Effect of Appliance Slipping and Deep Breathing to Decreasing Pain Scale in Patients

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Abstract: Fracture is one of the emergency cases in orthopedics which requires fast and precise management to avoid morbidity and mortality caused. Fracture management includes surgery to clean the crushed bones, perform internal and external fixation and connect the broken bones with special pins, plates, screws, or rods. After surgery, pain due to surgical incisions can be reduced. Method: This type of research is descriptive by establishing a case study method that can explore the problem of Nursing Care in patients with fractures. The results of this study indicate there was a decrease in the pain scale in fracture patients after splinting and deep breathing relaxation; this was shown by the pain scale in patients after the splint dressing and deep breathing relaxation was in the range of 3-7, and before the splint dressing and deep breathing relaxation was carried out it was in the range 6-9. This happens because applying a splint can reduce the movement of the bone or injured area so that it does not cause a painful sensation in the patient. So splint application and deep breathing relaxation have an effect on reducing the pain scale in fracture patients after being given pain management measures with splint application and deep breathing relaxation. Conclusion:Based on the results of the discussion of the results of the Implementation of nursing carried out on Mr. H with pain management, it can be concluded that there is an effect of splint installation and deep breathing relaxation. In the assessment at 12.30, the results obtained before deep breathing relaxation were obtained: the patient complained of pain with a pain scale of 8 (severe), respiratory rate of 24x /, pulse rate of 118x /, and after the splint installation and deep breathing relaxation were carried out, the patient said the pain was moderate with a pain scale of 6.Suggestion: It is expected that the family and patient handle problems experienced by patients by teaching deep breathing relaxation if pain occurs.
Keywords: Deep Breathing Relaxation, Fracture, Splint Dressing

INTRODUCTION

According to the World Health Organization (2024), it was reported that fractures are becoming more common; 178 million fractures occurred in 2019, and the overall prevalence rate was 2.7%.(1) As the number of vehicles on the road increases, the number of fracture accidents worldwide will also increase. As many as 5,144 people in Indonesia suffered fractures. In South Sulawesi alone in 2017, there were 6,762 accident incidents. With 1,483 cases, Makassar became the city with the highest number of accidents.(2)

According to data from the Indonesian Ministry of Health, lower extremity fractures due to accidents have the highest prevalence of all fracture cases that occur in Indonesia, which is around 46.2%. Lower extremity fractures due to accidents have occurred in 45,987 cases. Traffic accidents are the leading cause of femur fractures, with falls from a height reaching 37% and car or motorcycle accidents reaching 62.6%. Femur fractures reach 39% of all fracture cases, with men experiencing the highest frequency of femur fractures (63.8%), followed by tibia and fibula fractures (11%).(3)

A fracture is a damage or break in the bone or cartilage structure, either totally or partially, or bone discontinuity caused by a force that exceeds the elasticity of the bone. In some cases, fractures affect

the bone structure and involve surrounding tissues such as muscle tissue, nerves, and blood vessels.(4) In general, fractures occur due to trauma. Still, some types of fractures occur secondarily or are commonly called pathological fractures, which are caused by disease processes such as osteoporosis.(5) Poor fracture management can cause various complications such as compartment syndrome, arterial damage, wound infection, avascular necrosis, and fat embolism syndrome, and can even cause bleeding, shock, and severe pain. Suppose the immobilization position is incorrect in fracture cases. In that case, long-term complications can cause bone union disorders due to the less-than-optimal union process, causing deformity, angulation, or bone shifting.(6)

Injuries to the musculoskeletal system must be treated quickly and appropriately because if the treatment is not optimal, it can cause the injury to become more severe and cause bleeding.(7) Splinting can be used as a first aid measure for patients with fractures to immobilize the injured body part because fractures can cause instability. After the bleeding has stopped, the next step is to monitor the fractured part and immobilize it using a splint (*splint*).(8) Splinting is performed as an immobilization measure to reduce pain, and to ensure that the bone fusion occurs in a good position. The principle of splinting is done by maintaining the anatomical position of the bone structure; the splint covers 2 joints in the area of injury, provides soft padding on the splint, ties the splint at the top or bottom of the fracture area, and uses 3 splint blades on the lower extremity to reduce the risk of rotation.(9)

