pain: 3, there was only changes in pressure pain at T3-T4. T5 showed resting pain: 1, motion pain: 4, and pressure pain: 3, and there was a decrease in motion pain at T4-T5. T6 showed resting pain: 1, motion pain: 3, pressure pain: 2, there was a decrease motion pain and pressure at T5-T6. T7 showed resting pain: 1, motion pain: 3, and pressure pain: 2, and there was no change in motion pain and pressure pain at T6-T7. T8 showed resting pain: 1, motion pain: 2, and pressure pain: 1, there was a decrease in motion pain and pressure pain at T7-T8.
Based on the examination of pain with VDS, the results showed that there was still motion pain but there was a decrease in pressure pain.

Results of Muscle StrengthMeasurement
Measurement of muscle strength was carried out by Manual Muscle Testing (MMT). The results were as follows:
Table 6. Measurement of Muscle Strength T1-T8

Shoulder Muscle Regions	T1	T2	T3	T4	T5	T6	T7	T8

Flexors	2	2	2+	3	3	3+	4	4+
Extensors	3	3+	4	4	4+	4+	5	5
Abductors	2	2	2+	3	3	3+	4	4+

The results of the measurement of muscle strength on T1-T2 showed a slight increase in shoulder extensor strength. On T2-T3, there was an increase in shoulder extensors and a slight increase in shoulder flexors and abductors. On T3-T4, there was an increase muscle strength in the flexor and abductor shoulder. On T4-T5, there was a slight increase in muscle strength in the extensor shoulder. On T5-T6, there was a slight increase in the strength of the flexor and abductor shoulder muscles. On T6-T7, there was an increase in the strength of the flexor, extensor, and abductor shoulder muscles. On T7-T8, there was a slight increase in the strength of the flexor and abductor shoulder muscles.

On T1-T8, there was an increase in the strength of the flexor, extensor, and abductor shoulder muscles.

Results of Range of Joint Motion Measurement

The range of motion measurements performed using a goniometer on passive and active motion of the shoulder joint as follows:

Table 7. Range of Joint Motion Measurement T1-T8

Treatment	Passive			Active		
T1	S:45º-0-105º	F: 98º-0-45º	R: 43º-0-45º	S: 43º-0-95º	F: 85º-0-45º	R: 35º-0-40º
T2	S: 45º-0-110º	F: 100º-0-50º	R: 45º-0-48º	S: 48º-0-97º	F: 87º-0-45º	R: 37º-0-43º
T3	S: 45º-0-115º	F: 105º-0-53º	R: 48º-0-50º	S: 50º-0-100º	F: 90º-0-45º	R: 40º-0-45º
T4	S: 45º-0-119º	F: 110º-0-55º	R: 50º-0-50º	S: 53º-0-103º	F: 94º-0-45º	R: 43º-0-45º
T5	S: 45º-0-123º	F: 113º-0-58º	R: 53º-0-52º	S: 55º-0-105º	F: 97º-0-45º	R: 45º-0-45º
T6	S: 45º-0-125º	F: 115º-0-60º	R: 55º-0-55º	S: 58º-0-108º	F: 100º-0-45º	R: 48º-0-50º
T7	S: 45º-0-130º	F: 118º-0-64º	R: 60º-0-57º	S: 60º-0-110º	F: 113º-0-45º	R: 50º-0-50º
T8	S: 45º-0-135º	F: 120º-0-65º	R: 63º-0-60º	S: 63º-0-113º	F: 115º-0-45º	R: 50º-0-50º

The results of measuring the range of motion of the joints at T1-T8 in passive motion showed an increase in shoulder flexion, abduction, and adduction, and internal and external rotation.

The results of measuring the range of motion of the joints at T1-T5 in active motion showed an increase in shoulder flexion, abduction and adduction, and internal and external rotation. The results of measuring the range of motion of the joints at T6-T8 showed an increase in shoulder

flexion, abduction and adduction motion, and for internal and external rotation showed the same motion (no increase).

There was an increase in the range of motion of the T1-T8 joints passively and actively, although there was little change.

Results of Functional Activity Measurement

The functional activity measurement was performed using the Shoulder Pain and Disability Index (SPADI).

Table 8. T1-T8 Functional Activity Measurement (Pain Scale)

No	Activity	Value							
	How severe the pain was:	T1	T2	T3	T4	T5	T6	T7	T8
1.	At its worst.	6	6	5	5	4	3	3	2
2.	When lying on involved side.	4	4	3	3	2	2	1	1
3.	Reaching for something on a high shelf.	6	5	4	4	3	3	2	2
4.	Touching the back of the neck.	6	6	5	4	4	3	3	2
5.	Pushing with the involved arm.	5	5	4	4	3	2	2	1

The measurement of functional activity on pain scale with the value of 0-10 describes 0: no pain and a value of 10 is the worst pain that cannot be imagined. When the T1 showed moderately severe pain, it was reducing to mild pain until T8. T1 when lying on the involved side showed moderate pain until T8 became mild pain. T1 when reaching for something on a high shelf showed

the slightly severe pain, then, the pain until T8 reduced to mild pain. T1 when touching the back of the neck showed the slightly severe pain, then, the pain until T8 reduced to mild pain. T1 when pushing with the involved arm showed a bit severe pain, then, the pain until T8 reduced to mild pain.

The results of the measurement of functional activity of shoulder muscle at T1-T8 showed a decrease in pain from slightly severe pain to mild pain.

Table 9. T1-T8 Functional Activity Measurement (Disability Scale)

No	Activity	Value							
	How much difficulty was:	T1	T2	T3	T4	T5	T6	T7	T8
1.	Washing hair	6	6	5	4	4	3	3	2
2.	Rubbing back	6	6	6	5	5	4	4	3
3.	Putting on an undershirt or pullover shirt	6	6	5	5	4	4	3	3
4.	Putting on a shirt that buttons down the front	6	6	5	5	4	4	3	2
5.	Putting on pants	4	4	3	3	2	2	1	1

6.	Placing an object on a high shelf	6	6	5	5	4	4	4	3
7.	Carrying a heavy object	7	7	6	6	5	5	5	4

The measurement of functional activity on disability scale with the value of 0-10 describes 0: no difficulty and a value of 10 is very difficult and requires assistance for daily personal activities. The patient's disability scale showed a decreasing score from T1 to T8, indicating the patient became rather can do personal daily activities.

At T1, when the patient washing hair, it was rather heavy, then until T8, it became a little able to do washing hair. At T1, when the patient rubbing her back, it was a bit heavy and had difficulty doing it then until T8, it became a little able to do back rubbing. At T1, when the patient putting on an undershirt or pullover shirt rubbing her back, it had difficulty doing it then until T8, it became a little ease doing it. At T1, when the patient putting on a shirt that buttons down the front, it showed a bit of difficulty in doing so and until T8 the patient was able to wear a shirt a little. At T1, when the patient putting pants, it had moderate difficulty then until T8, the patient was able to put pants. At T1, when the patient placing an object on a high shelf, it had a bit of difficulty, then until T8, the patient was a little able to do so. At T1, when the patient carrying a heavy object, it had difficulty then until T8, the patient was a little able to do so.

The results of measuring T1-T8 activity showed that patients still needed full assistance from others in placing an object on a high shelf and carrying the heavy objects, while the patient still needed a little help from others when washing hair, rubbing back, putting on an undershirt or pullover shirt, Putting on a shirt that buttons down the front.

Discussion

1. Ultrasound

Ultrasound therapy is a type of thermotherapy (heat therapy) that can reduce acute and chronic pain. This therapy uses an electric current that is passed through a transducer containing quartz crystals that can expand, contract, and produce sound waves that can be transmitted to the skin and into the body. Ultrasound therapy is performed in the frequency range of 0.8 to 3 MHz or 800 to 3,000 kHz. Lower frequencies can lead to deeper penetration of up to 5 cm. The generally used frequency is 1,000 kHz having a heating target at a depth of 3 to 5 cm under the skin. At higher frequencies which is 3,000 kHz, the energy is absorbed at a shallower depth of about 1 to 2 cm. Sound waves can cause the molecules in the tissue to vibrate, giving rise to mechanical energy and heat (Arofah, 2010). Low frequency of 2,000 had the effect of thermal ultrasound (US) and causing pain reduction. The presence of a thermal stimulus fires the large diameter afferent nerve fibers which will provide an analgesic effect through a gate control mechanism/ counter irritation role. It was occurred due to the activation of the substantia gelatinosa. When the substantia gelatinosa is active, the gate was closed so that the pain impulse stops or is not transmitted to the center. In addition to reducing pain through nerve activity, ultrasound thermal stimulus will also activate the release of histamine which causes vasodilation of blood vessels, then increase the circulation so that irritating substances (factor P) will be carried away from the tissue and pain will be reduced. (Low, 2000). Being reduced pain, the muscles can carry out movement and function.

2. TENS

TENS is a way of using electrical energy to design the nervous system through the skin surface with its modulation effect (Slamet, 2006). TENS is a low-stimulation method whose main goal is to reduce pain (symptomatic) which will stimulate sensory nerves. Low-frequency currents tend to be irritating to the skin tissue so it will be painful at high intensity. TENS is able to activate thick-diameter nerves and small-diameter nerves that will convey various sensory information to the central nervous system. The effectiveness of the tension can be explained through the control gate theory with a sinusoidal waveform specification, phase duration of 125 microseconds, and 100-200 Hz based on the actualization of conditions and intensity according to patient tolerance (Parjoto, 2006).

3. Exercise Therapy (Codman Pendular Exercise)

The aim of therapy is to improve joint play in the shoulder joint so that it can improve joint limitations both passively and actively. Manipulation therapy should be terminated when the joint has reached maximal LGS without pain and the patient can perform normal active movements (Kuntono, 2009). Manipulation therapy has been shown to have an effect on overcoming pain and joint limitations (Mudatsir, 2012). This can restore normal joint function, and the patient's functional activity will be increased without pain. After giving manipulation therapy, it can be followed by Codman Pendular Exercise. This technique is done passively by moving the shoulder joint. The mechanism for reducing pain and increasing functional activity of the shoulder with Codman Pendular Exercise is obtained through distraction (gravity) and oscillation, as well as an increase in nutrition on the joint surface, thus facilitating joint mobilization, increasing the extensibility of the glenohumeral joint capsule in patients with frozen shoulder. The force of gravity causes the glenoid head

and humeral head to stretch so that there is no friction between them. Codman Pendular Exercise can not only be performed in the hospital but it can also be performed at home by educating the patients to improve their functional activities. Codman Pendular Exercise performed to some Frozen shoulder patients showed an increased patient' shoulder joint ROM and ability of functional activity. Both manipulation therapy and

Codman Pendular Exercise can be used for frozen shoulder patients because both methods can reduce adhesion to the glenohumeral joint capsule. If the adhesion to the joint capsule is reduced, the patient's limitation of motion will decrease so that the range of motion of the joint will increase and functional activity will also increase. The Codman Pendular Exercise intervention is effective in helping frozen shoulder patients, because the movements are easy to do and the patient does not feel pain when performing the movements because the it uses gravity. The force of gravity causes the glenoid head and humeral head to stretch so that there is no friction between them. Moreover, Codman Pendular Exercise also has the advantage of cost effectiveness due to it can carry out both in the hospital and home as a home program.

