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Physiotherapy Management of Frozen Shoulder EC Tendinitis Muscle Rotator Cuff Conditions Using Short Wave Diathermy, Active Resisted Exercise and Codman Pendular Exercise

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Abstract
This study aims to determine the role of physiotherapy in post-operative ligament management and knowing physiotherapy through TENS, CRYOTHERAPI, *SWT* and exercise therapy (TL) in overcoming problems with ACL injuries. To find out about an injury, you need to examine the history of the disease, both in the form of anamnesis and examination. A well-directed history and thorough examination can provide an accurate diagnosis. The examination is carried out with the aim of finding out the problems that exist in athletes after ACL surgery, developing therapy goals and determining the appropriate modality. Examination steps include history taking, physical examination and specific examinations, namely subjective examination and objective examination. Next, physiotherapy is carried out using TENS, CRYOTHERAPY, *SWT* which is a way of using electrical energy that is useful for stimulating the nervous system through the surface of the skin and has been proven to be effective in reducing various types of pain. The conclusions of this research are: 1) Giving TENS, CRYOTHERAPY, *SWT* In the case of post rupture of the anterior carciatum ligament, the aim is to reduce pain through a segmental mechanism and 2) there is a reduction in pain after six therapeutic procedures. Exercise therapy can have a pain reduction effect, both directly and breaking the pain cycle of pain spasms. Light and slow movements will stimulate the proprioceptor which is the activation of large diameter afferent fibers. Providing Exercise Therapy in cases of post anterior craciatum ligament reconstruction, namely improving balance and increasing muscle strength.

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1. INTRODUCTION

Definition

Frozen shoulder is a condition where there is stiffness in the shoulder joint due to thickening and contraction of the joint capsule which causes a decrease in capsule volume capacity (Marcel, 2015).

Stiffness in frozen shoulder is also divided into two types of patterns, namely capsular patterns and non-capsular patterns. The non-capsular pattern is a non-specific pattern characterized by limited movement and pain that occurs in certain directions of movement, depending on the topic of the lesion, for example limited to endo rotation or abduction only (Kuntono, 2004).

Frozen shoulder or adhesive cap sulitis is a shoulder disorder accompanied by pain and limited active and passive movement (Kelley et al, 2009). Meanwhile, according to M. Lubiecki and A Carr in 2007 Frozen shoulder is a condition characterized by pain and general movement restrictions with loss of external rotation movement. Even though it's deep In everyday life, the activities we do predominantly use hand movements, especially the shoulders.

Tendinitis in the Rotator Cuff is an inflammation that occurs in the muscle tendons

that are part of the Rotator Cuff. There is some literature that links the causes of frozen shoulder to the effects of repeated trauma to the shoulder or diabetes mellitus (Kuntono, 2004).

The existing population shows that at ages above 40 to 60 years there is a lot of stiffness and limited movement, where at this age the degeneration process has already occurred.

which can affect muscle strength and flexibility. Apart from that, 70% of these cases are experienced by women, and on X-ray examination they appear normal without any disturbance to the joint capsule (Gispen, 2001).

Writing purpose

The general objective of this research is: to determine the effect of Physiotherapy Management of Frozen Shoulder Conditions e.g. Rotator Cuff Tendinitis using Short Wave Diathermy (SWD), Active Resisted Exercise and Codman Pendular Exercise.

The specific objectives of this research are: 1) To determine whether the use of Short-Wave Diathermy modality can reduce pain in conditions of Frozen Shoulder ec Tendinitis.

M. Rotator Cuff. 2) To find out that giving Codman Pendular Exercise can increase the range of motion of joints in conditions of Frozen Shoulder ec Tendinitis M.Rotator Cuff. 3) To find out about giving Active Resisted Exercise can increase muscle strength in conditions of Frozen Shoulder ec Tendinitis M.Rotator Cuff. 4) To find out whether giving Active Resisted Exercise and Codman Pendular Exercise can increase functional activity in conditions of Frozen Shoulder ec Tendinitis M.Rotator Cuff

2. LITERATURE REVIEW

Case Description

In the condition Frozen Shoulder ec Tendinitis M.Rotator Cuff there are pathological changes in the tendons of the muscles that make up the Rotator Cuff where inflammation usually occurs in the tendons of more than one muscle due to direct injury to the shoulder or also injury caused by excessive work of the M.Rotator Cuff. If this condition is left for a long period of time, it will cause damage to the M.Rotator Cuff tendon and progress to M.Rotator Cuff tendinitis.