Pharmacological and non-pharmacological interventions can be used to manage pain. Non-pharmacological interventions include distraction, relaxation techniques, transcutaneous electrical nerve stimulation, ice and heat therapy, skin stimulation and massage, and neurosurgical pain management. (10) Many neurosurgical techniques have been used to treat patients with pain. Medications and other nonsurgical methods, such as splinting, can help reduce pain. (11) So, non-pharmacological therapy and splinting are the safest alternatives for managing pain by applying splints and breathing relaxation. (12)

Fractures can cause severe and unbearable pain, so the way to deal with the pain is to apply a splint and teach deep breathing exercises. (13) Splinting aims to reduce pain, stop bone movement or other situations that can harm nearby tissue, and accelerate tissue healing. Therefore, it seeks to determine whether there is an effect of splinting and deep breathing relaxation in reducing the pain scale in fracture patients. (14) The study aimed to assess the impact of applying a splint and deep breathing relaxation on lowering the pain scale in patients with distal 1/3 tibia and left fibula fractures. (15)

METHODS

This type of research is descriptive by establishing a case study method that can explore the problem of Nursing Care in patients experiencing Fractures. This research was conducted at the Syekh Yusuf Gowa Regional General Hospital emergency installation room, this research was conducted on Monday, October 14, 2024. The sample taken was 1 patient; the instruments used were interviews and patient observations

RESULT AND DISCUSSION

Result

Cases

Mr. H, 25 years old, male and muslim religion, was admitted to the hospital with complaints of pain due to fractures caused by a traffic accident. An assessment was carried out on the patient; it was found that there was a fracture in the left leg, and he was wincing in pain. The results of the client's assessment said pain in the left leg. The main complaint of data obtained from the patient, the patient said pain with a scale of 8 in the left leg. In the primary assessment, Mr. H did not have any problems with the airway because the airway was patent, and there was no sputum. There were no problems with the respiratory rate of 24x/minute in breathing. From the results of the Circulation assessment, bleeding was found, blood pressure 128/80 Mmhg, pulse rate 118x/minute, CRT <2 seconds, SPO2 95%. Disability, a

compliments level of consciousness was found with GCS 15 (E4V5M6); exposure found 2 problems; the first was the results of the assessment of a fracture in the left extremity; the patient was unable to move the left lower extremity and had complaints of pain, so there was a problem where there was impaired physical mobility. Second, the assessment results showed a tear, redness, and bleeding in the left extremity, so there was a problem of tissue/skin damage. The assessment found a problem: a fracture of 1/3 of the distal tibia and left fibula. The drug therapy given to the patient was RL 20 tpm, ketorolac 1 amp, tranexamic acid 500 mg, and amoxicillin 500 mg. The results of the study at Syekh Yusuf Gowa Hospital found that patients with fracture cases were treated when they first entered the ER by providing medical therapy and first aid by applying a splint to the fracture area and teaching patients to do deep breathing relaxation to reduce pain. The initial step was to place the patient in the yellow triage provided when the patient arrived and was escorted by the community to the ER.

Data Analysis

The author compiled a data analysis to establish a nursing diagnosis based on the medical history obtained during the assessment. Subjective data obtained results of the patient complaining of pain on a scale of 8; the patient complained of difficulty moving the extremities, pain when moving, and feeling anxious when driving. As for objective data, the client appeared to be grimacing and looked restless, and the pulse rate increased to 118x/minute. Limited movement, bleeding, and redness. From these data, the author formulates the problem based on patient complaints to establish a nursing diagnosis, namely acute pain, impaired physical mobility, and impaired skin/tissue integrity.

Nursing Diagnosis

Based on the data analysis above, 3 nursing problems emerged and were arranged based on priority. The primary nursing diagnosis is acute pain related to physical injury agents, where this diagnosis is the most prioritized because it dramatically interferes with the client's movement. The second nursing diagnosis, namely, is impaired physical mobility related to damage to the integrity of the bone structure; this diagnosis is the second priority diagnosis because the client experiences decreased muscle strength, anxiety when moving, and difficulty moving his left extremity. The third diagnosis namely impaired skin integrity/skin tissue related to mechanical factors (e.g. Pressure on bone protrusions, friction).