CONCLUSION

Frozen shoulder due to rotator cuff tendinitis is a disorder of the shoulder joint due to repetitive trauma or excessive injury that causes pain and limited joint motion in all directions of movement. With the onset of pain and limitation of joint motion, it causes physical problems and decreased functional activity. Ultrasound, TENS, and Codman Pendular exercise physiotherapy programs are given to reduce pain and increase the range of motion of the joints. Exercise therapy can also perform at home as a form of education. The results of the given physiotherapy showed very useful findings in decreasing pain, and increasing joint ROM, muscle strength, ability of functional activity so that personal daily activities can be carried out independently.

REFERENCES

AAOS (American Academy of Orthopedic Surgeon), 2007. *Frozen Shoulder*, accessed 21 August 2015, from http://www.AAOS.frozenshoulder.com.

Barua, SK (2004). Phonophoresis in Adhesive Capsulitis (Frozen Shoulder), *13*(1), 60-64.

David R. 2009. Approach to The Patient with Shoulder Pain in Primary Care Medicine. Lippincott Williams and Wilkins. Hal: 150.

Diercks R, Stevens M. 2004. *Gentle thawing of the frozen shoulder*. J Shoulder Elbow Surg. 5(13):499.

Donatelli, RA 2012. Physical therapy of the shoulder, Elseveir, USA. physio_joint. Accessed June 18, 2017.

Dudkiewicz I, Dudkiewicz, A, Oran M, et al. 2004. *Idiopathic adhesive capsulitis: long-term results of conservative treatment*. The Israel Medical Association Journal. Vol. 6: 524-526.

Goyal, M., Bhattacharjee, S., and Goyal, K. 2013. Combined Effect of And Range Mobilization (ERM) And Mobilization with Movement (MWM) Techniques on Range of Motion and Disability in Frozen Shoulder Patients. *Journal of exercise science and physiotherapy. Vol 9. No:2.*

Goodchild, L., Handchard, N., Rangan, A., Richardson, G., Robertson, J., and cDaid, C. 2012. Management of Frozen Shoulder. Vol 16. No:11. New York Media.

Jewell DV, Riddle DL, Thacker LR. 2009. *Interventions associated with on increased or decreased likelihood of pain reduction and improved function in patients with adhesive capsulitis.* A retrospective cohort study, Physical Therapy. Vol. 89, Iss : 419-429.

Kelley, MJ, Shaffer, MA, Kuhn, JE, Michener, LA, Seitz, A. A L., Uhl, TL, McClure, P. (2013). Shoulder Pain and Mobility Deficits: Adhesive Capsulitis. *Journal of Orthopaedic & Sports Physical Therapy, 43(5), A1-A31.*

Keith S. 2010. Passive Range of Motion and Codman's Exercise American *Academy of Orthopedic Surgeons*.

Kiery. 2004. *Capsulitis adhesive American: Journal Physical Therapy*.

Kuntono HP. 2004. *Aspek Fisioterapi Syndroma Nyeri Bahu*. Kupas Tuntas Frozen Shoulder. Surabaya. Hal: 3-9.

Lubiecki M, Carr A. 2007. *Frozen shoulder: past, present, and future*. Journal of Orthopaedic Surgery. Vol. 15, iss : 1-3.

Manske. Dan Robert, C. 2008. Diagnosis and Management of Adhesive Capsulitis. www.ncbi.nlm.nih.gov/pubmed/19468904. Diakses tanggal 6 Maret 2017.

Maund, E., Craig, S., Suekarman, S., Neilson, AR, Wright, K., Brealey, S., Dennis, L., Parjoto, S. 2006. Terapi Listrik Untuk Modulasi Nyeri. Semarang. Ikatan Fisioterapi Indonesia cabang Semarang.

Margaretha, S. (2014). ORR-71115-management-of-the-frozen-shoulder, 81-90.

Neviaser AS, Hannafin JA. 2010. *Adhesive capsulitis: a review of current treatment.* The American Journal of Sports Medicine. Vol. 38. Iss. 11, 2010: 2346-2356.

Sandor, MD. 2004. *Shoulder Pain*. 3rd Edition, PTD LTD.

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Chronic Low Back Pain et causa Spondylosis and Spondylolisthesis: Case Report

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Abstract

Chronic low back pain et causa spondylosis and spondylolisthesis is a rare case. One of the physical therapy interventions, in this case, is William's flexion exercises that are proven to relieve pain and increase range of motion. The purpose of this case report is to show William's flexion exercise can maintain or even reduce signs and symptoms of the patient's condition, increase functional activity measured by Oswestry Disability Index. Our patient is a 56-years-old-woman with Chronis low back pain et causa spondylosis and spondylolisthesis grade 1 condition after 10 treatments have changed the walking distance caused by William's flexion exercise.

Keyword: Chronic Low Back Pain, Spondylosis, Spondylolisthesis, William Flexion Exercise,Walking, Physiotherapy.

1. Introduction

Chronic low back pain is the largest musculoskeletal case in the world with rates reaching 70-80% and continues to increase over time in both men and women (1). In a 2017 controlled trial-based study, it showed that core stabilization exercise reduced pain better in cases of chronic non-traumatic low back pain, in that study only measured pain not with the patient's functional ability. (2). Meanwhile, in 2020, Fabio Zaina etc. stated that until now there has not been found the most effective way to deal with pain from various things that cause it (3). Recent findings of pain felt by patients with spondylosis

cases can be treated with non-surgical management whereas, for spondylolisthesis cases, surgery is generally carried out (4).

Previous studies have not discussed many cases of chronic low back pain et causa spondylosis and spondylolisthesis simultaneously. Therefore we discuss the problem of a patient with 2 cases at once. After 1 month, we found a case of chronic low back pain et causa spondylosis and grade 1 spondylolisthesis with functional improvement results, especially walking distance with routine William flexion exercise.

2. Case Presentation

A 56-year-old woman, a teacher with a normal BMI, complained of low back pain and tingling in the lower left leg since 1.5 years ago (December, 2019) suddenly and getting worse, pain when waking up, unable to straighten legs when supine and slightly bent when standing and walking. When taking the history, the patient admitted that he had fallen when he was in 4th grade with the glutes being the focus. Since January, the patient checked his condition to the hospital. Prof. Soeharso.

The results of the inspection obtained, the patient tends to tilt to the left when standing. When examining the basic active movements of the trunk, pain was found during extension, left lateral flexion, left rotation, and when doing left hip flexion and extension there was also a shortening of the Iliopsoas, left hamstring, quadratus lumborum, erectorspine muscles. Weakness of the abdominal muscles and gluteus

For a specific examination in this case, no pain was found during the step off/on test, but instability of vertebral motion was found when performing flexion movements. Positive results were found when the left slump test, contralateral laseque, and left femoral nerve test were examined.

To confirm this, the patient underwent an X-ray test and obtained a mild listhesis of 25% L4-L5 and a narrowing of L3-L4 and L4-L5 (figure 1).

As recommended by the doctor, the patient is asked to do therapy regularly. With the results of the MRI, it is contraindicated to exercise the

trunk towards the posterior. Thus, the treatment carried out is in the form of William flexion.

William Flexion Exercise is an exercise that aims to reduce lower back pain and improve lower trunk stability with active exercises on the abdominal muscles, as well as passive stretching of the gluteus maximus, hamstring, hip flexors and sacrospinalis muscles.

Figure 1

Dosage Exercises performed 8-10 times with movements held for 10-15 seconds repeated for 3 sets or as much as possible.

After 10 times treatments for approximately 1 month there was a feeling of thick feeling in the patient's feet which was no longer felt. Previously, the patient walked only 200 m and felt pain and during the sixth evaluation it was approximately 1 km but there was still pain in the hamstring and gluteus. For functional assessment using oswestry (low back pain and disability index) which is measured once a week. The results obtained during 6 weeks of

LOW BACK PAIN AND DISABILITY INDEX (REVISED OSWESTRY)

Patient Name: _____ Date: _____/_____/_____

Please read instructions carefully.
This questionnaire has been designed to give the doctor information as to how your low back pain has affected your ability to manage everyday life.
Please read all statements in each section and mark the box which most closely describes your problem.

SECTION 1 - PAIN INTENSITY

- ❑ The pain comes and goes and is very mild.
- ❑ The pain is mild and does not vary much.
- ❑ The pain comes and goes and is moderate.
- ❑ The pain is moderate and does not vary much.
- ❑ The pain comes and goes and is very severe.
- ❑ The pain is severe and does not vary much.

SECTION 2 - PERSONAL CARE

- ❑ I do not have to change my way of washing or dressing to avoid pain.
- ❑ I do not normally change my way of washing or dressing even though it causes some pain.
- ❑ Washing and dressing increases the pain but I manage not to change my way of doing it.
- ❑ Washing and dressing increases the pain and I find it necessary to change my way of doing it.
- ❑ Because of the pain, I am unable to do some washing and dressing without help.
- ❑ Because of the pain, I am unable to do any washing or dressing without help.

SECTION 3 - LIFTING

- ❑ I can lift heavy objects without any extra pain.
- ❑ I can lift heavy objects, but it gives extra pain.
- ❑ Pain prevents me from lifting heavy objects off the floor.
- ❑ Pain prevents me from lifting heavy objects off the floor but I can manage if they are conveniently positioned on a table.
- ❑ Pain prevents me from lifting heavy objects but I can manage light to medium objects.
- ❑ I can only lift very light objects at the most.

SECTION 4 - WALKING

- ❑ I have no pain on walking.
- ❑ I have some pain but it does not increase with distance.
- ❑ I cannot walk more than one mile without increasing pain.
- ❑ I cannot walk more than 1/2 mile without increasing pain.
- ❑ I cannot walk more than 1/4 mile without increasing pain.
- ❑ I cannot walk at all without increasing pain.

SECTION 5 - SITTING

- ❑ I can sit in any chair as long as I like.
- ❑ I can only sit in my favorite chair as long as I like.
- ❑ Pain prevents me from sitting more than one hour.
- ❑ Pain prevents me from sitting more than half an hour.
- ❑ Pain prevents me from sitting more than 10 minutes.
- ❑ I avoid sitting because it increases pain.

SECTION 6 - STANDING

- ❑ I can stand as long as I want without pain.
- ❑ I have some pain on standing but it does not increase with time.
- ❑ I cannot stand for longer than one hour without increasing pain.
- ❑ I cannot stand for longer than 1/2 hour without increasing pain.
- ❑ I cannot stand longer than 10 minutes without increasing pain.
- ❑ I avoid standing because it increases the pain.

SECTION 7 - SLEEPING

- ❑ I get no pain in bed.
- ❑ I get pain in bed but it does not prevent me from sleeping well.
- ❑ Pain reduces my normal sleep by 1/4 each night.
- ❑ Pain reduces my normal sleep by 1/2 each night.
- ❑ Pain reduces my normal sleep by 3/4 each night.
- ❑ Pain prevents me from sleeping at all.

SECTION 8 - SOCIAL LIFE

- ❑ My social life is normal and gives me no pain.
- ❑ My social life is normal but increases the degree of pain.
- ❑ My social life is unaffected by pain apart form limiting more energetic interests.
- ❑ Pain has restricted my social life and I do not go out very often.
- ❑ Pain has restricted my social life to my home.
- ❑ I have hardly any social life because of the pain.

SECTION 9 - DRIVING / RIDING IN CAR, ETC.

