

Increased Joint Flexibility in Post-Surgery Femoral Fracture Patients with Internal Fixation : Range of Motion (ROM)

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Abstract

Introduction: Decreased mobilization results in musculoskeletal damage that is atrophy. The solution restores joint flexibility in patients post femoral fracture surgery with internal fixation installation then Range of Motion exercise. Research objectives to increase joint flexibility in patients post femur fracture surgery with internal fixation: Range of Motion (ROM)

Method: Pre-experimental research design with one group pre-test and post-test design techniques. The study population of all postoperative fracture patients in the Surgery Room Dr. Ramelan Naval Hospital Surabaya, amounted to an average of 15 people in the range of September 2019. The sample technique used simple random sampling and inclusion criteria of 15 femoral fracture respondents with internal fixation. The instrument uses observation sheets and Standart Procedure Operational.

Results: The results of the study showed that the range of motion exercises averaged 39.47 before and after exercise 45.60. Paired t test showed a significant effect on range of motion with joint flexibility in femoral fracture patients with internal fixation by showing p less than α (0.005).

Discussion: The implication in this study is the effect of Range of Motion influences joint flexibility in femoral fracture patients with internal fixation, so that the operating room can apply and be socialized to nurses.

Keywords: Range of Motion, Joint Flexibility, Femoral Fracture Patients, Internal Fixation.

Introduction

Background

Research Objectives

A fracture or broken bone is a condition where the continuity of bone and cartilage tissue is disrupted. It is generally caused by direct and indirect trauma, which causes pressure on bone fragments. The impact of a femur fracture is shortening of the leg in the fracture area and significant impairment of physical mobility. Appropriate and rapid management can prevent further complications. One form of appropriate management is internal fixation using plates, screws, and nails, which aims to improve function by restoring stability, preventing disability, and reducing pain [1,2].

Internal fixation involves an incision at the site of injury along the anatomical plane of the fracture. Internal fixation is intended to maintain normal bone stability without compromising joint flexibility. Normal joint flexibility is characterized by the range of motion (ROM) of plantar flexion, dorsiflexion, inverse eversion, adduction, abduction, and flexion-extension. These movements should not cause pain.

A preliminary study in the Operating Room revealed that in September and October 2019, data on 31 patients with femoral fractures was obtained, with 15-16 patients per month. On the first day after Open Reduction Internal Fixation (ORIF), fifteen of the thirty-one patients experienced impaired joint flexibility.

The examination revealed that the Range of Motion (ROM) for plantar flexion was less than 50° in eighteen (75%) of the 31 patients. Meanwhile, the Range of Motion (ROM) for dorsiflexion was less than 15% in all patients with impaired joint flexibility, with all experiencing pain upon movement. This indicates that more than 50% of patients with internal fixation experience impaired joint flexibility.

Yandri (2011) found that patient laziness (44.7%), non-compliance with exercise (5.3%), and patient knowledge (2.6%) were factors contributing to impaired joint flexibility, as patients were reluctant to move immediately after internal fixation. Meanwhile, researchers' observations of post-operative patients revealed that 75% of patients reported remaining afraid to move despite nurses' encouragement, while 25% reported feeling reluctant to move due to ongoing pain. Furthermore, according to nurses, patient fatigue and other health issues that arise after surgery, such as fever and post-operative anemia, make patients even more reluctant to move.

If muscles, including those of the lower extremities, are not trained, especially in patients with gross motor dysfunction, over a period of time, they will permanently lose their motor function. Limited mobilization affects the patient's muscles through loss of endurance, decreased muscle mass, atrophy, and decreased stability. Other effects of limited mobilization include impaired calcium metabolism and disorders that can affect muscle and skeletal function. Decreased mobilization and movement result in significant musculoskeletal damage, with the primary pathophysiological change being atrophy. Decreased stability occurs due to loss of endurance, decreased muscle mass, atrophy, and actual joint abnormalities, rendering the patient unable to move continuously [3].

The solution to help restore joint flexibility in post-operative femoral fracture patients with internal fixation is that Range of Motion exercises are needed for stretching, increasing muscle flexibility and building muscle strength. All stretching done in ROM exercises can loosen tight muscles and increase the range of motion. Range of Motion (ROM) Exercise is very important for patients; patients can immediately perform various movements needed to accelerate the healing process after surgery. Progress in Range of Motion (ROM) in the form of increased joint range of motion, as well as a decrease in pain scale needs to be continuously monitored to determine further management by providing ROM exercises in the first 24 hours after surgery, so patients are encouraged to do Range of Motion (ROM) [4].