Nursing Intervention

Based on the results of interventions carried out on clients with pain management, Identification of characteristic locations, duration, frequency, quality, intensity of pain, Identification of scale, Provide non-pharmacological techniques to reduce pain, Collaboration of analgesic administration (500 gr of asamfenamic acid, after nursing actions for 1x30 minutes, it is expected that the level of pain will decrease with the criteria for the results of complaints of increased pain, increased grimacing, increased restlessness, difficulty sleeping sufficiently increased.

The intervention carried out by the author is to provide mobilization support to be able to move or be able to carry out activities independently, identify the presence of pain and other physical complaints, identify physical tolerance for movement, explain the purpose and procedures of mobilization, after carrying out nursing actions for 1x30 minutes, it is expected that physical mobility will increase with the following outcome criteria, increased extremity movement, increased range of motion, decreased limited movement and decreased physical weakness.

Intervention The disturbance of skin integrity carried out by the author is to carry out wound care, monitor wound characteristics (e.g., color, odor), monitor signs of infection, clean with NaCl fluid, apply a bandage or splint according to the type of wound and fracture, collaborate on antibiotic administration, do acupressure on the bone protrusion area. After nursing actions are carried out for 1x30 minutes, it is expected that skin and tissue integrity will increase with the following outcome criteria: decreased tissue damage, decreased skin layer damage, reduced pain, reduced bleeding, decreased redness, improved skin temperature, decreased

Nursing Evaluation

Acute Pain

The results of the evaluation of the first diagnosis of acute pain related to physical injury agents showed that the patient reported lower extremity pain, increased pain complaints, increased grimacing, increased restlessness, and increased difficulty sleeping.

Table 1. Nursing evaluation with a diagnosis of acute pain

Pre	Post	Implementation
1. The patient said that he felt pain in his left leg when moving, the pain felt like being stabbed with a pain scale of 8 (severe), the patient said that the pain was in the left leg, the duration was 5 minutes, the patient said that the pain was felt continuously. 2. The patient said that before being given analgesics, the pain he felt was on a scale of 8.	1. Teaching non-pharmacological deep breathing relaxation 2. Administration of analgesics Asamefenamate 500 gr/8 hours	1. After being taught deep breathing relaxation techniques, the pain felt decreased significantly with a pain scale of 6. 2. After being given 500/8 hours of mefenamic acid analgesics, the pain felt gradually decreased from a scale of 8 to a scale of 6.

The assessment was that acute pain had not been resolved, so the planning was carried out. Namely, the intervention was continued by identifying the location of characteristics, duration, frequency, quality, and intensity of pain, the pain scale, providing non-pharmacological techniques to reduce pain, and collaborating with administering mefenamic acid.

Physical Mobility

The results of the evaluation of the second diagnosis of physical mobilization disorders related to bone structure damage showed that the patient reported pain when moving the lower extremities, decreased extremity movement, reduced muscle strength, increased anxiety, and improved joint stiffness.

Tabel 2. Nursing Evaluation With A Diagnosis Of Physical Mobility Disorders

Pre Implementation		Post
1. 1. The patient said that the pain in the extremities was on a scale of 8. 2. 1.Range of motion decreased by (scale 1) 3. 2. The patient said he was unable to flex and rotate the patella and femur joints. 4. 3. The patient said he was anxious about moving.	1. Performing Splinting 2. Identifying the movement	1. After the splint was applied, the patient said the pain he felt had decreased significantly. 2. 1. The range of motion is still decreasing 3. 2. The patient said he was not yet able to flex and rotate the patella and femur joints.

Impaired skin integrity/skin tissue

Evaluation results on the second diagnosis of Impaired skin integrity/skin tissue related to mechanical factors (e.g., Pressure on bone prominences, friction). The results obtained increased expectations of decreased tissue damage, decreased skin layer damage, reduced pain, decreased bleeding, and decreased redness in patients.