- ❑ I get no pain while traveling.
- ❑ I get some pain while traveling but none of my usual forms of travel make it any worse.
- ❑ I get extra pain while traveling but it does not compel me to seek alternate forms of travel.
- ❑ I get extra pain while traveling which compels me to seek alternate forms of travel.
- ❑ Pain restricts all forms of travel.
- ❑ Pain prevents all forms of travel except that done lying down.

SECTION 10 - CHANGING DEGREE OF PAIN

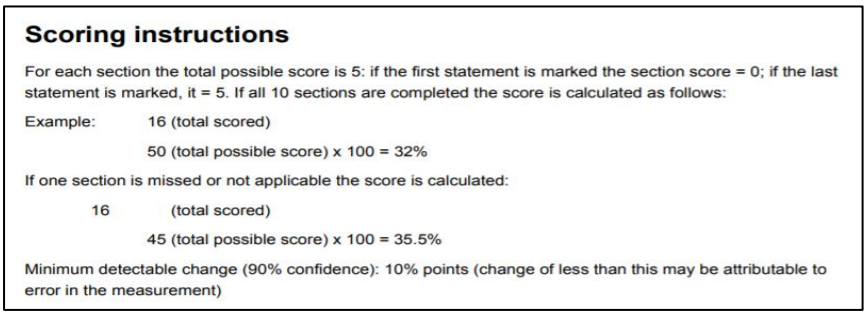
- ❑ My pain is rapidly getting better.
- ❑ My pain fluctuates but overall is definitely getting better.
- ❑ My pain seems to be getting better but improvement is slow at present.
- ❑ My pain is neither getting better or worse.
- ❑ My pain is gradually worsening.
- ❑ My pain is rapidly worsening.

therapy were 40% to 20%. These results are also due to the spirit and discipline of the patient doing therapy independently at home 2 times a day in the morning and evening with doses according to the recommendations of the therapist.

Figure 2

The Oswestry Disability Index (figure 2) is a functional measuring tool that is most often used in cases of problems with the waist. In this index there are 10 sections, where in each section there are 6 options to be marked when measuring the patient's function. If what is felt

or experienced by the patient is the first choice then the value is 0 and if the last choice is the value 5 in each section. The total assessment or measurement is described in Figure 3.



Scoring instructions

For each section the total possible score is 5: if the first statement is marked the section score = 0; if the last statement is marked, it = 5. If all 10 sections are completed the score is calculated as follows:

Example: 16 (total scored)

50 (total possible score) x 100 = 32%

If one section is missed or not applicable the score is calculated:

16 (total scored)

45 (total possible score) x 100 = 35.5%

Minimum detectable change (90% confidence): 10% points (change of less than this may be attributable to error in the measurement)

Figure 3

- If the result of the percentage of the Oswestry Disability Index <21% (minimum disability) indicates that the patient is able to do daily work. Education is the most needed thing, such as ergonomic position when sitting and lifting weights, as well as regular exercise.
- Results The percentage < 41% (moderate disability) indicates that the patient has difficulty maintaining static positions such as sitting and standing, lifting weights, traveling, and possibly having difficulty working.
- Results Percentage < 61% (Severe Disability) pain that is felt to interfere with daily activities.
- Results Percentage <81% (Crippied) Whatever the patient does, the patient feels pain in the waist, so further treatment is needed
- Results Percentage >81% Patients can only stay in bed, but this result can also be because the patient exaggerates the pain.

(Low Back Pain and Disability Index) Oswestry Item	T0 (before treatment)	T1 (2nd week of treatment)	T2 (4th week of treatment)
1. Pain Intensity	3	3	2
2. Personal Care	1	0	0
3. Lifting	0	0	0
4. Walking	4	3	2
5. Sitting	1	1	1
6. Standing	2	2	1
7. Sleeping	2	1	0
8. Social Life	2	2	1

9. Driving/Riding	1	1	1
10. Changing Degree of Pain	4	3	2
Total Score (%)	40%	32%	20%

3. Discussion

Management of cases of chronic low back pain in these patients aims to maintain or reduce signs and symptoms that interfere with the patient's daily activities. So far, William flexion exercise has been proven to reduce pain and increase range of motion in cases of low back pain exercise.

The mechanism of the William Flexion Exercise is to open the intervertebral foramen, stretch the structures in the ligaments, and give space to the apophyseal joints. Which is related to improving muscle performance. If muscle strength increases, the concentric-eccentric work of the muscles also increases. When the agonist muscle contracts, the antagonist muscle relaxes. This is very necessary so that there is no unbalanced muscle work and work harder because of compensation which causes pain when moving (4,5).

Human functional mobility is basically walking, when walking, the basic things needed are muscle synergy work, posture, coordination, balance. There are several factors that can cause interference when walking such as pain, muscle weakness, tightness, and so on (6).

In a walking analysis conducted by Shu Jee hyun (2019), the walking speed of patients with chronic low back pain is slower than that of people without back pain. In this study, it was stated that walking exercise with proper posture reduces the severity of low back pain (7).

William Flexion exercise can help reduce pain by suppressing intradiscal, -endorphins will appear and be responded to by receptors in the hypothalamus and limbic system regulating emotions. An increase in the amount of -endorphin has been shown to be effective in reducing pain, increasing blood pressure and the work of the respiratory system. The William flexion exercise aims to reduce pressure on the spinal joints, and stretch soft tissues which help to correct wrong posture and increase stability by exercising the abdominal muscles, gluteus Maximus and hamstring (8).

4. Conclusion

Chronic Low Back Pain et causa spondylosis and mild spondylolisthesis can be treated with surgical and non-surgical management, for non-surgical treatment is given to maintain / reduce signs and symptoms that interfere with daily activities. William flexion exercise has proven to be one of the treatments given to patients with low back pain. In addition, William flexion exercise can also increase the Range of Motion, activating the muscles that support posture and the muscles that also affect walking. So, it can be said that William flexion exercise can increase functional activity in someone who has chronic low back pain with the achievement of maintaining/reducing the patient's condition before treatment.

REFERENCES

1. Allegri, M., Montella, S., Salici, F., Valente, A., Marchesini, M., Compagnone, C., Baciarello, M., Manferdini, ME, & Fanelli, G. (2016). Mechanisms of low back pain: A guide for diagnosis and therapy [version 1; referees: 3 approved]. F1000Research, 5, 1–11. https://doi.org/10.12688/F1000RESEARCH.8105.1
2. Akhtar, MW, Karimi, H., & Gilani, SA (2017). Effectiveness of core stabilization exercises and routine exercise therapy in management of pain in chronic nonspecific low back pain: A randomized controlled clinical trial. Pakistan Journal of Medical Sciences, 33(4), 1002–1006. https://doi.org/10.12669/pjms.334.12664
3. Zaina, F., Balagué, F., Battié, M., Karppinen, J., & Negrini, S. (2020). Low back pain rehabilitation in 2020: New frontiers and old limits of our understanding. European Journal of Physical and Rehabilitation Medicine, 56(2), 212–219. https://doi.org/10.23736/S1973-9087.20.06257-7
4. Shamrock AG, Donnally III CJ, Varacallo M. Lumbar Spondylolysis and Spondylolisthesis. [Updated 2020 Sep 27]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK448122/
5. Gupta S. 2015. A comparison between mckenzie extensions exercises versus william's flexion exercises for low back pain in b.pt. Students. Vol. 3, Indian Journal of Physical Therapy. 2015.
6. Kane, SN, Mishra, A., & Dutta, AK (2016).Dynamic Simulation and Analysis of Human Walking Mechanism. Preface: International Conference on Recent Trends in Physics (ICRTP 2016). Journal of Physics: Conference Series, 755(1).

https://doi.org/10.1088/1742-6596/755/1/011001

7. Suh, JH, Kim, H., Jung, GP, Ko, JY, & Ryu, JS (2019). The effect of lumbar stabilization and walking exercises on chronic low back pain: A randomized controlled trial. Medicine, 98(26), e16173. https://doi.org/10.1097/MD.0000000000016173
8. Amila, A., Syapitri, H., & Sembiring, E. (2021). The Effect of William Flexion Exercise on Reducing Pain Intensity For Elderly with Low Back Pain. International Journal of Nursing and Health Services (IJNHS), 4(1), 28–36.

PROVISION COMBINATION OF CERVICAL TRACTION AND NEURAL MOBILIZATION MODALITY IN PHYSIOTHERAPY MANAGEMENT IN CERVICAL RADICULOPATHY: A CASE REPORT

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Abstract

Introduction: Cervical radiculopathy (CR) is a condition described as neck pain radiating to one or both sides of the upper limb, allowing sensory, reflex and even motor disturbances to occur. The incidence of CR was recorded as 1.07-1.75 per 1000 males and 0.68-5.8 per 1000 females. Most of the improvement was obtained through non-surgical measures, that physiotherapy management will be described in the form of a combination of cervical traction (CT) and neural mobilization (NM) modalities.
Case Presentation: A 52-year-old female patient complained of neck pain up to her left arm, appeared forward head posture, was diagnosed with cervical radiculopathy due to narrowing of the intervertebral disc from C5-7 (SMRI results).
***Management and Outcome*:** After 6 treatments, pain reduction was obtained from T0: 4/10 to T5: 2/10 numeric rating scale (NRS), the results of the goniometer measurement of the joint range of motion (ROM) neck flexion T0:42˚ to T5:45˚ and decreased disability rate from 35% (T0) to 42% (T5) neck disability index (NDI) score.
Discussion: The use of CT provides a short-term analgesic effect, increasing the intervertebral foramen space that the pressure between the discs decreases. While the NM technique will increase the ability of nerve gliding and decrease nerve mechanosensitivity.
Conclusion: The combination of CT and NM modalities can reduce pain, increase ROM and decrease disability in CR patients.

Keyword: *cervical radiculopathy (CR), radicular pain, cervical traction, neural mobilization, physiotherapy*

Introduction

Cervical Radiculopathy (CR) is a clinical condition caused by compression of the nerve roots in the cervical vertebrae. The clinical manifestations of CR are very broad but the usual symptoms are pain, sensory deficits, motor deficits and reduced reflexes or even a combination of these (1). The incidence of cervical radiculopathy cases based on epidemiological data is 1.07 to 1.75 per 1000 for males and 0.63 to 5.8 per 1000 for females (2). CR is more likely to occur in the elderly in whom the spine has degenerated, with an estimated risk of developing CR in the 50 to 54 year age range (3).

Cervical radiculopathy caused by nerve root compression may occur in 2 conditions such as disc herniation or bone osteophytes affecting cervical nerve roots. In an epidemiological study it was explained that the C7 nerve root (C6-7) herniation was the most commonly affected nerve root, followed by by nerve roots C6 (C5-6) and C8 (C7-T1 herniations). Narrowing of the nerve roots caused by disc material nerve damage both mechanically and chemically. Mechanically in the form of nerve compression that allows local ischemia and nerve damage, then chemical damage cause further sensitization and an increase the pain in related area (4). The high number of nerve root damage that occurs at levels C5-6 and C6-7 is associated with biomechanics of the cervical spine, where at levels C5-6 and C6-7 maximal flexion and extension movements occur and are at high loading. Cervical radiculopathy is a common cause of neck and arm pain with characteristic symptoms of pain radiating to the upper extremities according to a dermatomal distribution. Sensory symptoms (pain, numbness and paresthesias) may also be accompanied by weakness or altered reflexes depending on the level of the cervical nerve root involved (5).