Respondent Characteristics by Gender

Table 1: Respondent characteristics by gender in patients after femoral fracture surgery at Dr. Ramelan Hospital in November 2019

Gender	Frequency	Presentation
Woman	9	60 %
Man	6	40 %
Amount	15	100 %

Based on gender, there are more women than men. The most common gender is women, with 9 people representing 60% of women and men, with 6 people representing 40%.

Management that nurses can develop to increase the participation of post-fracture surgery patients in Range of Motion (ROM) exercises is by educating patients about the disorders experienced, the therapy schedule and the treatment being carried out. This will be able to increase patient and family participation. Information about what to expect including sensations during and after treatment can encourage patients to actively participate in the development and implementation of treatment. In addition, social support from family, close friends and nurses greatly influences helping patients carry out Range of Motion (ROM) exercises.

stated that ambulation can be implemented depending on the patient and family's readiness to learn and participate in training. Meanwhile, the nurse's role in patients suffering from femoral fractures is to train, monitor, and evaluate the extent to which the patient is able to move independently. If all of these things run continuously, joint flexibility disorders in patients with ORIF can be prevented. Many phenomena in patients with femoral fractures who experience joint flexibility disorders are due to a lack of knowledge about the importance of Range of Motion (ROM) [5].

Methods

This study used a pre-experiment with a one-group pre-test and post-test design technique, namely analyzing the effect of Range of Motion (ROM) to increase joint flexibility in femoral fracture patients with internal fixation in the operating room of Rumital Dr. Ramelan Surabaya. This study design is a type of research that emphasizes the time of pre-test and post-test treatment on respondents with post-femoral fracture surgery. In the initial stage, observations will be made on the patient's joint flexibility, then ROM exercises will be carried out for 3 (three) days and the flexibility will be measured again on the 4th (fourth) day. Researchers used a homogeneous population, namely respondents who fit the researcher's criteria, and obtained results of 15 respondents. Sampling in this study used probability sampling with a random sampling technique. The instrument used to measure the level of joint flexibility with an observation sheet that refers to the concept of joint flexibility according to standard operating procedures, for data analysis using the Paired t test because this study design is in the form of "Before After" which proves whether there are changes before and after treatment is given. If $p < 0.05$, it means that Range of Motion (ROM) has an influence on joint flexibility [6].

Results

Research Results and Explanation of General Research Data

Respondent Characteristics Based on Age

Table 2: Characteristics of respondents based on age in patients after femur fracture surgery at Dr. Ramelan Hospital in November 2019

Age	Frequency	Presentation
< 20 years	0	0 %
21-59 years	10	66,7 %
> 60 years	5	33,3 %
Amount	15	100 %
Mean	2.33	

Based on age, there were no respondents under 20 years of age. 10 people aged 21-59 years old with a percentage of 66.7 and 5 people over 60 years old (33.3%).

Respondent Characteristics Based on Last Education

Table 3: Characteristics of respondents based on education level in patients after femur fracture surgery at Dr. Ramelan Hospital in November 2019

Last education	Frequency	Presentation
SD	4	26,7 %
SMP	2	13,3 %
High School/Vocational School	8	53,3 %
DIII	0	0 %
S1	1	6,7 %
Amount	15	100 %
Mean	2.47	

Based on the last education, there were 4 respondents with elementary school education (26.7%). The highest education of respondents was high school/vocational school with 8 people (53.3%), and there were no respondents with a Diploma III education.

Respondent Characteristics Based on Religion

Table 4: Characteristics of respondents based on religion in patients after femur fracture surgery at Dr. Ramelan Hospital in November 2019

Religion	Frequency	Presentation
Islam	15	100 %
Kristen	0	0 %
Hindu	0	0 %
Budha	0	0 %
Confucianism	0	0 %
Amount	15	100%

Based on religious group, there were no respondents who were of a religion other than Islam. A total of 15 respondents in this study were Muslim (100%).

Respondent Characteristics Based on Monthly Income

Table 5: Respondent characteristics based on monthly income in patients after femur fracture surgery at Dr. Ramelan Hospital in November 2019

Income	Frequency	Presentation
Rp 500.000 - < Rp 1.000.000	1	6,7 %
Rp 1.000.000-Rp 2.000.000	6	40 %
> Rp 2.000.000	8	53,3 %
Amount	15	100 %
Mean	2,47	

Based on monthly income, eight respondents (53.3%) had the highest income of >Rp 2,000,000, and one respondent (6.7%) had the lowest income of Rp 500,000 - <Rp 1,000,000.

