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Passive Rom Therapy to Improve Muscle Strength in Post-Op Upper/Lower Extremity Patients: a Case Study

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Abstract. *Fractures are emergency conditions that must be treated quickly and accurately and in accordance with fracture management procedures. In general, clients with fractures must undergo surgery which in addition to causing pain also affects activity. After surgery, rehabilitation is needed to prevent contractures. Nursing care for patients with upper/lower extremity fractures must be prioritized and focused on providing comfort, preventing complications, and achieving optimal rehabilitation in rehabilitation. Patients are taught mobilization or movement exercises, namely Passive Range of Motion (ROM). Purpose: To determine the Effectiveness of Passive ROM Exercise in Postoperative Patients with Upper/Lower Extremity Fractures on Length of Stay at Sukoharjo Regional General Hospital. Design: This researcher studied the type of experimental research. The method used is a case study. Results: the results of the study showed that the majority of Active ROM respondents were treated for 2 days with a frequency of 5 respondents. Then the results showed that there was a difference in the effect of passive ROM on the length of stay for fracture patients at Sukoharjo Regional General Hospital.*

Keyword *: Post op fracture , ROM, muscle tone*

1. INTRODUCTION

World Health Organization WHO (2018) data shows that for more than a century surgical care has been an important component of health care worldwide, an estimated 234.2 million surgical procedures are performed each year (Wilujeng et al., 2023) . The most surgical or surgical procedures in hospitals worldwide are due to accidents, namely fracture surgery with a percentage of 35.6% and the rest are other surgical cases (Nabhani, Sulastri, 2022) . Based on the 34 provinces in Indonesia, the highest number of extremity fracture operations is in Bali Province (3,065), followed by DKI Jakarta (2,780), East Java (2,655), Central Java (2,576) and Jambi (2,443) (Ministry of Health of the Republic of Indonesia, 2018) . Most perform extremity fracture operations (20.3%) (Riskesdas, 2018) . Fractures in Indonesia are the third largest cause of death after coronary heart disease and tuberculosis. Fracture cases caused by injuries include falls, traffic accidents and sharp or blunt object trauma. The trend in injury prevalence shows an increase from 7.5% in 2017 to 8.2% in 2018 (Ministry of Health of the Republic of Indonesia, 2021) . In Indonesia, the number of fracture operations until the end of 2017 had reached 27.9% of the total types of operations. The prevalence of fractures is quite high, namely the incidence of fractures in the extremities, which is around 46.2%.

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Fracture is a condition of discontinuity of bone structure caused by direct or indirect trauma, direct impact occurs when direct trauma hits the bone can also be caused by repeated compression and fractures due to indirect impact usually occur due to rotation (Taufik et al., 2022) . Fractures are divided into open fractures and closed fractures. An open fracture is a fracture where there is a connection with the outside environment through the skin. A closed fracture is a fracture where the skin is not penetrated by bone fragments, so that the fracture site is not contaminated by the environment outside the skin. (Purba & Situmorang, 2021) . Fractures occur due to trauma (traffic accidents, falling from a height while standing or sitting resulting in a fracture), pathological (bone metastasis), degeneration, spontaneous (very strong muscle pulling occurs) (Syokumawena, Devi Mediaarti, 2022) . Treatment and care for patients with extremity bone fractures are determined after the diagnosis and prognosis of the fracture that occurs if surgery is not performed are known (Latifah, 2023) . In treating fractures, one of them is surgery or surgery, after surgery, rehabilitation is needed to prevent contractures (Sumarni & Yulastri, 2021) . In rehabilitation, there is an action with the aim that the part that suffered the fracture can return to normal and to restore individual abilities, in rehabilitation patients are taught mobilization or movement exercises (Jamaludin et al., 2022) .

The exercises given to maintain or restore the category of perfection of the ability to move joints normally and fully to increase muscle mass and muscle strength are Range Of Motion (ROM) exercises (Sudrajat et al., 2019) . ROM is one of the physical indicators related to movement function (Yulianita et al., 2023) . ROM can be interpreted as the maximum movement possible in a joint without causing pain. ROM is an important activity in the recovery of muscle and joint strength after surgery to prevent further complications (Baiturrahman, Ichsan Budiharto, 2019) . In post-op conditions of extremity fractures, a person is unable to carry out activities due to limited movement, so muscle strength can be maintained through continuous use of muscles, one of which is through joint mobilization with joint range of motion or ROM exercises (Agusrianto & Rantesigi, 2020) . ROM is divided into two, namely active and passive Range of Motion (ROM), Range of Motion (ROM) exercises that are actively evaluated, which are important activities in the postoperative period to restore the patient's muscle strength (Yazid & Sidabutar, 2022) . This active ROM movement can have a maximum effect compared to passive ROM as much as 3x, for the reason that the client's active ROM movement can be more frequent and independent in training and comfortable and reduce pain (Vitri Dyah Herawati & Indriyati, 2023) . This also means that early mobilization exercises using active ROM are the main factor in providing care for clients with postoperative fractures in the extremities (Agustina et al., 2021) .