Provocative tests were conducted to identify potential sources of neuropathic pain felt by the patient. In this case, the spurling test shoulder abduction and neck distraction can be selected for CR with a moderate sensitivity value or around 50% with a high specificity value of more than 80% (6). Imaging for CR cases should be in the form of radiographs, computed tomography scans or magnetic resonance imaging (MRI). Radiographs are usually taken from an anteroposterior (AP) and lateral view of the cervix. The data obtained from radiographs can be in the form of disc height and degenerative changes, while imaging performed from a lateral view angle will obtain better foramen evaluation results. MRI provides soft tissue evaluation for disc herniation and signs of myelomalacia. Then for imaging a CT scan is suitable to provide an explanation in the form of pathology and information on the presence of disk impingement (1). Various conservative treatments can be use as options in the management of patients with CR, but unfortunately there is not much evidence that explains which conservative treatment gives the best results in this case. The combination of two or more modalities (multi-treatment) in CR cases is widely chosen by

medical personnel and most patients have obtained improvement from non-surgical treatment for CR cases. Based on the explanation above, it can be concluded that the purpose of this study is to describe the management of physiotherapy by administering a combination of cervical traction and neural mobilization modalities in CR patients.

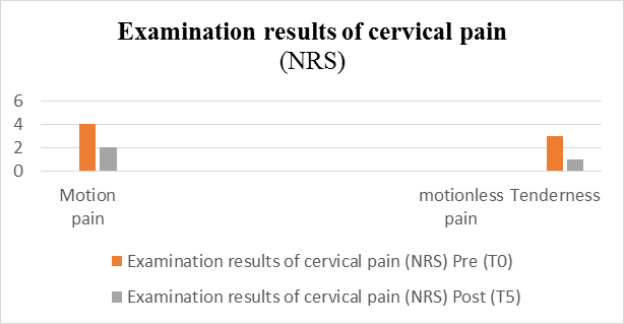
Case Presentation

A 52-year-old female patient works as a nurse. 5 years ago, the patient underwent cervical MRI with the result that there was a narrowing of the right and left C5-7 intervertebral discs resulting in irritation of the C5-6 and C6-7 nerve roots. After a few years, the complaints subsided, but approximately 3 months ago, the patient again felt radiating pain and even interfered with the patient's daily activities, including work. The patient came to the orthopedic poly and received a referral to a medical rehabilitation clinic, the patient explained that the main complaint he felt was neck pain to the left arm and it felt worse when he woke up. It was also stated that the patient has a habit of stretching his neck when he feels tense by making sudden movements to the right and left, the patient is also used to sleeping with stacked pillows, the patient appears to have a slightly forward head posture. The patient took celexocib 200 mg according to the prescription given by the doctor.

Management and Outcome

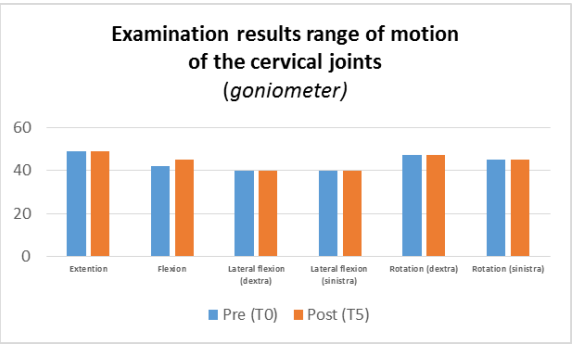
The patient's therapy visit schedule is every 2 times a week (total 3 weeks) and treatment is given in the form of a combination of 2 modalities, namely CT and NM and is given education at the beginning of the visit. The main goal of therapy is to reduce the intensity of radiating pain and for other purposes such as correcting posture and increasing ROM, especially in neck flexion motion so that an increase in the ability of daily activities will be obtained without any significant complaints. There are several examinations related to patient complaints such as pain using a numerical rating scale or NRS (table 1), joint range of motion using a goniometer (table 2), and to see the level of patient disability an examination using the neck disability index (NDI) (table 3).

Table 1. Results of pain assessment using the Numeric Rating Scale (NRS)



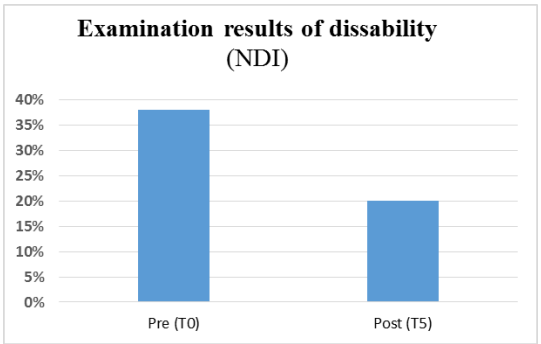
Pain assessment using the NRS where the scale consists of a value of 0 to 10 where 0 is no pain, 1 to 3 mild pain, 4 to 6 moderate pain and 7 to 10 severe pain. Motion pain only occurs when neck flexion is radiating and intermittent, motionless pain is not found, while tenderness occurs when palpation or emphasis is placed on the area m. upper trapezius.

Table 2. Results of ROM examination cervical (goniometer)



Examination of the ROM cervical joints was performed using a goniometer and only on cervical flexion which experienced an increase in from 42° (T0) to 45° (T5).

Table 3. Results of the CR (NDI) patient disability examination



Based on the examination of the degree of disability in the CR patients above, it was found

that there was a decrease in the percentage score of the NDI from 35% (T0) to 20% (T5), where the interpretation of the NDI score if 0-20% means minimal disability (mild), 20-40 % mild disability, 40-60% severe disability, 60-80% paralyzed and 80-100% completely disabled.

A special test or provocative test is given in the form of a spurling test, this test is used in cases of cervical radiculopathy. The specific value of the spurling test is 93% to be use as a diagnosis of CR, while the sensitivity value is 30% (7). The test is performed with the patient sitting relaxed, the patient neck extension and rotation to the side of the complaint (in this case left rotation) then the therapist applies pressure above the patient's head in a forward downward direction. Positive finding in the form of radicular pain to the ipsilateral side according to the direction of rotation where in this case the pain radiates to the left arm so that the patient is positive for CR. The next test is the distraction test which has the same purpose as the spurling test, carried out with the patient sitting, the therapist's palm is placed under the patient's chin and the other hand holds the patient's occipital & temporal area, then gives a pull or distraction in an upright direction to reduce the burden in the cervical area, if there is a decrease in pain from the previous pain intensity, the patient is positive for cervical radiculopathy. The specific value of the distraction test for the diagnosis of CR is 0.86 and with a low sensitivity value of 0.50 (8).

Education was given at the beginning of the visit (T0) with the aim of supporting the healing process of the CR patient. One of the educations given is in the form of posture correction by exemplifying how to properly position the head, namely the axial extension position or neutral neck position according to the recommendation of a physical therapist to reduce neck pain and spasm in the upper trapezius muscle, which CR patients often complain about (9). Mentions in the results of his research that there is an improvement in pain, function and a decrease in the level of disability after being given a combination of 2 modalities of cervical traction and neural mobilization in CR patients. The combination of the two modalities was carried out simultaneously and carried out by 2 therapists. Cervical traction is given with the aim of increasing the inter disc space and the intervertebral foramen space so as to reduce pressure on the problematic nerve roots. The results of traction will be maximized if performed in a state of muscle pain has subsided, CT (10).

The therapy is carried out in a relaxed supine position with the patient's spine in a comfortable position. CT was performed in 10 sets with intermittent mode which was given in stages from grade II, grade III and grade IV. Each set is performed for 60 seconds (1 minute) with 30 seconds of rest. Simultaneously with manual cervical traction, the patient was given NM with one of the goals to facilitate nerve gliding ability. The neural mobilization technique is a technique that includes passive motion of repetitive flexion and extension of the elbow, wrist and fingers of

the involved side and is applied slowly and oscillatingly. NM administration was initiated with low medial nerve mechanosensitivity (neutral position), then progressively increased to 90° shoulder abduction combined with external rotation to further facilitate nerve gliding and reduce the level of nerve mechanosensitivity (11).

Discussion

Physiotherapy management in CR patients with complaints of pain radiating from the neck to the left arm, tenderness in the m. upper trapezius, limited neck flexion and decreased functional ability in daily activities such as work. Patients receiving CT and NM treatment 6 times for 3 weeks of therapy have obtained a decrease in pain intensity from T0:4/10 to T5:2/10 (NRS), an increase in the degree of joint neck flexion range of T0:42° to T5: 45° (goniometer) and the final result was a decrease in the neck dissability index (NDI) score from 35% (T0) to 42% (T5). Giving CT will get a short-term analgesic effect and provide space between the vertebrae cervical which will expand the area of the intervertebral foramen so that there is a decrease in intra-disc pressure (11). The analgesic effect obtained plays a role in reducing pain in CR patients.

Giving NM will provide a neural mobilization technique were able to significantly increase the flow of nerve intraneural and dispersion of liquid nerve and improve edema intraneural and flow aksoplasma the liquid contained in and around the myelin sheath, which with increasing aksoplasma were allegedly able to reduce the deficit in sensory and motor on the part of the involved limb so There will be a decrease in symptoms such as numbness, tingling, weakness and muscle tension. As the results have been obtained, pain reduction occurs not only in motion, neck flexion tenderness in thearea m. The upper trapezius also experienced a decrease, the motor deficit as previously complained, namely the limitation in motion, neck flexion also improved, which showed an increase in the ROM neck flexion. Neural Mobilization has 2 techniques, namely sliding and tensioning, the technique is slinding considered more comfortable in patients with conditions of increased irritability and the severity of symptoms felt. So that the administration of NM in this patient uses atechnique sliding. The benefits that exist in NM will restore a state homeostatic in and around the nerves through the action of nerve mobilization, reducing nerve adhesions if this occurs where adhesions nerve will interfere with the ability of the nerves in motion sliding, reduce the level of mechanosensitivity nerve or reduce the activity of the nervous system. mechanoreceptors present in the related areas (11). Through the reduction of both sensory symptoms and motor skills after being given the combination of these modalities, the decrease in disability in patients also decreased according to the results of the pre and post NDI examination above.

Conclusion

A 52-year-old female patient with a diagnosis of cervical radiculopathy due to C5-C7 nerve root irritation (disc herniation), for 6 times (3 weeks) a combination treatment of 2 modalities in the form of CT and NM was given and there was a decrease in radicular pain, decreased tenderness in m. upper trapezius, an increase in the range of motion of the cervical joints, especially in neck flexion and a decrease in the NDI score with the interpretation of the patient being classified as mildly disabled.