Respondent Characteristics Based on Occupation

Table 6: Respondent Characteristics Based on Occupation of Patients After Femur Fracture Surgery at Dr. Ramelan Hospital in November 2019

Work	Frequency	Presentation
Indonesian National Armed Forces (TNI) and Indonesian National Police (POLRI)	2	13,3 %
Self-employed	6	40,0 %
Students	7	46,7 %
Amount	15	100 %
Mean	2,80	

Based on occupation, 6 respondents (40%) were self-employed. There were no retired respondents. Two respondents (13.3%) worked as members of the Indonesian National Armed Forces (TNI) and the rest were students.

Respondent Characteristics Based on History of Bone Fractures

Table 7: Respondent Characteristics Based on History of Bone Fractures in patients after femur fracture surgery at Dr. Ramelan Hospital in November 2019

History of Bone Fracture	Frequency	Presentation
Of	0	0 %
No	15	100 %
Amount	15	100 %
Mean	2,00	

Based on a history of previous fractures, all 15 respondents (100%) had no history of fractures. Special Data from Research Results

Joint flexibility results before ROM therapy

Table 8: Respondent Characteristics Based on the Degree of ROM Before Being Given Range of Motion (ROM) Exercise in patients after femur fracture surgery at Dr. Ramelan Hospital in November 2019

No	Flexibility value								Average Age
	Flexi-bility	Exten-sion	Dorso	Plantar	Inver-sion	Eversies	Abduc-tion	Adduc-tion	
1	110	115	15	30		5	10	8	(P) 21-59 Years
2	100	110	20	35	5	5	8	8	(L) > 60 Years
3	100	100	20	35	5	8	10	6	(P) > 60 Years
4	110	120	10	40	5	6	10	8	(P) > 60 Years
5	120	120	20	45	10	8	8	6	(P) > 60 Years
6	120	120	25	40	8	6	8	6	(P) > 60 Years
7	115	110	25	40	7	8	10	8	(M) 21-59 Years
8	110	120	20	35	5	6	10	8	(P) 21-59 Years
9	100	115	20	45	10	8	8		(P) 21-59 Years
10	100	120	25	40	8	8	10	8	(M) 21-59 Years
11	110	115	15	40	6	6	10	6	(M) 21-59 Years
12	100	100	20	45	8	8	15	6	(P) 21-59 Years
13	110	120	20	40	6	10	15	8	(M) 21-59 Years
14	120	120	15	40	10	8	15	8	(M) 21-59 Years
15	115	110	25	45	8	6	10	10	(P) > 60 Years
Mean	109,33	114,33	19,67	39,67	7,07	7,07	10,47	7,60	
Rata-rata total	39,47								

Based on Table 8 above, the average joint flexibility value before ROM exercises for the Dorso flexion exercise was 19.67, Plantarflexion exercise 39.67, Inversion exercise 7.07, Eversion exercise 7.07, Abduction exercise 10.47, Adduction exercise 7.60, Flexion exercise 109.33, and Extension exercise 114.33. The

total average for all flexibility exercises was 39.47. Based on Table 8 above, it shows that of the 15 respondents, the average ROM degree before the Range of Motion (ROM) Exercise Dorso Flexion was 19.67 (normal range 20°-30°) with the highest ROM degree of 25° and the lowest 15°. The average ROM value

of respondents before being given the Range of Motion (ROM) Exercise Inversion was 7.07° (normal range 10°) [7,8].

Before being given the Range of Motion (ROM) Exercise Eversion, the average degree of ROM of respondents was 7.07 (normal range 10°). Meanwhile, after respondents were given the Range of Motion (ROM) Exercise eversion, there was an increase in the average degree of ROM, namely 9.73.

Before the Abduction Range of Motion (ROM) Exercise was given, the average ROM degree of respondents was 10.47. After

respondents were given the abduction Range of Motion (ROM) Exercise, the average ROM degree increased to 14.07 with an average increase of 3.6. The average ROM degree of respondents before being given the adduction Range of Motion (ROM) Exercise was 7.60 [9].

Based on Table 8 above, it shows the respondent's ROM degree before being given the flexion Range of Motion (ROM) Exercise with an average of 109.33 (normal range 120°- 130°). The respondent's ROM degree before being given the extension Range of Motion (ROM) Exercise was 114.33 [10,11].