Table 3. Nursing Evaluation With A Diagnosis Of Impaired Skin/Tissue Integrity

Pre Implementation		Post
1. The patient said it was painful, the pain scale was 8, there was a cloth wrapped in the area of the invoice 2. There appear to be signs of infection due to the blood coming out.	1. Apply a splint to the bone spur area 2. Monitor for signs of infection	1. After splinting the bone area, the patient still feels pain. 2. there still appear to be signs of infection in the wound area

DISCUSSION

Assesment

A man was taken by residents to Syekh Yusuf Regional Hospital, Gowa Regency, at 12.30. He was a traffic accident victim, and an assessment was carried out on the patient; it was found that there was a fracture in his left leg, and he was wincing in pain; then, at 13.15, the officer splinted his leg to reduce the pain scale. The pain was obtained with a scale of 8 before splinting and deep breathing relaxation techniques were performed, and after splinting and deep breathing relaxation, the pain level was 6 or the pain level. This is in line with the suitability between the theory and the results of the intervention analyzed from the effect of splinting and deep breathing relaxation on patients diagnosed with 1/3 tibia and left fibula fractures, where the intervention is expected to reduce the scale or level of PainPain experienced by patients.

The results of the influence of splint application and deep breathing relaxation to reduce the pain scale in patients in the Emergency Room of Syekh Yusuf Hospital, Gowa Regency, namely the influence of splint application and deep breathing relaxation, nursing problems obtained from the results of the patient's assessment are acute PainPain. Impaired physical mobility and impaired skin and tissue integrity, but most patients feel acute pain based on the results of the assessment, objective data was obtained, and the patient appeared to be wincing in pain pain and appeared restless and protective to avoid pain pain. Increased pulse rate and difficulty sleeping from the examination of vital signs showed blood pressure of 128/80mmHg, pulse rate of 118x/minute, and respiratory rate of 24x/minute.

From the assessment results, the patient also appeared to have difficulty moving his extremities; the patient said pain when moving, limited movement, decreased muscle strength, and felt anxious when driving; the patient appeared weak. From the observation, tissue/skin damage was obtained; there was bleeding, and it appeared reddish. Based on the results of the data received from installing splints and teaching deep breathing relaxation, it can overcome acute pain nursing problems. This aligns with Meliana's research, showing a decrease in the pain scale in fracture patients after splinting and deep breathing relaxation. This was shown by the pain scale in patients after the splint dressing, and deep breathing relaxation was in the range of 3-7, and before the splinting and deep breathing relaxation was carried out, it was in the range of 6-9. This happens because applying a splint can reduce the movement of the bone or injured area so that it does not cause a painful sensation in the patient(6).

Other studies found that the pain felt was at a severe level. Correct splinting of fractures can reduce the patient's pain, especially for open fractures (15). Pain is a condition in the form of an unpleasant feeling, very subjective. The feeling of pain in each person is different in terms of scale or level, and only that person can explain or evaluate the pain they experience (16). Providing splints and deep breathing relaxation will cause the skeletal muscles experiencing spasms to relax slowly, reducing the pain scale's intensity. (17). When a fracture occurs, the parts that cannot be used and tend to move unnaturally (extraordinary movements) are not as rigid as usual. The muscles will respond naturally, namely by contracting, the aim is to bandage and protect the injured area. The continuous contraction will cause pain. Muscle spasms accompanying fractures are also natural splints designed to minimize movement between bone fragments. (18). Physiologically, Pain occurs when nerve endings called nociceptors are affected by harmful stimuli, thus creating nerve impulses, these impulses flow quickly to the spinal cord through sensory nerves. These impulses will immediately be pushed to the brain, and the brain will process the sensory pain and then respond to it through the motor pathway to stop the action that causes pain. (15).

Splints can support or hold body parts so that they do not shift or change from the desired position, thus preventing body parts from shifting from their place, and can reduce/eliminate pain. (19). Correct and good splint application can significantly reduce bleeding by reducing movement and increasing the effect of muscle tamponade around the fracture. However, things that need to be improved in splint application are that officers, before performing splint application, should wash their hands first, then wear a hand, and provide sufficient ties, not too stiff, tight, or even loose, and there is a time contract for the next handling. (18)

Diagnosis

In this case, 3 nursing diagnoses were found, including:

The first nursing diagnosis is acute pain related to physical injury agents. This diagnosis is the most important because it interferes with the client's movement. This diagnosis is established in Major data

and minor data where subjective data complains of pain and objective data is obtained appearing grimacing, being protective, restless, increased pulse rate, difficulty sleeping, increased blood pressure, and breathing patterns change some subjective data and also objective data that have been found There are several criteria for the results of the Pain Level with decreasing results and include complaints of pain experiencing a decrease, decreased grimacing expression, decreased levels of restlessness, difficulty sleeping improved, and improved pulse rate.