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References

1. Iyer S, Kim HJ. Cervical radiculopathy. Curr Rev Musculoskelet Med. 2016;9(3):272–80.
2. Mansfield M, Smith T, Spahr N, Thacker M. Cervical spine radiculopathy epidemiology: A systematic review. Musculoskeletal Care. 2020;18(4):555–67.
3. Childress MA, Becker BA. Nonoperative management of cervical radiculopathy. Am Fam Physician. 2016;93(9):746–54.
4. Van Boxem K, Huntoon M, Van Zundert J, Patijn J, Van Kleef M, Joosten EA. Pulsed radiofrequency: A review of the basic science as applied to the pathophysiology of radicular pain: A call for clinical translation. Reg Anesth Pain Med. 2014;39(2):149–59.
5. Kim HJ, Nemani VM, Piyaskulkaew C, Vargas SR, Riew KD. Cervical radiculopathy: Incidence and treatment of 1,420 consecutive cases. Asian Spine J. 2016;10(2):231–7.
6. Cohen SP. Epidemiology, diagnosis, and treatment of neck pain. Mayo Clin Proc [Internet]. 2015;90(2):284–99. Available from: http://dx.doi.org/10.1016/j.mayocp.2014.09.008
7. Tong HC, Haig AJ, Yamakawa K. The Spurling test and cervical radiculopathy. Spine (Phila Pa 1976). 2002;27(2):156–9.
8. Wainner RS, Fritz JM, Irrgang JJ, Boninger ML, Delitto A, Allison S. Reliability and diagnostic accuracy of the clinical examination and patient self-report measures for cervical radiculopathy. Spine (Phila Pa 1976). 2003;28(1):52–62.
9. Enwemeka CS, Bonet IM, Ingle JA. Postural correction in persons with neck pain. I. A survey of neck positions recommended by physical therapists. J Orthop Sports Phys Ther. 1986;8(5):235–9.
10. Khan RR, Awan WA, Rashid S, Masood T. A randomized controlled trial of intermittent Cervical Traction in sitting Vs. Supine position for the management of Cervical Radiculopathy. Pakistan J Med Sci. 2017;33(6):1333–8.
11. Savva C, Korakakis V, Efstathiou M, Karagiannis C. Cervical traction combined with neural mobilization for patients with cervical radiculopathy: A randomized controlled trial. J Bodyw Mov Ther [Internet]. 2020;26(February):279–89. Available from: https://doi.org/10.1016/j.jbmt.2020.08.019

O-10

CASE STUDY: PHYSIOTHERAPY PROGRAM IN BELL'S PALSY

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Abstract

Introduction:Bell's palsy is an acute facial nerve disease where the first symptom is pain in the mastoid area and causes facial paralysis[1]. In one year the incidence of this disorder can occur in 23 people out of 100,000 people[2]. Problems caused by Bell's palsy include the occurrence of facial asymmetry, a decrease in muscle strength on the side of the injured face, which results in decreased functional ability and interferes with activities. Bell's palsy treatment can be given medical therapy and physiotherapy programs. Physiotherapy plays a role in increasing muscle flexibility, facilitating weak muscles in carrying out movements to improve muscle work. This report follows up on the research of[3], conducted the same program on 8 patients with similar complaints, getting results that are in accordance with this study.

Case Presentation: A 50 years male, had a profession as civil servants and muslim, residing in Ngawi, East Java. The examination that has been carried out on the patient found that there is asymmetry on one side of the face, there are limitation in the movement of opening and closing the eyes, limitations in smiling, puffing the cheeks and smile, while the movements of frowning and raising the eyebrows have not been able to do.

Management and Outcome:Physiotherapy modalities with infrared, electrical stimulation, massage facial to increasing muscle flexibility, facilitating weak muscles in carrying out movements to improve muscle work. Furthermore, to determine the patient's progress, measurement results were used in the form of a Manual Muscle Testing (MMT) to determine the increase in strength in facial muscle and Ugo Fisch Scale to determine the increase in functional ability in facial muscle.

Discussion: This study was to measure the effects of electrical stimulation, infrared and facial massage on patients with Bell's palsy. This report will follow up the research of[3] about their study on 8 patient with the same complaint whether there are result that are ini sync with this study.

Conclusion: It is proven that cases of Bell's Palsy that receive in the form of infrared, electrical stimulation and massage can increase muscle strength and can increase facial functional activity

Keyword:Infra Red, Electrical Stimulation, Facial Massage, Manual Muscle Testing, Ugo Fish Scale

Introduction

Bell's palsy is an acute facial nerve disease where the first symptom can be pain in the mastoid area and cause hemiparesis or facial paralysis[1]. *Bell's Palsy* is defined as facial nerve paresis with idiopathic peripheral type, which can affect the upper or lower face causing loss of taste on one side of the tongue or ipsilaterally. Symptoms of this disease are usually mild with complete recovery in about 2-3 weeks. The risk of developing this disease is 2% for life p . In one year the incidence of this disorder can occur in 23 people out of 100,000 people . Bell's palsy can occur in men and women where a comparison of the age of her in 10-40 years and occurred in the face of the right and left, with the number of cases of the same lot[2].

This disease usually comes quickly, even in a matter of hours or overnight with symtoms including on side of the face, invisible forehead wrinkles, weak facial muscles, looks like a tired person, difficult to speak, difficulity toblink eyes and something even unable to, dropping lips, or tilted so that is difficult to speak, difficulty eating and drinking, pain in or around the ear, sensitivity to sound, excessive or reduced salivation, loss of taste. While symptoms on one side of the eye such as difficulty closing the eyes , diminished her , brow eyes and lower eyelids seemed to fall, when exposed to light become sensitive[4].

Problems that occur in Bell's palsy *are* facial asymmetry , on the side of the lesion it will feel stiff and thick , on the side of the lesion there is a decrease in facial muscle strength, and irritation is most likely on one side of the eye with the lesion.

In the case of Bell,s palsy, physiotherapy plays a role in the restoration of functional abilities to be more optimal, so it is hoped that patients can carry out all their activities more easily such as eating and drinking, smiling, gargling, blinking and others. Giving an infrared aiming improve the circulation and causes a reduction in pressure on local edema[5]. The health benefits of massage are to occur enhancement right flexibility, providing a relaxed, and stimulates the sensory receptors in the tissue of the skin to reduce spasm[6].

Giving flow *Faradic which* is one of the intervention of physiotherapy in heading right to provide stimulation on the muscles which point the stimulus in the skin as well as for Enhancing muscle work either pitch it is in part the outside and on the inside, the flow *Faradic* cause onset of effect therapist namely the facilitation contraction in the muscles, to train the work on the muscles, and also to train the work on the new muscle[7]. Stimulation repetitive electrical will provide information to be forward to the " supra spinal mechanism,"and then going on pattern of motion and integrate in to the movement patterns of the functional[8].

[3]Said that the granting of infrared, electrical stimulation and massage can reduce stiff the muscles of face patient bell's palsy dextra. This study was to measure the effects of electrical stimulation, infrared and facial massage programs using the Ugo Fisch scale on patients with right Bell's palsy. This report will follow up the research of[3] about their study on 8 patient with the same complaint wethwer there are results that are in sync with this study.

Case Presentation

The patient feels that his lips have been drooping for three days and his eyes are difficult to close. At that time, when he was about to perform ablution, the patient felt the water leaking while gargling. In the morning the patient was taken to a neurologist by the family for a checkup and then given medicine by the doctor. Because after 3 days the complaints did not improve, the doctor was referred to physiotherapy. The patient currently has difficulty gargling, eating, speaking and closing his eyes. The patient feels more uncomfortable when driving because the eyes feel sore but when resting feels more comfortable. Patients already receiving treatment in poly neurologist with a given medication and now has to undergo physiotherapy.Personal history of the patient, the patient was an unmarried civil servants at the same time so do activities at home alone and often use fan wind after a long day at home or while sleeping.The aim is to facilitate the increase in the strength of the muscles face the patient and optimization for increasing the ability of the functional face of the patient.

Management and Outcome

Assessment inspection basic physical between covers several aspects of vital sign, inspection, and palpation. On examination ofinspection obtained their asymmetrical in any one side of the face / ipsilateral, patients are not able to close my eyes, can not be raised eyebrows and frowned, asymmetric smile. Based on the palpation study, no pain was found .

Findings in vital sign examination showed normal conditions in all aspects (blood pressure, respiratory rate, pulse rate, temperature).

Table 1. Vital Sign Examination

Vital Signs	Interpretation
Blood Pressure : 130/ 80mmHg	Within normal limits
Pulse : 84x/minute	Within normal limits
Breathing : 18x/minute	Within normal limits
Temperature : 36 C	Within normal limits

In the examination of basic motion using active motion examination . For this active movement examination, it was found that there were limitations in the movement of opening and closing the eyes, limitations in smiling, puffing the cheeks and prodding, whereas in the movements of frowning and raising the eyebrows, it was not possible to do this .

Table 2. Examination Results on Facial Muscle Strength

muscle activator	muscle function	MMT value

m. frontalist	wrinkled forehead	0 (not the contraction of muscles)
m. orbicularis oris	Scream or whistle	1 (minimum muscle contraction)
m. zygomaticus major	Smile	1 (minimum muscle contraction)
m. orbicularis oculi	Close your eyes	3 (there are contractions but do with maximum effort)

Examination of facial muscle strength, measured by Manual Mucsle Testing (MMT) which has 4 rating categories from 0 to 5, Where 0 is no contraction and 5 is normal contraction with maximu effort, the result show that at m. frontalis muscle contraction did not occur and was given a value of 0, in m zygomaticus major and m. orbicularis oris the same contraction accured, namely minimal muscle contraction and was given a value of 1, in m. orbicularis oculi was found to have contractions but was performed with difficulty and was given a score of 3.

For functional on the face using a *Ugo Fisch Scale* , this examination is aimed at evaluating the progress of the movement in the face of patients with Bell's Palsy. The use of when it aims to provide an assessment on side sick and the healthy side with five positions are not the same , namely when it breaks, frowned, closing his eyes, smile and whistled.Here used 4 rating given in % for each position are listed in the table below among others:

Table 3. Assessment of Patient Ability in %

0%	Zero means complete asymmetry , and no voluntary movement occurs
30%	Poor means healing towards asymmetry
70%	Fair means partial healing towards symmetrical
100%	Normal means contraction and controlled

Percent here is a percentage that matches the ability of the patient which will relate to the muscle strength that occurs in each movement. The score will be well worth it if it is close to 100 , so that if it has not been approached or reached the sum of 100 from all activity should act physiotherapy still do to prevent the symtoms of remainder we caused.

The percentage figure from each position are converted into scores with points as shown in the table below :

Table 4. Point Value of Ugo Fisch Scale

Rest position	20
Frowning	10
Close eyes	30
Smile	30
Whistling	10

For conditions normal in the sum of five positions a face that is numbered 100. Score evaluation obtained from figure percentage multiplied by each point. Where will be obtained and final score from the sum of the five point of assessment.

For thr final value of the five aspects, they are classified in a classification table according to their degree, which is presented in the table below :

Table 5. Degrees of Ugo Fisch Scale

Degree	Score	Results
I	100	Normal
II	75-99	Mild paralysis
III	50-75	Moderate paralysis
IV	25-50	Paralysis was severe
V	1-25	Severe paralysis
VI	0	paralysis total

Describes the severity of the disease experienced by someone who has *Bell's palsy* which is grouped into grades I to VI. Where it is said to be normal or cured if the patient has a score of 100 so that it is categorized into grade I, and it is said to have total paralysis if the patient has a score of 0 so it is categorized into grade VI.

Table 6. Results of Examination Functional on Muscles Face

Face position	Score
At rest	20 points x 70% = 14
wrinkled forehead	10 points x 0% = 0
Closing the eyes meeting	30 points x 30% = 9
Smile	30 points x 30% = 9
Whistling	10 points x 30% = 3
Total value	35

In the examination above, an assessment of the five points of the facial position on the Ugo Fisch scale is carried out which is multiplied by a percentage that is according to the ability of the patient. Where in the resting position the final score is 14, when frowning, the final score is 0, when closing the eyes, the final score is 9, when smiling, the final score is 9, and when whistling, the final score is 3. Overall, the total score is 35, where in this condition the patient is in the category of grade IV group, which means the patient has moderate to severe paralysis on one side of his face.

