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PHYSIOTHERAPY MANAGEMENT FOR CERVICAL ROOT SYNDROME: A CASE STUDY

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Abstract

Introduction: Cervical root syndrome (CRS) is a pain that extends from the vertebrae of the neck to the arms. The occurrence of CRS can be caused by factors related to activity, posture, and degenerative changes of the cervical discs that can be caused by age, trauma, repetitive movements, and work. The appearance of such pain can decrease productivity, quality of life, and social activities. Problems caused by cervical root syndrome are sharp spreading pain, muscle weakness, spasm in the cervical muscles, and a decrease in ROM to decrease the functional ability of the patient

Case Presentation: The patient age 54 years old came to the Dempo clinic in Malang with a CT-Scan with the results of hernia nucleus pulposus in C3 and C4 and with complaints of pain radiating from the neck to the left arm since 2 weeks ago. Activities that aggravate complaints are when the patient looks up, turns to the left, when going to sleep, and when typing using a laptop for a long time. Pain will be reduced when sleeping at night. The patient is a lecturer whose activities are a lot of sitting, standing, and using a laptop to teach.

Management and Outcome: Patient receive therapy three times in once a week. Ultrasound therapy and cervical traction were used for the patient. The Numeric Rating Scale (NRS), Range of Motion using metline, and Neck Disability Index (NDI) were used to evaluate patient.

Discussion: After therapy in three weeks with ultrasound and cervical traction, the pain decreases and ROM increases. The functional ability of the neck decreased the disability rate from 26% to 20%.

Conclusion: Physiotherapy program conducted in three times for three weeks' therapy with physiotherapy modalities used such as ultrasound and mechanical traction is able to reduce pain and restore the body's function to carry out daily activities.

Keyword: Cervical root syndrome, CRS, Physiotherapy, Ultrasound, Cervical Traction



Introduction

The incidence of neck pain in the world is 83/100,000 people and the prevalence increases in the fourth and fifth decades (Taso et al., 2020). In Indonesia, as many as 16.6% per year experience neck pain complaints, with initial complaints of discomfort in the neck becoming severe pain of 0.6% (Marliana & Sinaga, 2019). About 10% over 50 years of age experience cervical pain. One of these impacts can cause pain from the cervical vertebrae and spread to the arms or commonly called Cervical Root Syndrome (CRS). The emergence of the pain, can reduce productivity, quality of life, and social activities. Problems caused by cervical root syndrome are sharp radiating pain, muscle weakness, cervical muscle spasm, and a decrease in ROM so that it can reduce the patient's functional ability (Sulistiyowati et al., 2014).

CRS can be caused by a history of trauma and overuse, while 70% of CRS sufferers are due to cervical spondylosis, hernia nucleus pulposus (Marliana & Sinaga, 2019). Most of the causes of CRS are cervical spondylosis which refers to degenerative changes with age. Cervical spondylosis causes a decrease in disc height and narrowing of the intervertebral foramen. Part of the cause of CRS is the herniation of the nucleus pulposus caused by prolonged flexion trauma. Herniation of the cervical disc is caused by a change in the position of the nucleus pulposus at the cervical level of the intervertebral disc, causing compression and inflammation of the nerve branches in the cervical. HNP is a condition in which there is an expulsion of the contents of the nucleus from within the intervertebral disc (disc rupture) so that the nucleus of the disc protrudes into the annulus ring (fibrous ring around the disc) and causes giving manifestations of nerve compression (Maksum & Hanriko, 2016). Extreme movements or abnormal kinematics of the cervical spine can cause compression. Compression of the cervical nerve roots causes physiological changes in the involved nerve tissue such as neck pain radiating to the arms accompanied by paresthesia or numbness in the upper extremities (Sayer et al., 2008). This change causes the structure of the neural network to tend to be more sensitive or a process known as nerve root sensitization occurs. The occurrence of nerve root sensitization in cases of nerve root compression that most often occurs is compression at C7, followed by C6, compression at C5 and C8 is rare, while C3 and C4 are also rare with followed and not followed by pain (Kinandana et al., 2020). The consequences of CRS in the form of pain, limited range of joint motion and physical activity for a long time, such as: teaching, writing in books, typing and operating a laptop. According to Iyer & Kim (2016), more than 30% complain of pain when sitting, standing, and walking for a long time.