The second nursing diagnosis, namely, is impaired physical mobility related to damage to the integrity of the bone structure; this diagnosis becomes the second priority diagnosis because the client experiences decreased muscle strength, anxiety when moving, and difficulty moving his left extremity. Of course, this diagnosis is also established through subjective and objective data found in the client. Some of the criteria for the results of this diagnosis are increased physical mobility, including increased movement of the extremities, increased muscle strength, decreased limited movement, and reduced joint stiffness.

In the third nursing diagnosis, namely, impaired skin/tissue integrity related to mechanical factors (e.g., pressure on bony prominences, friction), this diagnosis becomes the second priority diagnosis because this diagnosis is established by minor data and primary data where there is no subjective data and objective data obtained tissue or skin layer damage, pain, bleeding, and redness. The criteria for increased expected results from this diagnosis namely decreased tissue damage, decreased layer damage, reduced pain, reduced bleeding, reduced redness, improved body temperature, and improved texture.

Intervention

The interventions are splinting and non-pharmacological techniques, by teaching deep breathing relaxation techniques and splinting to reduce pain levels. Splinting can reduce pain by reducing muscle spasms, swelling, bleeding, and immobilization of the fractured part can prevent displacement and injury. Splinting also causes relaxation of the skeletal muscles to stimulate the release of endogenous opioids, namely endorphins and enkephalins, to reduce the patient's pain. The splinting can reduce pain because there are restrictions so the injured part does not shift.

Relaxation techniques allow patients to control themselves when discomfort, physical stress, and emotions are in pain. The decreased pain intensity caused by deep breathing relaxation techniques can stimulate the body to release endogenous opioids that will inhibit pain impulses to reduce the patient's perception of pain.

Implementation

Implementation of nursing care was given to Mr. H with pain management of splinting and deep breathing relaxation. In the assessment at 13.00, the results obtained before deep breathing relaxation were obtained: the patient complained of pain with a pain scale of 8 (severe), respiratory rate of 24x /, pulse rate of 118x /, and after the splinting and deep breathing relaxation were performed, the patient said the pain was moderate with a pain scale of 6. The purpose of splinting is to relax skeletal muscles, which is believed to stimulate the body to release endogenous opioids, namely endorphins, and enkephalins, which can reduce pain. In the evaluation of the first 30 minutes, the pain scale was from 9 to 7; in the second 30 minutes, the pain scale decreased from 7 to 6. Therefore, the splinting that was done can reduce pain because of the restrictions so that the injured part does not shift. This proves that splinting and deep breathing therapy can be used to reduce the pain scale in fracture patients, which is in line with research that states that there is a significant change in the pain scale in fracture patients.

Meanwhile, the author will apply a non-pharmacological technique, namely deep breathing relaxation therapy, which can reduce pain by relaxing muscle tension that supports pain. It is done for 10-15 minutes in a relaxed position, sitting or lying on your back. Then, instruct to take a deep breath, exhale slowly, and feel the current air flowing from the hands and feet to the lungs, then, the air is released. This is in line with previous research, which states that deep breathing relaxation techniques can reduce the pain scale because when doing deep breathing relaxation, the body will release endogenous opioids in the form of endorphins and enkephalins, which are like morphine, so this can reduce the pain scale.(6).

Implementing care given to Mr. H in the initial assessment, the results obtained before mobilization support were obtained. The patient complained of pain when moving his extremities, decreased extremity movement, reduced muscle strength, and increased anxiety. The implementation of nursing care was to apply a splint and identify movement. The impact of trauma on fractures includes limited activity due to pain due to friction of motor and sensory nerves in fracture wounds. Pain is subjective; no two people experience the same pain, and no two painful events result in the same response or feeling in an individual. Most of the quality of life of fracture patients is disturbed in the domain of physical function and physical limitations, while the quality of life reviewed from a mental perspective is good overall. Education is needed to improve patients' quality of life so they can undergo surgery(20).