Sensibility testnusing tactile sensation and tongue tasye test. Examination of the patient's sensibility used a tactile examination which obtained a decreased sensation, on examination the therapist touched the patient's left and right face which found a thicker feeling felt on the side of the face that experience weakness. On examination of the soy sauce taste test, it was reported that the patient was still able to distinguish sour, sweet, salty and bitter tastes so that no decrease in taste was found.

Physiotherapy Program Plan

All physiotherapy measures will be given to patients where the patient undergoes all treatment procedures in the hospital.The patient was admitted to the physiotherapy clinic. The purpose of all the modalities of physiotherapy given is improving recovery or prevent the degeneration of the nerves and muscles, for muscle relaxation and effect sedative,

Facilitating their muscle contraction, muscle work can be educated back, give exercise on muscle were paralyzed, relaxes and improves blood circulation and the preservation of tone muscles. At table below this would explain all the actions are awarded

Table 7. Physiotherapy Program

Intervention	Dose	Information	Aim
infra red	F:3 times a week I:30- 40 cm patient tolerance Tim e : 15 minutes	Perpendicular position of weak areas	increase circulation so that the pressure edema, local will be reduced
Electrical stim ulation	F: 3 times a week I: patient tolerance faradic current Q: 3 sets , each motor point contractions 30 times.		facilitating contraction of muscle, me mberikan exercise on muscle, as well as train the work at o tot the new

Facial massag e	F : 3 times a week I: 3-5 times repetition of every move Time:5-10 Minutes	To increase flexibility, produce a r elaxing effect ,

Discussion

Muscle Strength Measurement Results with MMT

Table 8. MMT measurement results from the first to seventh therapy

	Score						
	IT	T2	T3	T4	T5	T6	T7
M .Frontralis	0	0	1	1	1	3	3
M.Orbicularis Oculi	3	3	3	3	3	3	4
M. Zygomaticus Major M. Zygomaticus Minor	1	1	1	1	1	3	3
M.Orbicularis Oris	1	1	1	1	1	1	3

The table above shows and increase in muscle strength from T1 to T7. Application of electrical stimulation using current faradic for facilitating contraction of muscle obtained an increase in T1 from the value (0) musculus frontalis, value (3) musculus orbicularis oculi, the value of (1) musculus zygomaticus major, musculus zygomaticus minor, musculus orbicularis oculi, which increased in T7 be value (3) musculus frontalis, value (4) musculus orbicularis oculi, value (3) musculus zygomaticus major, musculus zygomaticus minor, musculus orbicularis oris.

Results of Measurement of Facial Functional Ability (Ugo Fisch Scale)

Table 9 . Functional Ability Measurement Results from the first to seventh therapy

T1	Saat istirahat	20 x 70% = 14
	Mengerutkan dahi	10 x 0 % = 0
	Menutup mata rapat	30 x 30% = 9
	Tersenyum	30 x 30% = 9
	Bersiul	10 x 30% = 3
	Jumlah	**35**
T2	Saat istirahat	20 x 70% = 14
	Mengerutkan dahi	10 x 0 % = 0
	Menutup mata rapat	30 x 30% = 9
	Tersenyum	30 x 30% = 9
	Bersiul	10 x 30% = 3
	Jumlah	**35**
T3	Saat istirahat	20 x 70% = 14
	Mengerutkan dahi	10 x 0% = 0
	Menutup mata rapat	30 x 30% = 9
	Tersenyum	30 x 30% = 9
	Bersiul	10 x 30% = 3
	Jumlah	**35**
T4	Saat istirahat	20 x 70% = 14
	Mengerutkan dahi	10 x 30% = 3
	Menutup mata rapat	30 x 70% = 21
	Tersenyum	30 x 30% = 9
	Bersiul	10 x 30% = 3
	Jumlah	**50**
T5	Saat istirahat	20 x 70% = 14
	Mengerutkan dahi	10 x 30% = 3
	Menutup mata rapat	30 x 70% = 21
	Tersenyum	30 x 30% = 9
	Bersiul	10 x 30% = 3
	Jumlah	**50**

T6	Saat istirahat	20 x 100% = 20
	Mengerutkan dahi	10 x 70% = 21
	Menutup mata rapat	30 x 100% = 30
	Tersenyum	30 x 70% = 21
	Bersiul	10 x 30% = 3
	Jumlah	**74**
T7	Saat istirahat	20 x 100% = 20
	Mengerutkan dahi	10 x 70% = 21
	Menutup mata rapat	30 x 100% = 30
	Tersenyum	30 x 70% = 21
	Bersiul	10 x 70% =21
	Jumlah	**113**

On the result of the measurement of the ability of functional use (*Ugo Fisch Scale)*during T1 and T7 found any increase in the ability of the functional are significant mainly on the activity of closing the eyes and when the rest already obtained the result of a perfect 100%, while the activity wrinkled forehead, smilling and whistling already happened increase be 70%. From the result of therapy above obtained prognosis both in the case of bells palsy this.

1. Infrared

Have physiological effects to the enhanching metabolism in layers of superficial skin that causing increase the supply of oxygen and nutrients to the tissues that eventually will provide relaxation to the muscles and the effect on increasing the ability of contraction in the muscles[9].

This is in accordance with the study of[3] who provided physiotherapy actions in right *Bell's palsy* patients and the sample consisted of 8 people . In table 4, it can be seen that there is an increase in the average, namely at rest with a scale of 0.38 to 7.00 which means that when the condition is still there is an increase; in the position of frowning the scale of 4.50 rose to a scale of 8.13 where this also increased ; for the position of closing the eyes obtained a scale of 6.38 to a scale of 16.50 which in this condition of closing the eyes also increased; when smiling from a scale of 7.88 it rose to 18.00 which means that in this smiling position there is also an increase ; the position of whistling from a scale of 3.50 rose to a scale of 7.00 which means that in this whistling condition there is also an increase.

2. Electrical Stimulation

ES can suppress chemical mediators required for reconnection of axon twigs with motor end plates in muscles as well as reduce random electrical activity of nonfunctioning muscle fibers. ES that maintains a partial nerve supply can simulate muscle overuse and contribute to suppression of chemical mediators required for the reinnervation of denervated fibers[10]. In this study, Sheth MS et al., for groups A and B, the difference in the mean score of the facial scoring system at the end of 4 weeks was found to be statistically significant ($z = 4{,}861$, $z = 4{,}016$, $p < 0.001$). However, at the end of 4 weeks the difference in median values between groups was not found to be

statistically significant (z=0.420, p=0.675). Conclusion: Results show no benefit or harm with electrical stimulation in subjects with early facial paralysis .

Flow faradic is one intervention fisioterapi that is useful to provide stimulation or stimulation of the muscles work which point the stimulus in the skin and to play arole in enhancing muscle work which is located in part outside or in part inside. Stimulation electrical granted on nerve hatched will result ini facilitation for weak muscle in movement in a movevent of his[8].

In the study of Emad Eldin, 2020 said that the application of TENS and faradic currents appears to be a safe method in treating bell's palsy because it can reduce the severity of the symptoms, especially in the early stages, with a preference to apply TENS rather than faradic currents alone or with TENS[11].

3. Massage

Will provide stimulation in network software to improve the flexibility of muscles, giving stimuli early on receptor of sensory tissue in the skin which can ultimately cause effect of relaxation. Massge provided with a smooth (gentle) in the face of the lesions will reduce complaints numbness or sense of te bales are felt by the patient, the enchancement metabolic processes where the nature of muscle physiology is expeted to be maintained properly ang to keep the relaxation of muscle face between another onmusculus frontalis, musculus orbicularis oculi, musculus zygomaticus major, musculus zygomaticus minor, musculus orbicularis oris[6].

Conclusion

It is proven that cases of Bell's palsy that receive treatment in the form of infrared, electrical stimulation and massage can increase mescle strength and can increase facial functional activity.

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References

1. NicolaMarotta, 2020. *Neuromuscular electrical stimulation and shortwave diathermy in unrecovered Bellpalsy* Arandomized controlled study Medicine 99:8
2. Dona,R. 2015. *Laki-laki 45 tahun dengan Bellspalsy*. Jurnal ilmiah kesehatan.
3. Suci Aminati, dkk. *2017. Pengaruh Infra Red dan Elektrical Stimulation serta Massage terhadap Kasus Bells palsy Dekstra Jurnal Fisioterapi dan Rehabilitasi* (JFR) Vol.1, No.1,Tahun2017 ISSN 2548-8716
4. Choi et all. 2020 *Effects of a facial Muscle Exercise Program including Facial Massage for Patients with Facial Palsy, Korean Acad Nurs* Vol.46 No.4,542-551 http://dx.doi.org/10.4040/jkan.2016.46.4.ISSN(Print)2005-36731 ISSN (Online)2093-758X
5. Banuetal.(2013).OriginalArticle,1(1),36–43.https://doi.org/10.5144/0256-4947.2012.37
6. Prentice,W., 2012. *Therapeutic Modalities in Rehabilitation;*MCGrawHill,NewYork.

7. Singh,J. 2005. *Textbook of Electrotherapy*; Jaype Brothers Medical Published Delhi.
8. Hasan,S. 2015. *Bell's Palsy–A Phychologically Distressing Condition–Overview Of Literature*. World jurnal of pharmacy and pharmaceutical sciences
9. Sujatno. 2002. *Sumber Fisis* ; Akademi Fisioterapi Surakarta DepkesRI, Surakarta
10. Sheth Megha, 2013. Sandeep *Effect Of Electrical Stimulation On Facial Grading System In Subjects With Early Facial Palsy* NJIRM 2013; Vol. 4(3).May- June ISSN: 0975-9840 ISSN: 2230 - 9969
11. Emad Eldin. 2020. *Effect of Transcutaneous Electrical Nerve Stimulation And Faradic Current Stimulation on the Recovery of Bell's Palsy* International Journal of Human Movement and Sport Science 8(6):369-380,2020 DOI:10.13189/SAJ.2020.080608

O-10

COMBINATION TENDON AND NERVE GLIDING EXERCISE WITH NEURODYNAMIC MOBILIZATION TO IMPROVE HAND FUNCTION IN CARPAL TUNNEL SYNDROME PATIENT: A CASE REPORT

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Abstract

Introduction: Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy of the upper extremity caused by compression of the median nerve with an overall prevalence in the general population of 5.3% for women and 2.1% for men. In general, CTS will cause pain, neurological symptoms, and decreased functional ability and can interfere with daily activities. Treatment of carpal tunnel syndrome (CTS) can be done by giving a physiotherapy program, one of which is exercise. The purpose of this study was to determine the effectiveness of the combination of tendon and nerve gliding exercise with neurodynamic mobilization on increasing functional activity in patients with Carpal Tunnel Syndrome (CTS).
Case Presentation: A 19-year-old woman came with a diagnosis of Carpal Tunnel Syndrome Dextra. She had a tingling sensation in his 1,2,3 and 4th half finger with carpal compression and a positive Phalen test. The patient was given a combination of tendon and nerve gliding exercise with neurodynamic mobilization for 6 weeks face-to-face and was evaluated.
Management & Outcome: The patient showed good adherence to the program and achieved the desired goal within 6 weeks of therapy. The patient showed improvement (in pain, range of motion, and hand function. Tendon and nerve gliding exercise combined with neurodynamic mobilization was effective in improving clinical symptoms in patients with CTS.
Discussion: Several recent pieces of literature state nerve and tendon gliding exercise as an alternative intervention in conservative management of CTS. Nerve and tendon gliding exercise is a joint and tendon mobilization exercise program that can be applied by performing several movements of the hands and wrists. This case report combines neurodynamic mobilization. This Exercise Program was carried out for 6 sessions and after 6 weeks of close monitoring and guidance of a combined training program. Overall, the results of this case report for CTS-related disorders and clinical symptoms showed significant results for improving hand function in CTS patients.
Conclusions: A combination of tendon and nerve gliding exercise with neurodynamic mobilization is effective for improving hand function in CTS patients.