Bagheripour et al., (2016) stated that administering ultrasound and cervical traction in CRS

patients can reduce pain and improve ROM. Based on this research, the authors are interested in providing physiotherapy modalities to patients with CRS Ultrasound and cervical traction with the aim of the patient being able to perform functional activities without any disturbance.

Case Presentation

Subjective Examination

On March 9, 2021, the patient age 54 years old came to the Dempo clinic in Malang with a CT-Scan with the results of hernia nucleus pulposus in C3 and C4 and with complaints of pain radiating from the neck to the left arm since 2 weeks ago. Activities that aggravate complaints are when the patient looks up, turns to the left, when going to sleep, and when typing using a laptop for a long time. Pain will be reduced when sleeping at night. The patient is a lecturer whose activities are a lot of sitting, standing, and using a laptop to teach.

Physical examination

The patient reports that she is in good health, vital signs such as blood pressure, pulse, respiration and body temperature in normal conditions. On palpation found muscle spasm in the upper trapezius. Meanwhile, on the static inspection of the symmetrical right and left shoulders, no changes in posture were found, while on the dynamic inspection there were limitations when raising the hands up and looking up.

Basic motion examination is carried out by examining active, passive and isometric movements against prisoners of the patient. At the time of active and passive movement obtained extension limitations, lateral flexion sinistra, and rotation sinistra along with pain. The patient is able to resist minimal to moderate resistance but is accompanied by pain on flexion, left lateral flexion, and left rotation.

Specific examinations are also performed by physiotherapists to establish a diagnosis according to the patient's complaints and history, then a Spurling test is carried out with an ICC inter rater value: 0.70 (Thoomes et al., 2018) as for the procedure carried out, namely asking the patient to sit down and then the therapist being behind the patient provides compression for lateral bending, lateral flexion, extension, and lateral bending flexion, extension. A positive result of this examination is if the patient feels pain when compression is given and feels it radiates to the arm (Corey & Comeau, 2014).

Pain measurement are using NRS (Numerical Rating Scale), Motion of joint range motion measurement used a metline, and Functional capabilities of the neck measurement used NDI (Neck Disability Index).

Pain measurement was carried out using the Numeric Rating Scale (NRS) and the patient was

asked to rate how severe the pain was. The classification of pain is described by a value consisting of: (0) no pain (5) moderate pain (10) severe pain (Taso et al., 2020). Pain measurement using the Numerical Rating Scale, which was found on the examination of pain at rest with a value of 0 which indicates no pain at rest in the rest, pressure pain 3 (moderate pain) when pressed in upper trapezius, and motion pain 5 (moderate pain) when moved extensions, lateral flexi sinistra, and sinistra rotation.

The joint range of motion (ROM) is the result of the joint range of movement that can be done when the joints are moving (Trisnowiyanto, 2012). ROM examination using metline obtained results at the initial position is 11 cm, when the movement of the neck flexion is 5 cm with ROM 6 cm and neck extension 13 cm with ROM 2 cm. While when the lateral movement flexi initial position 15 cm, when lateral flexi dextra 10 cm with ROM 5 cm and lateral flexi sinistra 12 cm with ROM 3 cm. When dextra rotation results obtained 14 cm with ROM 5 cm and sinistra rotation the result is 17 cm with ROM 2 cm at the initial position of 19 cm.

Functional ability using the Neck Disability Index (NDI) this instrument is used to measure the extent to which neck pain affects ability in daily activities. The NDI consists of 10 questions with five subscales each given a value from 0 to 5. Then add up to a maximum total of 50. If any questions are skipped, divide the total patient score by the number of sections completed times 5 (maximum = 50). With the interpretation of 0-4 points (0-8%) no disability (normal), 5-14 points (10-28%) mild disability (mild), 15-24 points (30-48%) moderate disability (moderate), 25-34 points (50-64%) severe disability (severe), 35-50 points (70-100%) complete disability (very severe). Total $\frac{13}{50} \times 100\% = 26\%$ (mild disability) (Putra et al., 2020).

Management and Outcome

Physiotherapy treatment in patients conducted at Dempo Clinic, Malang aims to reduce pain and improve ROM so as to improve the patient's functional ability.

Table 1. Intervention

Intervention	Dosage	Description
Ultra sound	F : 2-3x/ weeks I : According to patient tolerance T : 10 Minutes T : Continues	The patient's position sits, then the therapist directs the transducer in the cervical section of the patient.
Servikal Traksi	F : 2-3 x/weeks I : According to patient tolerance T : 10 minutes, (rest : 5 seconds)	The position of the patient sitting facing the cervical traction mechanic tool, the

T : Mechanical therapy

therapist attaches the traction device to the patient's cervical part and adjusts the pull load for traction. Traction force uses 10-15% of the patient's body weight.