Joint flexibility results after ROM therapy

Table 9: Characteristics of Respondents Based on the Degree of ROM After Range of Motion (ROM) Exercise was Given to Patients After Femur Fracture Surgery at Dr. Ramelan Hospital in November 2019

No	Flexibility	Extension	Dorso	Plantar	Inversion	Eversies	Abduction	Adduction	Average Age
1	120	125	20	40	10	10	15	10	(P) 21-59 Years
2	120	125	25	45	10	10	15	10	(L) > 60 Years
3	120	120	20	35	10	10	10	10	(P) > 60 Years
4	130	130	15	45	5	8	15	10	(P) > 60 Years
5	130	130	25	50	10	10	12	10	(P) > 60 Years
6	130	125	25	50	10	10	12	10	(P) > 60 Years
7	130	120	30	45	10	10	15	10	(M) 21-59 Years
8	125	130	30	45	8	8	15	10	(P) 21-59 Years
9	125	125	25	45	10	10	12	10	(P) 21-59 Years
10	120	130	30	45	10	10	15	10	(M) 21-59 Years
11	120	125	25	50	8	10	15	8	(M) 21-59 Years
12	125	120	30	50	10	10	15	10	(P) 21-59 Years
13	130	130	25	50	8	10	15	10	(M) 21-59 Years
14	130	125	25	45	10	10	15	10	(M) 21-59 Years
15	130	120	30	50	10	10	15	10	(P) > 60 Years
Mean	125,67	125,33	25,33	46,00	9,27	9,73	14,07	9,87	
Rata-rata total	45,60								

Table 9 shows that the average joint flexibility score after ROM exercises for the Dorsoflexion (Dorsoflexion) was 25.33; Plantarflexion (46.00); Inversion (9.27); Eversion (9.73); Abduction (14.07); Adduction (9.87); Flexion (125.67); and Extension (125.33). The total average for all flexibility was 45.60.

After being given the Range of Motion (ROM) Exercise Dorso Flexion was 25.33 (normal range 20°-30°) with the highest degree of 30° and the lowest 15°. There was an average increase of 5.66. After the Range of Motion (ROM) Exercise the average degree of plantar flexion ROM was 46.00[12-14].

The respondents' ROM degree after being given the Inversion Range of Motion (ROM) Exercise was 9.27 (normal range 10°). There was an average increase of 2.02 ROM degrees after the respondents were given the Range of Motion (ROM) Exercise [15 -17].

The Effect of Providing Range of Motion (ROM) Exercises on Joint Flexibility

Table 10: Results of the T-Test of the Effect of Providing Range of Motion (ROM) Exercises on Increasing Joint Flexibility in Patients after Femur Fracture Surgery at Dr. Ramelan Hospital in November 2019

Flexibility value	Mean	SD	PVALUE	N
Before	39,47	2,031	0,000	15
After	45,60	1.352		

The results of the analysis found that the average total joint flexibility before ROM Therapy was 39.47 while the joint flexibility value after ROM was 45.60 with a standard deviation before 2.031 and after ROM exercise 1.352. The results of the Paired t test statistical test obtained a p value of 0.000, meaning there was a significant difference in the value of joint flexibility before and after ROM exercise [18-20].

The table above shows that the overall Range of Motion (ROM) Exercise movements, namely dorso, plantar, inversion, eversion, abduction, adduction, flexion and extension have a ρ value of less than α (0.005) which statistically shows that Range of Motion (ROM) Exercise has an influence on increasing joint flexibility in post-operative femoral fracture patients with internal fixation on day 1 in the operating room of Dr. Ramelan Hospital, Surabaya [21,22].

Conclusion

The Effect of Giving Range of Motion (ROM) Exercise on Increasing Joint Flexibility in Patients after Femur Fracture Surgery with Internal Fixation shows that there is an increase in the average degree of ROM before the exercise is carried out 1x 24 hours is 39.47 with after being given Range of Motion (ROM) Exercise on the 4th day is 45.60 The results of the statistical test obtained a ρ value of less than α . The entire Range of Motion (ROM) Exercise movement, namely dorso, plantar, inversion, eversion, abduction, adduction, flexion and extension has a ρ value of less than α (0.005).

Researchers concluded that effective range-of-motion exercises should be implemented in the operating room to help prevent flexibility disorders and improve joint flexibility in post-operative patients with internal fixation. Range-of-motion exercises can be administered to patients with limited mobility and who are unable to perform some or all range-of-motion exercises independently. Therefore, nurses should schedule range-of-motion exercises.

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