Some literature states that the importance of early mobilization is to improve circulation, prevent problems or complications after surgery, and speed up the patient's recovery process.(21). In line with research conducted by Sujati, it states that mobilization is the ability possessed by each person to move in their surrounding environment for the sake of fulfilling daily needs (Activities of Daily Living/Adl) and fulfilling the role they carry out. With this ability, a person can carry out physical activities that are basic needs, sports and can participate in activities both in the family, group, and social community environment.(22). Achieving this condition requires adequate body system functions so that there are no physical or psychological limitations. In fracture patients, bone tissue discontinuity can occur, which is characterized by pain, crepitation, and impaired mobilization, so patients must be mobilized immediately.(23).

Implementation of nursing care given to Mr. H in the initial assessment obtained results before being given wound care; the patient's tissue damage decreased, skin layer damage decreased, pain decreased, bleeding decreased, redness decreased, and skin temperature improved. Implementation at the observation stage includes paying attention to infection indicators, including color, size, and odor of the wound, and paying attention to swelling, redness, exudate or pus, location, and pain intensity (scale 8), the wound was cleaned with 0.9% NaCl.

According to previous research conducted by Rumapea, in line with the wound care applied, nurses implemented various interventions to address the problem of impaired skin integrity. (24). The provision carried out provides skin integrity care; the implementation carried out at the observation stage includes paying attention to infection indicators, including the color and smell of the wound, and paying attention to swelling, redness, location, intensity of pain and the wound is cleaned with NaCl after the plaster and bandage are removed gradually. In wound care can help the formation of new tissue granulation to accelerate the healing process. (25).

Evaluation

After the pain management application in fracture patients, the results showed that the pain complaints decreased, the pain scale 6 grimacing decreased sufficiently, restlessness decreased

adequately, the pulse rate improved sufficiently to 8920x/minute after the splint was applied, and deep breathing exercises were taught. This aligns with previous studies showing that splinting is a first aid method for musculoskeletal system injuries/trauma to immobilize the injured body part using a tool. This splinting aims to reduce and eliminate pain and prevent fracture movement, which can cause damage to the surrounding soft tissue. (26). This is similar to the research conducted by Kurniasar, which showed that splinting also causes relaxation in skeletal muscles so that it can stimulate the release of endogenous opioids, namely endorphins and enkephalins, to reduce pain felt by patients. For 2 times every 30 minutes, the results were obtained, namely in the first 30-minute evaluation, the pain scale was from 9 to 7, the second 30 minutes, the pain scale decreased from 7 to 6. Therefore, splinting can reduce pain because there are restrictions so that the injured part does not shift(19).

After the implementation of exposure management, the movement of the extremities decreased, the range of ROM decreased, the pain decreased, and the physical weakness decreased, providing a comfortable position for the patient. This aligns with previous research showing that physical mobility barriers are limitations of the upper and lower extremities in moving independently and in a directed manner. Characteristic limitations are difficulty changing positions, limited range of joint motion, doing other activities with the help of others, and slow movement. (27). Education is needed to improve the quality of life of post-operative patients. Some literature mentions the importance of early mobilization to improve circulation, prevent problems or complications after surgery, and accelerate the patient's recovery process. (21).

After observation, the implementation of exposure management has not been maximized because where there is increased tissue damage, increased layer damage, bleeding is relatively high, and skin temperature improves, the evaluation applied continues the operation so that the fracture can be paired gif faster. This is in line with previous studies, which show that the implementation carried out at the observation stage includes paying attention to infection indicators, including color, size, and odor of the wound, and paying attention to swelling, redness or pus, location, intensity of pain and the wound is cleaned with NaCl after the plaster and bandage are removed gradually(25)

CONCLUSION

Based on the results of the discussion of the results of the Implementation of nursing carried out on Mr. H with pain management, it can be concluded that there is an effect of splinting and deep breathing relaxation. In the assessment at 12.30, the results obtained before being given deep breathing relaxation were that the patient complained of pain with a pain scale of 8 (severe), respiratory rate of 24x /, pulse rate of 118x /, and after the splint bandage and deep breathing relaxation were performed, the patient said the pain was moderate with a pain scale of 6. The purpose of splinting is to relax skeletal muscles, which are believed to be able to stimulate the body to release endogenous opioids, namely endorphins, and enkephalins, which can reduce pain.

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