This active ROM exercise nursing action was carried out for 1 meeting for 3 consecutive days, the results obtained were an increase in muscle tone strength from scale 2 to scale 4. So from several studies above which show that there is an effect of Passive ROM techniques on increasing muscle strength in post-fracture patients, the author is interested in implementing Passive ROM techniques in post-op fracture patients in the Flamboyan Inpatient Room, Sukoharjo Regional Hospital.

Referring to this information, the author conducted a study aimed at finding out a general description of Passive ROM therapy nursing care in improving muscle strength in post-op fracture patients.

2. METHOD

The type of design and approach used in this study is *a case report* with a descriptive observational design, using a nursing process approach . The researcher used therapeutic communication in conducting interviews and nursing assessments of patients. This study is a case study of nursing care so that before collecting data, the researcher first provided guidance and asked permission to be used as a managed case to the ward supervisor. After obtaining permission to provide nursing care to the managed case, the researcher then conducted an orientation stage for the patient. At the orientation stage, the researcher tried to ask about the patient's general health condition to identify the extent to which the patient was ready to be interviewed. The researcher created a comfortable environment and built a relationship of mutual trust with the patient. At the work stage, the patient underwent a nursing assessment starting from identity, predisposing factors, precipitation factors to medical therapy received by the patient. At the termination stage, the researcher closed and ended the nursing assessment by saying thank you and then making a time contract to implement nursing care for the patient. Then the researcher adjusted it to the theories and previous research that were in accordance with this case and also adjusted it to the Indonesian Nursing Diagnosis Standards (SDKI), Indonesian Nursing Outcome Standards (SLKI) and Indonesian Nursing Intervention Standards (SIKI).

This study was conducted on December 5-8, 2023, on five patients with a medical diagnosis of post-operative fracture in the Flamboyan Room of Sukoharjo Hospital who experienced post-operative fractures. Patients were given Passive ROM therapy for ± 15 minutes for 3 consecutive days. This study obtained patient data using interview methods, observation, documentation studies and literature studies. The research used in the interview was self-research with the help of assessment guidelines and implementation strategies (SP). While

other instruments used physical examination sheets, monitoring sheets, tensiometers , thermometers and scales and nursing care documentation.

Standard Operating Procedures for the implementation of actions in this case study were adopted based on Susanto's research (2018) which has been developed and modified with other research. The inclusion criteria in this case study were patients who experienced post-op fracture on day 2 (H+2) and were willing to be respondents. Exclusion criteria in this case study were patients who used heavy equipment or additional loads on the upper and lower extremities after surgery, patients who did not experience *open fractures* and were not willing to be respondents. Passive ROM technique was given for ± 15 minutes and was carried out for 3 consecutive days. Nursing evaluation on one patient was conducted 3 times, namely the first evaluation was conducted ± 5 minutes after the patient received Passive ROM therapy, and the second evaluation was conducted ± 5 minutes after the patient was taught the Passive ROM technique. The evaluation was conducted by reviewing the results of the muscle strength scale measurements. The data analysis method used in the application of this case study was carried out by means of a simple description using the average value.

3. RESULTS

The study in this case study was conducted in December 2023 at Sukoharjo Hospital, Central Java Province with five subjects with a medical diagnosis of post-op fracture, and the clinical findings below were obtained. The results of this study, the five patients in the age category of children to adults with ages 13-44 years. The three patients have something in common, namely extremity fractures. Patients experience physical mobility problems in the extremities, currently with a doctor's diagnosis of post-operative fracture.

Clinical Findings :

1) Vital signs:

Table 1. Vital signs

Px Name	Age	TTV Results
An. S	15 years	BP: 115/72 mmHg N: 97x/minute SpO2: 99% S: 37.5 C
An. K	13 years old	BP: 110/70 mmHg N: 95x/minute SpO2: 98% S: 37.5 C
Mr. R	36 years old	BP: 125/80 mmHg N: 60x/minute

		SpO2: 98% S: 37.5 C
Mr. A	44 years old	BP: 137/84 mmHg N: 88x/minute SpO2: 98% S: 37.5 C
Mr. K	25 years old	BP: 120/70 mmHg N: 65x/minute SpO2: 98% S: 37.5 C

Therapy given

Pharmacological therapy or commonly known as therapy used to treat patient diseases through collaboration between doctors and pharmacists to treat patient diseases using drugs. Therapy given to patients during the treatment process in the inpatient room (table 1)

Table 2. Therapy given

Drug name	Dose
RL Infusion	20 tpm
Mother Profen	3x400 mg
Paracetamol	3x500 mg
Calc Tablet	2x1
Epirisone	2x1

X-ray examination results

Laboratory examinations are intended for early detection, diagnosis, and treatment of diseases in patients. Routine laboratory examinations are needed to provide a quick response and take preventive measures for possible disease occurrence. The patient's laboratory results on July 4, 2023 are as follows (table 2).