Signs and symptoms from Frozen Shoulder ec Rotator Cuff Tendinitis is pain, limited range of motion of the joint, decreased muscle strength, and impaired functional activities. The type of pain that can be felt in this condition is movement pain. Movement pain here is the pain experienced when moving the shoulder which arises due to pathological changes in the M. Rotator Cuff tendon which becomes inflamed (Smeltzer, 2001).

There is tenderness that can be felt by sufferers when one of the parts of the tissue experiencing pathology receives pressure from the outside. And those who often experience tenderness are in the rotator cuff tendon because this part is in the latero-posterior part of the shoulder so it is easy to palpate when the arm is in an abducted and endorotated position (Smeltzer, 2001). Real limitation of the range of motion of the glenohumeral joint, both active and passive movements. Where the non-capsular pattern occurs due to limited movement depending on the lesion topic. For example, those who experience limitations only have abduction (Kuntono, 2004). This decrease in muscle strength is caused by limited range of motion of the joints and movement pain, so that sufferers will limit themselves to movement in the shoulder and the muscles that move the shoulder which are part of the rotator cuff will become static. So, if this situation is left for a long time, the muscles will lose their elasticity and result in decreased muscle strength (Kuntono, 2004). Patients with Frozen Shoulder ec Tendinitis M.Rotator Cuff found clinical signs and symptoms such as

pain, limitations range of motion of joints, decreased muscle strength will directly affect/interfere with the functional activities they undertake (Sidarta, 2004).

Frozen Shoulder ec TendinitisM. Rotator Cuff has physiotherapy problems, namely pain in the shoulder, limited range of motion of the joint which ultimately results in a decrease in shoulder muscle strength and functional activities become disrupted (Hardjono, 2007). For this reason, in this case appropriate treatment needs to be given to resolve this problem.

PHYSIOTHERAPY INTERVENTION TECHNOLOGY

Physiotherapy intervention in this case was by administering Short Wave Diathermy, Active Resisted Exercise and Codman Pendular Exercise. The aim of providing this intervention is to reduce pain, increase joint range of motion, increase muscle strength, and improve daily functional activities. Short Wave Diathermy is a therapeutic tool that uses electromagnetic energy produced by a high frequency alternating current of 27.22 MHz (Sujatno, 2002).

The effects of the Short-Wave Diathermy modality are: (1) increasing body metabolism, (2) increasing blood supply, (3) increasing conductivity and excitatory threshold, (4) reducing excitability in nerves, (5) reducing blood viscosity and blood pressure, (6) relaxes and provides optimal muscle conditions (Sujatno, 2002).

This is caused by the local heating effect, which will increase tissue circulation in the glenohumeral joint in the form of capillary and arteriole vasodilation resulting in an increase in temperature and improvement in tissue circulation. It can reduce the activity of thinly myelinated A delta and unmyelinated C sensory nerves due to the influence of sensory level pain modulation and spinal level, thereby reducing pain (Low, 2000).

Effectiveness in using SWD is determined by determining the dose and intensity. The intensity is determined by the sufferer himself based on the burning sensation he receives. According to Scliphake, intensity is divided into four levels, namely: (a) submitis intensity (the patient does not feel the heat), (b) mythic intensity (the patient feels a little heat), (c) normal intensity (the patient feels comfortable pain), (d) fortis intensity (the sufferer feels very hot but can still tolerate it) (Arofah, 2010).

Things that must also be considered when determining the dose in cases of frozen shoulder:

(1) the area to be treated, (2) the depth of the tissue from the surface, (3) the place experiencing pain. The parameters that must be paid attention to when applying Short Wave Diathermy are: (1) if the condition is sub-acute then the time used is 15-20 minutes and the flow is intermittent, (2) if in a chronic condition then the time used is 20-30 minutes with continuous current (Sujatno, 2002).

(2) Active Resisted Exercise is part of active exercise where static and dynamic muscle contractions occur by providing external resistance, with the aim of increasing muscle strength and increasing muscle endurance. External resistance can be manual or mechanical. Manual resistance is resistance whose strength comes from the therapist with the amount of resistance adjusted to the patient's ability and the amount of resistance given cannot be measured quantitatively. In the case of Frozen Shoulder ec Tendinitis M.Rotator Cuff, manual resistance techniques are used by the therapist. To do active resisted exercise, the things you need to pay attention to are cardiovascular conditions, fatigue, substitution movements, osteoporosis and muscle pain. And the contra indication is if the patient is experiencing inflammation and pain.

(3) Codman Pendular Exercise is a technique introduced by Codman, in the form of arm swings with a bent body position. The aim is to prevent adhesions in the shoulder joint by carrying out passive movements as early as possible which are carried out by the patient actively and

are given weight (Kisner, 2002).