Keywords: carpal tunnel syndrome, tendon nerve gliding exercise, neurodynamic mobilization, hand function

Introduction

Carpal tunnel syndrome is the most common case of median nerve entrapment leading to symptoms of peripheral neuropathy. In the general population, the overall prevalence rate is 5.3% for women and 2.1% for men, and the incidence is higher in some occupations (19). In Indonesia, the research of Andrian et al (2017), found that the prevalence of CTS among administrative staff at Hasan Sadikin General Hospital Bandung was 3.3% (4). Although the exact cause of CTS is unknown, it is believed to be caused by a variety of factors, including continuous strain, overuse, repeated or prolonged wrist extension, holding equipment for long periods, and unfamiliar manual work. The occurrence of CTS is caused by increased intracarpal pressure, decreased mobility of the median nerve due to the presence of fibrous tissue, deformation in the form of compression and stretching of the median nerve, increased stiffness of the synovium and the flexor retinaculum or transverse carpal ligament, and hypertrophy of the thenar muscle that puts pressure on the carpal tunnel, the thickness of the flexor tendons overactivity (16) (21).

Typical characteristics of CTS include the presence of complaints including numbness and tingling in the thumb, 2nd finger, 3rd finger, and 4th half finger, weakness of thumb abduction and oppositional movement, pain in the palm and fingers, swelling, temperature changes, and worsens when repeated activities are made and gets worse at night (1)(16). Other symptoms of CTS sufferers usually manifest as decreased mobility of the cervical spine, decreased grip strength, and changes in posture in the form of lateral flexion away from the affected side (18).

Treatment of CTS varies depending on the severity of symptoms, duration of symptoms, and patient preferences. Exercise is one of the recommended physiotherapy options for CTS. Exercise can reduce median nerve pressure in the hand, increase range of motion and improve hand function (2). Physiotherapy also often uses active tendon and nerve gliding exercises, which are mechanically based interventions that can stimulate soft tissue healing and increase the vascularity of the median nerve in the carpal tunnel (14). Active tendon and nerve gliding exercise can reduce edema, increase median nerve activity

by reducing density surrounding connective tissue, and enhances nociception by reducing the concentration of inflammatory substances and increasing the sensitivity of the peripheral nervous system (13). In patients with CTS, tendon and nerve gliding exercise can improve short to medium-term outcomes when combined with other treatments (11).

Recently, several studies have reported the best results when neurodynamic mobilization is used as a conservative treatment, where nerve shifts help to mobilize nerves relative to musculoskeletal tissue (5)(20). The biomechanical effect of this treatment is to restore nerve activity by reducing edema and carpal tunnel adhesions. Due to the chronic nature of CTS, studies have also described the neuromodulatory effects of nerve mobilization techniques, such as reduction of median nerve perception; reduction of pain-causing substances and inflammation, and reversibility of previously enhanced pain pathways. Therefore, peripheral and central sensitization can reduce or reduce the possibility of pain regulation (9)(12). However, the clinical effectiveness of neurodynamics combined with tendon and nerve gliding exercise is unclear because very few studies to date have analyzed this combined approach for the treatment of CTS.

This case study aims to determine the effectiveness of the combination of tendon and nerve gliding exercise with neurodynamic mobilization to improve hand function in CTS patients.

Case Presentation

The case of a 19-year-old woman; BMI 27.1 (height = 1.55 meters, weight = 65 kg); right-handed users; a student (who often spends hours in front of a laptop, typing about 10 hours a day) came to the physiotherapy poly at RSUD Dr. Soeselo Slawi. This case study was conducted for 6 weeks (February 2021 - March 2021) the patient was referred from a neurologist to the physiotherapy outpatient polyclinic Dr. Soeselo Slawi with a diagnosis of carpal tunnel syndrome dextra.

The patient reported a 1-year history of worsening CTS on the right side (from January 2020) and complained of wrist pain, tingling, and discomfort, extending from the

wrist to the upper arm behind the elbow. Intermittent numbness of the first to fourth fingers, especially at night. The patient's complaints will decrease when the patient rests and gently massages the wrist area or shakes the hand. This combination of exercises aims to reduce pain, restore muscle strength, and optimize daily functional activities in the patient's activities as a student.

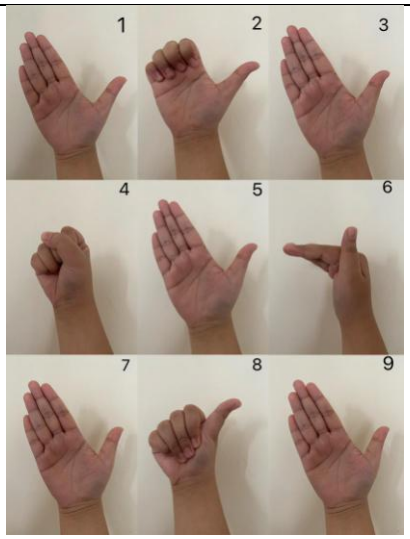
The basic physical examination includes inspection and palpation. According to the inspection results, there is no edema or deformation of the hands. Palpation revealed right wrist flexor muscle spasm and right wrist tenderness. The physiotherapist then performs special examinations to diagnose carpal tunnel syndrome. This syndrome is diagnosed using the Phalen test and the carpal compression test. In two special tests, a positive tingling sensation was found and extended to the first, second, third, and fourth fingers.

Basic movement examination is carried out through passive, active, and isometric examinations. During passive motion examination, it was found that there was a limited range of motion (ROM) in palmar flexion movements and pain appeared when the movement was forced to exceed the ROM threshold. Isometric movement examination showed pain when performing an isometric examination in palmar flexion movements.

Pain assessment uses the Numeric Pain Rating Scale, a pain measurement tool to determine pain intensity on a numerical scale of 0 to 10. An eleven-point pain scale with scores ranging from 0 "no pain" to 10 "worst pain imaginable" for current pain levels, and worst during the previous 24 hours, Measurement of muscle strength using Manual Muscle Testing (MMT), which is used in physical therapy. MMT uses 5 criteria for assessing muscle strength. Functional activity examination, especially for the upper extremities with Boston Questionnaire Carpal Tunel Syndrome (BQCTS). The CTS-related disability questionnaire consists of 11 Symptom Severity Scale (SSS) questions and 8 Functional Status Scale (FSS) questions. Score in both scales ranged from 1 to 5 points with a higher score being equivalent to more than 120 severe symptoms or a higher degree of dysfunction and a score of 1 being equal to absence of symptoms or dysfunction. BCTQ has been shown to have good reproducibility, internal consistency, and validity in patients with CTS.

Management and Outcome

Patients are given verbal and written instructions along with printed illustrations to perform the following exercises for the wrist/hand: tendon and nerve gliding exercises (Fig. 1a & 1b); and the therapist performed neurodynamic mobilization (Fig. 2). The therapist administered this exercise combination until the patient's 6-week follow-up visit and was provided with an exercise journal for record compliance. The prescribed exercises were:



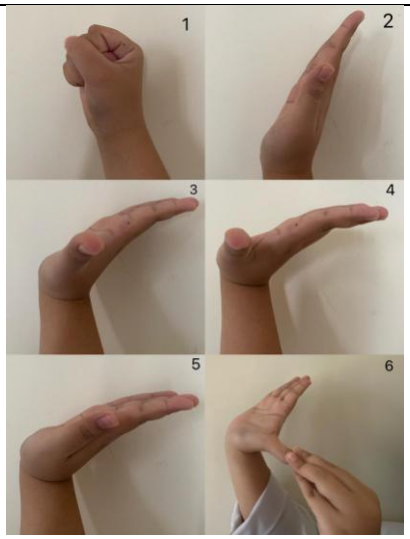
Tendon Gliding Exercise

- Palmar and all fingers in a straight position
- Bend your fingers down until each knuckle and fingertips touch the top of your palm
- Make a fist and squeeze slowly
- Bend the patient's fingers straight ahead to form the letter "L"
- Bend your fingers only at the MCP joints and PIP joints and then return to the starting position

Dose

F: 3-5x a week; I: - T: 1 set, hold 7 seconds.

Figure 1a. Tendon Gliding Exercise



Nerve Gliding Exercise

- The wrist is in a neutral position and the fingers and thumb are in a flexed (grasped) position.
- Then, with finger extension.
- With wrist and finger extended and thumb in neutral.
- With wrist, finger, thumb extension.
- Like the fourth position, with the forearm supinated.
- Like the fifth position, and the other hand gently stretching the thumb.

Dose

F: 3-5 times a week I: - T: 1 set, hold 7 seconds.

Figure 1b. Nerve Gliding Exercise

Neurodynamic Mobilization

- The therapist's initial position is a fixation on the patient's shoulder and one hand holds the patient's palm.
- The therapist moves the patient's hand to a 90-degree shoulder abduction position
- The therapist moves the patient's hand to an external position of shoulder rotation
- The therapist moves the extension of the patient's finger and wrist
- The therapist moves the patient's hand to the supine position
- In the last step, the therapist moves the patient's hand to an extended position from the elbow, is given 15 seconds of resistance with 10-second intervals repeated 10 times.

Dose

F: 2 x a week; I: to the extent of discomfort; T: 10 repetitions of 15-second hold and 10-second interval; T: Neurodynamic Mobilization

Figure 2. Neurodynamic Mobilization of the Median Nerve

Result

Total meetings and giving exercise combinations were 6 sessions. After 6 weeks of close monitoring and a guided combination exercise program, the patient showed improvement in symptoms. Based on the evaluation records, clinical outcomes had greatly improved outcomes with the implementation of a combination exercise program. Pain decreases, ROM increases, and hand function improves. Improved functional status according to BCTQ.

At the end of the follow-up period, the patient was able to write for 2 hours, type, and do daily household chores without pain (Table 1). The patient still hopes that the minor residual pain he feels in both hands will subside and he can be pain-free and continue to do his hand activities more efficiently.

Table 1. Case Study Evaluation Results

	T1	T2	T3	T4	T5	T6
ROM (ISOM)	S : 55° - 0° - 55°	S : 55° - 0° - 55°	S : 60° - 0° - 60°	S : 60° - 0° - 65°	S : 60° - 0° - 70°	S : 60° - 0° - 70°
PAINFUL (NPRS)	5	4	4	3	2	2
MUSCLE STRENGTH (MMT)	4	4	4	5	5	5
FUNCTIONAL (BCTQ)	20 (moderate)	16 (mild)	16 (mild)	10 (mild)	8 (asymptomatic)	7 (asymptomatic)

Discussion

Patients in this case report are encouraged to keep records of the designated rehabilitation programs to support patient compliance with the programs carried out in this report. Patients showed significant improvement in clinical signs and symptoms (reduced pain, increased hand ROM and forceps function, and improved functional ADL indicators). Therefore, close collaboration and communication with patients and patient adherence to the combination exercise program in this case report had a significant impact on patient outcomes and changes.