Table 3. X-ray Results

Px Name	Age	X-ray Results
An. S	15 years	Close Fracture of the Left Humerus
An. K	13 years old	Close Fracture of 1/3 distal ulna dextra
Mr. R	36 years old	Displaced Distal Radius Fracture
Mr. A	44 years old	Ipsilateral tibia fracture
Mr. K	25 years old	Ankle Fracture Sequelae

Results of comparison of hemodynamic data (Muscle Strength)

The three patients have something in common, namely extremity fractures. Patients experience problems with physical mobility in the extremities, currently with a doctor's diagnosis of post-fracture surgery. Based on the results of the assessment, nursing problems were found to hinder physical mobility, then the patient was given active ROM exercise implementation. Patients were given ROM therapy for 3 days with a duration of each session for ± 15 minutes. The results of the intervention were measured by looking at the comparison of hemodynamic data in the form of muscle strength. before and after active ROM intervention (table 3).

Table 4. Results of comparison of muscle strength before and after intervention

Patient Name	Muscle strength scale before intervention	Muscle tone strength scale			%
		Day 1	Day 2	Day 3	
An. S	2	2	2	3	99%
An. K	2	2	3	4	100%
Mr. R	2	2	2	3	90%
Mr. A	3	3	3	4	100%
Mr. K	2	2	3	4	100%

From the results of the table above, changes were obtained in the muscle strength scale before and after the intervention in the form of Passive ROM for 3 consecutive days, the five patients experienced an increase in the muscle strength scale from scale 2 to scale 3 and scale 4.

4. DISCUSSION

The results of the study showed that post-fracture surgery subjects were 13-44 years old. The clinical picture of humerus fractures in most patients is young adults (>20 years old. Humerus shaft fractures usually occur in adulthood due to falling on the hand twisting the humerus causing a spiral fracture and can occur in the elderly due to metastasis. Supracondylar humerus fractures usually occur in children and it is possible that they can occur in adulthood (Nopianti et al., 2019) . The results of this study are supported by other studies which state that the level of independence of patients aged 20-55 years or productive age is higher than in children and the elderly (Lestari, 2017) . The study also stated that at productive age they have

good joint flexibility. In older adults, flexibility tends to decrease in the level of activity and muscle strength, so that it can reduce the range of motion of the joints (Putri AK, 2019) .

The results of the study showed that the subjects of post-operative humerus fractures were male. Fractures are more common in men than in women (M & Al Fajri, 2021) . This is due to men's activities as breadwinners and the higher intensity of activities outside the home, activities such as climbing, driving motor vehicles, sports and others that can increase the risk of injury (Jamaludin et al., 2022) . The results obtained were muscle tone on the first day of the three patients with an average value of 2 lower than the third day with a muscle tone result of 4. This shows that the patient experienced improvement as stated in the results in the muscle tone table.

This test technique uses a scale of 0-5. With a value category of 0 there is no joint muscle movement at all, scale 1 there is contraction when pressed but no visible movement, scale 2 there is movement but cannot fight gravity, scale 3 there is movement against gravity, scale 4 there is movement of the examiner's resistance but it feels weak, scale 5 there is movement and can fight the examiner's resistance with maximum strength (M & Fajri, 2021) .

Post-operative physical mobility disorders of extremity fractures are complications due to damage to bones, musculoskeletal, and nerves due to trauma from the fracture (Permana et al., 2021) . The results of previous studies obtained a mean value before ROM implementation and after ROM implementation in 18 patients, a mean value of 1.77 was obtained and patients experienced increased muscle tone. A p value of 0.0001 was obtained, which means $p < 0.05$, which means that there is an effect of ROM on the muscle tone of post-open surgery clients (Kurniawan, 2023) . ROM aims to help improve the perfection and ability of normal and complete joint movements in order to increase muscle mass and muscle strength, prevent contractures and shortening of bone structures, prevent complications of blood flow due to mobility, maintain muscle tone, maintain joint movement, stimulate blood flow, and train basics (Rahayu & Nuraini, 2020) .

The importance of performing active ROM with postoperative clients with lower fractures with orif intervention to help the healing process. Postoperative fracture patients who underwent early mobilization in the leg area, found that early mobilization had an effect on muscle tone in fracture patients (Permadhi et al., 2022) . Range of motion exercises need to be given after surgery, because they can cause patients to recover quickly in postoperative muscle and joint function and can increase the ability of basic daily living activities, with signs of minimal patient dependence on others. (Rohmah & Rivani, 2023) .

5. CONCLUSION

The results of the study showed that there was an effect of passive *ROM exercise* in postoperative patients with upper/lower extremity fractures on the scale of muscle strength and physical mobility. Thank you to the Muhammadiyah University of Surakarta and the Flamboyan Inpatient Room of Sukoharjo Hospital for providing the opportunity and facilitating me in conducting this research.

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