The mobilization technique itself utilizes the influence of gravity to produce a pulling effect on the humeral bone from the glenoid fossa. And the dosage for implementing this technique is that in each movement you give 8 swings with 3 repetitions.

PHYSIOTHERAPY PROCESS

In this study, the patient's identity was obtained, namely Mr. T, 85 years old, male, Muslim, is a retired civil servant whose address is Kraton Lor Rt.2 Rw.2 Pekalongan Utara. The examinations carried out include pain examination, examination of limited range of motion of joints, examination of muscle strength, and examination of functional activities. To reduce problems in patients, physiotherapy interventions are carried out using modalities namely Short-Wave Diathermy (SWD), Active Resisted Exercise, and Codman Pendular Exercise.

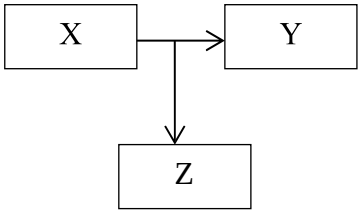
3. RESEARCH METHOD

Research Design

This research uses a descriptive analytical method which aims to determine the assessment and changes that can be seen in the research. The research design used was a case study design (Notoatmojo, 2010).

This research case was taken at the PKU Muhammadiyah Hospital, Yogyakarta, which was carried out in November 2021

1. Research subject
   Research subjects are the parties sampled in the research. The research subjects in this study were patients with the condition Frozen Shoulder ec Tendinitis M.Rotator Cuff.
2. Research variable
   Variables are concepts that influence variability. Meanwhile, the concept itself can simply be defined as a description or abstraction of a certain phenomenon. There are two types of variables, namely: 1) Dependent variables, namely variables that are dependent or dependent, where the results obtained depend on the independent variable, the variables here are pain around the shoulder, a decrease in muscle strength, a decrease in the range of motion of the shoulder joint, and a decrease in functional ability. 2) The independent variable is a variable that is free, which will greatly influence the results of the dependent variable, in this case the independent variable is the implementation of therapy which will be carried out using the Short-Wave Diathermy, Active Resisted Exercise and Codman Pendular Exercise modalities (Notoatmojo, 2010). The research design of the study is described as follows.



Information:
X: patient's condition before being given the physiotherapy program Y: patient's condition after being given the physiotherapy program Z: physiotherapy program

Problems that arise before undergoing a therapy program are tenderness and movement pain, limited range of motion in joints, decreased muscle strength, and decreased functional activity of the patient. The patient went to PKU Muhammadiyah Hospital Yogyakarta to undergo therapy. Previously, a pain examination was carried out using the VDS scale on the patient's shoulder to determine the level of tenderness and movement pain.

RESEARCH INSTRUMENTS

The research instruments in this study are as follows:

1. Pain Examination

   Pain is an uncomfortable feeling. This examination uses a measuring instrument, namely the VAS scale. By showing the pain scale and asking the patient what pain they feel, namely silent pain, tender pain and movement pain. score 1: no pain, score 2: very mild pain, score 3: mild pain, score 4: not so severe pain, score 5: moderately severe pain, score 6: severe pain and score 7: almost unbearable pain (Mardiman et al., 1994).
2. Limitation Check

   Scope of Joint Movement An examination is carried out to determine the area that a joint can reach when the joint moves, both actively and passively. This examination uses a measuring instrument, namely a Goneometer. Measurement of the Scope of Motion of the Shoulder joint during flexion, extension, abduction, adduction, exorotation, endorotation movements. Normal values for the shoulder joint are: (a) Sagittal: 500-0-1700, (b) Frontal: 1700-0-750, (c) Rotation: 900-0-800 (Mardiman et al, 1994).
3. Muscle Strength Examination

   The examination is carried out to determine muscle strength. This examination uses a measuring instrument, namely MMT (Manual Muscle Testing). The assessment criteria are:

   : Value 0=Nonecontraction, Value 1 = There is a Contraction, Value 2 = There is a contraction, minimizing the force of gravity, Value 3 = Movement against gravity, Value 4 = Minimum resistance, Value 5 = Maximum resistance (Maximum resistance) (Mardiman et al, 1994).
4. Activity Check

   Functional Functional activities are activities carried out every day. This examination uses a measuring tool, namely the Shoulder Pain and Disability Index (SPADI). By asking questions and answers to patients about pain and limitations when carrying out activities. Type of pain scale: when lying on the affected side, reaching for something on a high shelf, touching the back of the neck, pushing with the affected hand. Types of disability scale: Washing hair, rubbing back when showering, putting on and taking off undershirts or clothes, wearing button-up shirts, wearing pants, picking up objects above, Lifting heavy objects (more than 10 pounds). The assessment criteria for the pain scale are 0: no pain, and 10: worst unbearable pain, while the disability scale criteria are 0: no difficulty, and 10: very difficult and requires help. The method is to circle numbers that describe pain and limitations (Roach, 1991).