Mobilization exercises are commonly used for CTS symptoms by increasing axonal transport and nerve conduction. The most common mobilization exercises are tendon gliding and nerve gliding exercises. Tendon gliding and nerve gliding exercises can maximize the relative excursion of the median nerve in the carpal tunnel and excursion of the flexor tendons relative to each other (22). The exercise is a sequence of finger movements, for gliding the tendon, and movements of the wrist and fingers, for gliding the median nerve. The patient should practice 3 to 5 times a week, every 10 repetitions. Each position is held for seven seconds (9).

Some recent literature mentions nerve and tendon gliding exercise as an alternative intervention in the conservative management of CTS (7). Nerve and tendon gliding exercise

is a joint and tendon mobilization exercise program that can be applied by performing several movements of the hands and wrists.

This exercise program was followed by improvement in clinical symptoms in patients, measured for 6 weeks. This exercise also helps the tendons shift to their original position which can increase the range of motion of the joints and optimize the patient's hand function. This program can be included with other non-medical interventions such as splinting and lifestyle changes (22). According to the American Academy of Orthopedic Surgeons, this exercise is divided into 4 main parts, namely: wrist extension stretch, wrist flexion stretch, median nerve glides, and tendon glides (2).

It was reported that tendon and nerve gliding exercise resulted in significant improvement in CTS-related symptoms, including the severity of clinical symptoms in terms of pain and general functional status of patients in all study groups based on a meta-analysis by Kim, which identified 4 randomized controlled trials. A systematic review of nerve and tendon gliding exercise as an intervention in CTS reported that after performing this exercise routinely at the clinician's dose, participants experienced faster clinical symptoms, shorter pain recurrence intervals, and return to optimal hand and wrist function. . As many as 2 of the 3 studies reviewed that compared nerve and tendon gliding exercise with other conservative interventions such as splinting showed that all participants in the treatment group experienced significant improvement in CTS symptoms in the form of pain compared to the comparison group.

Nerve and tendon gliding exercise can maximize symptom improvement caused by median nerve compression in the carpal tunnel and flexor tendon-related symptoms that occur in CTS patients. When the exercise is performed, remodeling and stretching of the tenosynovium around the carpal tunnel structures occur, this reduces adhesion and compression of the structures within the carpal tunnel. In other words, this exercise can return the anatomical structure to its original position and so that the compression adhesion in the tunnel is reduced and the symptoms also gradually disappear. This effect is also thought to increase the venous return from the median nerve so that the pressure in the canal is reduced (6) (17).

Neurodynamic mobilization has the effect of reducing nociceptive pain in nerves by increasing intraneural nerves (10). Another effect of neurodynamic mobilization has a potential effect on nerves that can reduce swelling of nerves, increase blood supply to nerves and improve median nerve neurodynamics (8). The principle of Neurodynamic mobilization adopts tension utilizing elongation of the nerves which can increase the transmission of nerve impulses to the distal, slide nerves where nerve excursions occur which make the transmission of nerve impulses from proximal to distal and compression, in the case of CTS there is pressure due to muscles and fascia, on Its execution involves an elbow extension maneuver, extension of the wrist, Lateral ipsilateral flexion of the neck closes the spinal canal and intravertebral foramen around the nerves, so that in this position there is an increase in nerve pressure which will pump impulses from proximal to distal. The provision of Neural Mobilization was evaluated after 10 weeks using the Boston Carpal Tunnel Questionnaire (BCTQ) measurement, which increased functional status by 47%, for a 67% reduction in subjective symptoms of CTS (15).

This is in line with the original study, Elgendy, Ali, and Labib (2018), which investigated the effectiveness of neurodynamic mobilization in CTS patients, and the intervention was applied three times per week for two weeks. Significant improvements were seen in pain levels, along with improvements in upper limb function, as measured using the upper limb functional scale (UEFS). Neurodynamics plays an important role in pain management and improves nerve root mobility. When nerve roots are under pressure and microcirculation is impaired, pressure on the nerve roots can cause edema and demyelination. Neurodynamic techniques involving short oscillations have been shown to reduce edema and thereby reduce hypoxia and hiss (3).

Therefore, the literature on training combination purchasing programs should be improved. Further research should be carried out with more participants and the incorporation of more complicated technologies with suitable conventional therapies in physiotherapy services in Indonesia to propose a more robust approach to patient functional

improvement. This exercise program was carried out for 6 sessions and after 6 weeks of close monitoring and guidance of a combined exercise program Overall, the results of this case report for

disorders and clinical symptoms related to CTS showed significant results for improving hand function in patients with CTS in this case the patients were able to write for 2 hours, type, and do daily household chores without pain. In particular, the persistence of the results of this report for 6 weeks can be attributed to the combined administration of nerve and tendon gliding exercise with neurodynamic mobilization.

Conclusion

The combination of giving tendon and nerve gliding exercise with neurodynamic mobilization can be an effective alternative mediating intervention for patients with CTS. The biomechanical effect of this exercise can reduce adhesion to carpal tunnel edema and restore nerve portability. Given the high incidence of CTS, it is necessary to have an effective and efficient alternative therapy applied to CTS patients, one of which is nerve gliding exercise and neurodynamic mobilization. This case report can conclude that tendon and nerve gliding exercise combined with neurodynamic mobilization is effective in improving hand function in CTS patients.

Acknowledgments

References

1. Rahman F. Studi Kasus: Program Fisioterapi Pada Carpal Tunnel Syndrome Case Study: Physiotherapy Programs in Carpal Tunnel Syndrome. J Fisioter dan Rehabil. 2020;4(2):58–66.
2. American Academy of Orthopaedic Surgeons. (2016). Management of carpal tunnel syndrome evidence-based clinical practice guideline. http://www.aaos.org/ctsguideline Accessed November , 2019.
3. Andayani NLN, Wibawa A, Nugraha MHS. Effective Ultrasound and Neural

Mobilization Combinations in Reducing Hand Disabilities in Carpal Tunnel Syndrome Patients. J Keperawatan Indones. 2020;23(2):93–101.
4. Andrian, Lailiyya N, Novitri. Carpal Tunnel Syndrome Prevalence and Characteristics among Administrative Staff at Dr.Hasan Sadikin General Hospital Bandung. Althea Med J. 2017;4(2):192–6.
5. Hartantri W, Arfianti L. Combination of Telerehabilitation with Conventional Therapy in the Treatment of Bilateral Carpal Tunnel Syndrome: A Case Report. Surabaya Phys Med Rehabil J. 2020;2(2):73.
6. Putri P. Nerve and Tendon Gliding Exercise As Nonmedical Intervention for Carpal Tunnel Syndrome. Essence Sci Med J [Internet]. 2019;17(2):34–9. Available from: https://ojs.unud.ac.id/index.php/essential/article/view/53789
7. Azza, Mohamed & Atya, Azza & Mansour, Waleed. (2011). Laser versus Nerve and Tendon Gliding Exercise in Treating Carpal Tunnel Syndrome. Life Science Journal. 8.
8. Talebi GA, Saadat P, Javadian Y, Taghipour M. Manual therapy in the treatment of carpal tunnel syndrome in diabetic patients: A randomized clinical trial. Casp J Intern Med. 2018;9(3):283–9.
9. Utomo P, Surya WA, et al. Current Concept Management of Carpal Tunnel Syndrome: A Case Report. Indones J Med. 2020;5(1):70–86.
10. Fernández-de-las-Peñas C, Cleland J, Palacios-Ceña M, Fuensalida-Novo S, Alonso-Blanco C, Pareja JA, et al. Effectiveness of Manual Therapy versus Surgery in Pain Processing due to Carpal Tunnel Syndrome: A Randomized Clinical Trial. Eur J Pain (United Kingdom). 2017;21(7):1266–76.
11. Huisstede BM, Hoogvliet P, Franke TP, Randsdorp MS, Koes BW. Carpal Tunnel Syndrome: Effectiveness of Physical Therapy and Electrophysical Modalities. An Updated Systematic Review of Randomized Controlled Trials. Arch Phys Med Rehabil [Internet]. 2018;99(8):1623-1634.e23. Available from: http://dx.doi.org/10.1016/j.apmr.2017.08.482
12. Heebner ML, Roddey TS. The Effects of Neural Mobilization in Addition to Standard Care in Persons with Carpal Tunnel Syndrome from a Community Hospital. J Hand Ther. 2008;21(3):229–41.
13. Sim SE, Gunasagaran J, Goh KJ, Ahmad TS. Short-term Clinical Outcome of Orthosis Alone vs Combination of Orthosis, Nerve, and Tendon Gliding Exercises and Ultrasound Therapy for Treatment of Carpal Tunnel Syndrome. J Hand Ther [Internet]. 2019;32(4):411–6. Available from: https://doi.org/10.1016/j.jht.2018.01.004
14. Ballestero-Pérez R, Plaza-Manzano G, Urraca-Gesto A, Romo-Romo F, Atín-Arratibel M de los Á, Pecos-Martín D, et al. Effectiveness of Nerve Gliding Exercises on Carpal Tunnel Syndrome: A Systematic Review. J Manipulative Physiol Ther [Internet]. 2017;40(1):50–9. Available from: http://dx.doi.org/10.1016/j.jmpt.2016.10.004
15. Wolny T, Saulicz E, Linek P, Shacklock M, Myśliwiec A. Efficacy of Manual Therapy Including Neurodynamic Techniques for the Treatment of Carpal Tunnel Syndrome: A Randomized Controlled Trial. J Manipulative Physiol Ther. 2017;40(4):263–72.
16. Sucher BM, Schreiber AL. Carpal Tunnel Syndrome Diagnosis. Phys Med Rehabil Clin N Am [Internet]. 2014;25(2):229–47. Available from: http://dx.doi.org/10.1016/j.pmr.2014.01.004
17. Savage NJ, Albano J. Marrying Tendon and Nerve Gliding Exercises with Hydrodissection Following Injection for Carpal Tunnel Syndrome – A New Treatment Approach ? J Orthop Case Reports. 2020;10(9):38–46.
18. Erickson M, Lawrence M, Jansen CWS, Coker D, Amadio P, Cleary C. Hand Pain and Sensory Deficits: Carpal Tunnel Syndrome. J Orthop Sports Phys Ther.

2019;49(5):CPG1–85.
19. Ibrahim A, Gilerson A, Harmel T, Tonizzo A, Chowdhary J, Ahmed S. The Relationship Between Upwelling Underwater Polarization and Attenuation/Absorption Ratio. Opt Express. 2012;20(23):25662.
20. Duymaz T, Sindel D, Kesiktaş N, Müslümanoğlu L. Efficacy of some combined conservative methods in the treatment of carpal tunnel syndrome: A randomized controlled clinical and electrophysiological trial. Turkish J Rheumatol. 2012;27(1):38–46.
21. Sucher BM, Hinrichs RN, Welcher RL, Quiroz LD, St. Laurent BF, Morrison BJ. Manipulative Treatment of Carpal Tunnel Syndrome: Biomechanical and Osteopathic Intervention to Increase The Length of The Transverse Carpal Ligament: Part 2. Effect of Sex Differences and Manipulative "Priming." J Am Osteopath Assoc. 2005;105(3):135–43.
22. Carlson, H., Colbert, A., Frydl, J., Arnall, E., Elliot, M., & Carlson, N. (2010). Current options for nonsurgical management of carpal tunnel syndrome. *International journal of clinical rheumatology*, *5*(1), 129–142. https://doi.org/10.2217/IJR.09.63