Pain Measurement Results with NRS

The results of pain measurement are as follows:

Table 2. Pain measurement

NRS	T1	T3
Rest	0/10	0/10
Press	3/10	3/10
Movement	5/10	4/10

Based on the table above shows a decrease in pain from T1 – T3 from press pain to motion pain. The use of ultrasound modality and traction service can decrease the level of pain in T1 silent pain: 0, press pain: 3, motion pain: 5. Being T3 silent pain: 0, press pain: 3, motion pain: 4.

Range of Motion Measurement Results

The results of range of motion measurement are as follows:

Table 3. Range of Motion Measurement

Neck Movement	T1	T3
Flexi	6	6
Extension	2	3
Lateral Flexi Dextra	5	5
Lateral Flexi Sinistra	3	4
Rotation Dextra	5	5
Rotation Sinistra	2	3

Based on the table above found an increase in LGS on extension movement from 2 to 3 on T2 and T3, lateral flexi sinistra from 3 to 4 on T2 and T3, and sinistra rotation 2 to 3 on T2 and T3. after undergoing therapy as many as three meetings.

Functional Ability Measurement Results

The results of Functional Ability Measurement are as follows:

Table 3. Functional Ability Measurement

NDI	T1	T3
Pain intensity	2	1
Personal Care	2	1
Lifting	2	2
Reading	2	2
Headache	0	0
Concentration	0	0
Work	2	2
Driving	0	0
Sleep	2	1
Recreation	1	1
Score	26%	20%

Based on the table above, the higher the value produced indicates the better the ability of functional activity after undergoing therapy as many as three meetings. Table 3 shows changes in pain, self-care, and sleep levels from 2 to 1. With a total score of 26% to 20% with a mild disability interpretation.

Discussion

The physiotherapy program for CRS in three weeks aims to decrease the pain and increasing ROM so as to improve functional abilities. The interventions given in this case study are ultrasound and cervical traction.

Ultrasound is a physiotherapy intervention modality in the form of longitudinal waves (sound) with a frequency between 20-20,000 Hz. Ultrasound given to the cervical area will focus on soft tissues and areas of pain. The movement pattern of the applicator using a 5cm² transducer, frequency 1 MHz, mode: continuous, intensity: up to 1.2 W/cm² with the patient's tolerance limit (Bagheripour et al., 2016) Thermal effects produced by ultrasound in the form of heat that can increase the metabolic activity of blood flow and analgesic effect on nerves. Every 1°C increase in temperature of the tissue, increases the average metabolism of the ultrasound effect within 2°C-3°C so as to reduce muscle spasm (Gautham et al., 2014). These results show evidence that ultrasound has a mechanical effect that can produce micro massage which will reduce the sensitivity of receptors (mechanoreceptors and muscle spindles) and change muscle viscoelasticity, so that it can reduce muscle spasm, increase joint range of motion, and have a sedative effect on nerves, so that pain can be reduced. Glynn & Fiddler, 2009).

Cervical traction is a therapeutic technique using a mechanical machine in the form of pulling or stretching the cervical area (Romeo et al., 2018). Traction force from cervical traction mechanic uses 10-15% of the patient's body weight (Bukhari et al., 2016)). The results of giving

cervical traction can increase circulation in cervical blood vessels, stretch muscles and paraspinal ligaments and facilitate muscle relaxation (Bagheripour et al., 2016). In addition, traction can also reduce pain in the sensory fibers in the spinal cord by stimulating the afferent fibers of joints and large muscles as well as widening the intervertebral foramen and reducing pressure on nerve roots, widening joint spacing, and muscle spasms so that with reduced pressure on the nerve roots, blood flow increases. Blood will flow smoothly which results in a decrease in pain, an increase in cervical range of motion, and an increase in functional status (Marliana & Sinaga, 2019). By giving cervical traction, it can reposition the protruding disc so that irritation of the posterior longitudinal ligament due to pressure on the disc can be released, so that pain can be reduced (Dewangga, 2020).

Conclusion

The physiotherapy program which was carried out three times for three weeks of therapy with physiotherapy modalities used such as ultrasound and mechanical traction was able to reduce pain and restore the body's function to carry out daily activities.

Acknowledgments

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