MEASURING INSTRUMENT

The measuring instruments used in this research are:

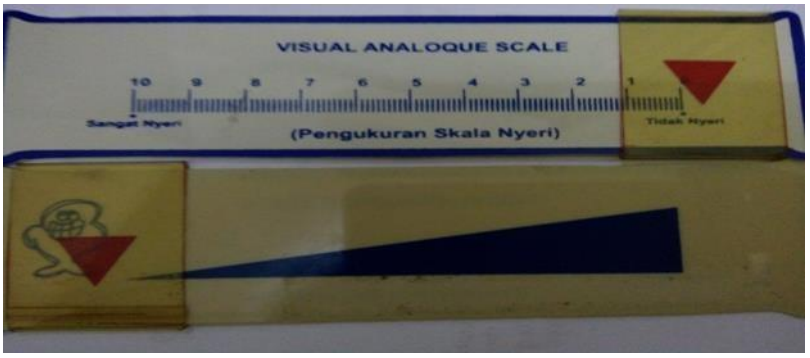
1. PFGD:

   Active: - Flexi – Not Full ROM, Pain (+), Extension – Not Full ROM, Pain (+)

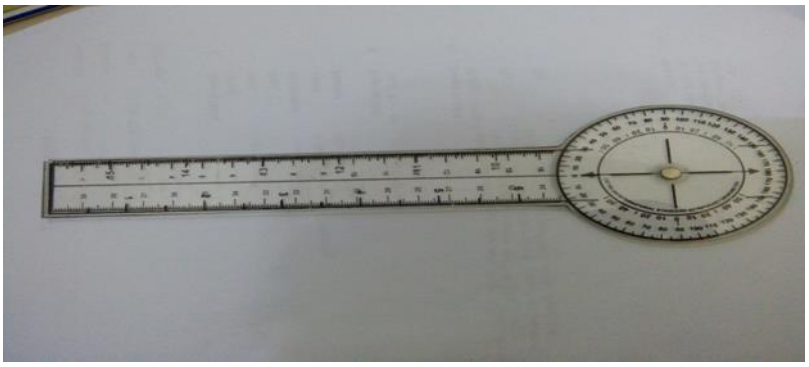
Passive: Flexi: Not Full ROM, Pain (+) Elastic, Extension: not full ROM, Pain (+)
Hard Isometric: Against minimal resistance Flexi and Extension Pain (+)

2. Pain scale measuring tool

Silent Pain = 0, Pressing Pain = 70mm, Movement Pain = 95mm



3. GONEOMETER: Active: S: 0º-0-95º, Passive: S: 3º-0-110º



4. MMT

DATA COLLECTION PROCEDURE

1. Physical examination

   Aims to determine the patient's physical condition, the examination includes: Vital signs, Inspection, Palpation, Percussion, Auscultation (IPPA), and basic ovement examination and specific examination.

2. Interviews

   The method used in this research to collect data is by means of question and answer between the therapist and the patient, namely direct anamnesis with the patient (Auto Anamnesis).

3. Observation

   Observations are carried out to determine the patient's progress while being given therapy. In this study, the author documents observing and studying the patient's progress.

4. RESULTS AND DISCUSSION

1. Pain Evaluation

   Evaluation of pain with the VAS Scale: Shows a decrease in the pain scale experienced by the patient. From the scale above, data results are obtained at T1, silent

pain is symbolized in blue with a pain value of 1 (no pain). For tenderness, it is symbolized in red with the result of reducing pain in the m.infraspinatus tendon and m.supraspinatus tendon with a T1 value of 4 (not so severe pain) and a T4 result of 3 (mild pain). Movement pain is symbolized in green with a T1 value of 3 (mild pain) and at T4 there is a decrease in movement pain with a value of 1 (no pain).

According to Rida Yulianda, et al., (2010) explained that providing Short Wave Diathermy (SWD) intervention in Frozen Shoulder conditions can be effective in reducing pain.

This is caused by Short Wave Diathermy which is given an intensity according to the normality/warm level so that it will increase local temperature and result in vasodilation of blood vessels so that it can increase blood flow and increase metabolic waste substances (prostaglandin, histamine, and bradykinin) so that it can stimulate nociceptors and the pain will decrease or even disappear, then muscle tone will decrease so that tissue elasticity increases and will cause muscle relaxation.

The results of the analysis from this research are that pain can be reduced because Short Wave Diathermy can have a warming effect on patients, resulting in vasodilation of blood vessels and smooth metabolism so that muscles can relax and pain will be reduced.

2. Evaluation of Joint Range of Motion

Evaluation of the Scope of Joint Movement with a Goneometer showed that there was an increase in the scope of joint crunching. Based on the graph above, the results of left shoulder extension flexion movements in active and passive movements showed an increase in the degree of joint movement range at T1 to T4, the average difference being at T4. For left shoulder abduction movements in active and passive movements there is an increase in the range of motion of the joint at T3 but in left shoulder adduction movements there is no change in the degree of joint range of motion. Meanwhile, for left shoulder exorotation-endorotation movements, both active and passive movements, there is an increase in the range of motion of the joint which on average occurs at T4. The increase in the range of motion of the joints in frozen shoulder conditions is in accordance with the statement of I Nyoman Warta, (2010) who explains that there is a significant effect from administering the Codman Pendular Exercise in Frozen Shoulder cases. This is because the Codman Pendular Exercise is able to stretch soft tissue structures such as muscles and tendons, thereby maintaining the flexibility of these tissues, thereby increasing the range of motion of the shoulder joint and automatically increasing its functional activity.

The results of the analysis from this research are that providing the Codman Pendular Exercise modality is effective in increasing the range of motion of joints in Frozen Shoulder conditions because it can increase tissue flexibility from the effects of applying weights when carrying out active movements resulting in an increase in the range of motion of joints.

3. Evaluation of Muscle Strength

Evaluation of Muscle Strength with MMT (Manual Muscle Testing) Based on the graph above, the results show that in the flexor and extensor muscle groups there was no increase in muscle strength. At T1 to T4 the muscle values for flexor 3 and extensor 4. For the abductor and adductor muscle groups there was no increase in muscle strength. At T1 to T4 the muscle values for abductor 3 and adductor 4. For the exorotator and endorotator muscle groups there was an increase in muscle strength at T3 and T4 with the result of the muscle strength value being the same, namely 4. The

increase in muscle strength in the frozen shoulder condition is in accordance with Eka Ayu Fatmawati's statement (2014) which explains that the exercise therapy technique in the form of Active Resisted Exercise is able to increase muscle strength in frozen shoulder sufferers because this exercise can increase the recruitment of motor units so that additional motor units will be stimulated, then the muscle fibers will also contract and increase muscle strength. increase.

Analysis results from this research, Active Resisted Exercise is effective for patients with frozen shoulder because the resistance given can gradually contract the muscle fibers so that muscle strength increases.

4. Evaluation of Functional Activities

Evaluation of Functional Activities with the SPADI Index (Shoulder Pain and Disability Index). From the graph above, it can be concluded that in the type of hair washing activity, there is an increase in functional activity at T3 and T4 with a value of 0, which means there are no difficulties. For this type of back rubbing activity when bathing occurs increased functional activity at T3 and T4 with a value of 2, which means it can be done using assistive devices. And for the type of activity of putting on & taking off a t-shirt, there was an increase in functional activity at T3 and T4 with a value of 2, which means you can use assistive devices. For other types of activities such as wearing a button-up shirt, wearing trousers, picking up objects above and lifting heavy objects, there was no change in increasing functional activity or still experiencing limitations or difficulties.

According to research by Salim (2014), providing exercise therapy in the form of Codman Pendular Exercise and Active Resisted Exercise in Frozen Shoulder conditions can have a significant influence in resolving problems in the form of pain, decreased muscle strength and limited range of motion in joints. So, if these three problems can be resolved it will have an effect on increased functional activity.

Analysis results from this research

is the Codman Pendular Exercise combined with Active Resisted Exercise which is effective for frozen shoulder conditions to increase the patient's functional activity because it can increase the range of motion of the joints and increase muscle strength so that the patient's functional activity will automatically increase.

5. CONCLUSION

Based on the research results, it was concluded: There was a decrease in tenderness in the infraspinatus and supraspinatus muscles as well as movement pain during flexion movements, abduction exorotation and endorotation of the left shoulder. There was an increase in muscle strength in the left shoulder exorotator and endorotator muscle groups. There is an increase in the range of motion of the joint in flexion, abduction, exorotation and endorotation of the left shoulder. There is an increase in functional activities such as washing hair, rubbing the back when bathing and putting on & taking off t-shirts.

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