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Nursing Care for Avascular Necrosis Patients After Total Hip Replacement Surgery: Case Report

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ABSTRACT

Avascular Necrosis (ANV) is a pathological condition caused by impaired blood supply to the subchondral femur bone, causing necrosis and deformity of bone tissue. This condition causes severe pain, joint stiffness, and impaired physical mobility. Chronic avascular necrosis requires surgery to stabilize physical function. Total Hip Replacement surgery is one of the surgical options to relieve pain and restore joint function in patients with avascular necrosis. Nursing care for ANV patients is very important in managing pain, preventing complications, and promoting recovery. Through comprehensive nursing care, nurses have a significant impact on the physical and emotional health of patients, helping them live healthier and more functional lives. This article aims to implement nursing care for avascular necrosis patients undergoing surgery at Haji Adam Malik General Hospital, Medan. This study is a case report of a 63-year-old patient who had suffered from avascular necrosis for 10 years and underwent Total Hip Replacement surgery. Assessment data were collected through physical examination and supplemented with laboratory and radiology results. The postoperative diagnoses that are the priority in this patient are acute pain, impaired physical mobility, impaired skin integrity, and self-care deficit. Nurses focus on the criteria for treatment outcomes in reducing pain levels, increasing joint range of motion and physical mobility, improving skin integrity, and improving self-care. The intervention results are pain control that allows earlier mobilization and can be a reference for professional nurses in improving the quality of service, especially for avascular necrosis patients undergoing Total Hip Replacement (THR) surgery.

Keywords: **avascular necrosis (AVN), early rehabilitation, nursing care, physical mobility, total hip replacement (THR)**

INTRODUCTION

Avascular Necrosis occurs due to impaired blood flow to bone cells due to traumatic or non-traumatic events (Konarski et al., 2022). This condition can develop aggravated femur head structure, pelvic joint deformity, severe pain, and limited motor function (Mugheed et al., 2023). Risk factors for Avascular Necrosis (AVN) are often associated with trauma to joints and bones, long-term corticosteroid use, excessive alcohol consumption, systemic conditions such as lupus erythematosus, sickle cell anemia, and HIV/AIDS (Bialik et al., 2023). Studies show that AVN is frequent in populations with high-risk factors, such as in patients with autoimmune diseases or those receiving long-term corticosteroid therapy. Globally, AVN is common in people aged 30 to 50 years (Moya et al., 2015; Pijnenburg et al., 2020).

Several countries have screened populations of people with avascular necrosis, but in Indonesia there have been no epidemiological reports of AVN. According to estimates, there are 20,000 new cases detected in the US every year. In Japan, between 12,000 and 24,000 additional cases of avascular necrosis have been identified in recent years (Rakhshankhah et al., 2024). In the United States, it is estimated that about 10,000 to 20,000 new cases of AVN are diagnosed each year (Yeghaneh et al., 2019). In Indonesia, there is no specific data on the prevalence of AVN incidents. However, the existence of risk factors such as alcohol consumption with trauma to joint makes it possible that AVN cases also occur in Indonesia. The gold standart examination used to diagnose avascular necrosis is the Magnetic Resonance Imaging (MRI) examination. (Rakhshankhah et al., 2024). Suppose the condition of this AVN worsens significantly, and conservative therapy is not effective.

In that case, total hip replacement surgery (THR) is the first choice in dealing with patient complaints (Goncharov et al., 2024). THR is a procedure to replace damaged pelvic joints using prostheses to relieve pain, restore joint function, and improve the patient's quality of life (Zhang et al., 2020). This procedure has been recorded to have a success rate, especially in patients with severe deformities (Konarski et al., 2022). However, this invasive procedure has complications such as death, infection, dislocation, and pulmonary embolism that occur during hospitalization, so it will have a negative impact on the patient's physical function (Pijnenburg et al., 2020). Therefore, strategies to reduce complications after THR are essential to improve curative effects and patient satisfaction. As a standard comprehensive nursing plan devoted to nursing and medical staff, the clinical nursing line provides a routine daily care plan as well as multidisciplinary services for patients (Zhang et al., 2020).

There are no scientific articles that provide an overview of the implementation of nursing care for patients with avascular necrosis in Indonesia. This case report aims to provide an overview of the implementation of nursing care for patients with avascular necrosis after total hip replacement surgery and to add to the research data related to Avascular necrosis (AVN) in Indonesia because it has not been widely studied by others. The scope of nursing care implementation starts from assessment, diagnosis, planning, implementation, and evaluation of nursing.

METHODS

This research method is a case report to implement nursing care for avascular necrosis patients undergoing total hip replacement surgery. The results of the assessment provide an overview

of nursing care that has been carried out by nurses for three days. Nurses are responsible for patients for one shift per day with a total of 18 hours of care. Assessment data were collected through physical examination results and supplemented with laboratory and radiology examination results in the Review of Systems (ROS) format: Review of Systems and Wound Assessment Design-R During the 3 days of nursing care implementation, the criteria for treatment outcomes focused on increasing pain levels, physical mobility status, increasing skin integrity, and increasing self-care in patients as well as evaluation with the NRS scale for pain and muscle strength testing with ROM. This study upholds ethical considerations where informant approval is obtained.

Case

Deep assessment

Mr. H, a 63-year-old man, has limited mobility due to pain in his left leg, the patient has experienced this for 10 years but he has never been to a health facility to check the pain he felt. The patient only comes to muscle masseurs every time he feels pain. For 2 months, the patient felt severe pain, and the masseur expressed his inability to provide help as usual. The patient is a rice farmer who grows crops every day. The patient has been suffering from hypertension but has never been treated regularly has a history of consuming alcohol about 2-3 times a week, a history of smoking one pack in 2 days, and has a history of bone trauma due to falling in the rice field 10 years ago while farming. The patient has no prior history of orthopedic surgery. There is no history of osteoporosis, osteoarthritis, and muscular dystrophy in patients and families. The patient is currently being treated at the Haji Adam Malik Central General Hospital.

Results of physical examination on November 20, 2024: patient post-operative day 1 with compos mentis consciousness, GCS: 15, lying down and fearful of moving due to pain, the patient appears to be protecting the pelvic area, the patient is tense and restless, Numeric rating scale value (NRS=3), VAS= face appears grimacing, blood pressure: 155/75 mmHg, HR: 83 x/i, Temperature 36.7^{o}C, SpO2: 99 % room air, Respiratory rate: 22 x/i, with regular rhythm and vesicular breath sound. The results of chest X-rays concluded that the lung TB was active for a long time, and the aortic elongation was elongated. At this time, no follow-up pulmonary TB examination is performed. AP pelvis x-ray photos concluded that AVN hip joint left. The results of AP pelvic X-ray photos of the THR post-operative concluded that there was a left hip prosthesis with good position and position, soft tissue swelling with emphysema in the left

hip region. Abnormal post-operative laboratory results include Hb 9.1 g/dL; Hematocrit 25.9%; Leukocytes 13.53*) 10^3/µL, Urea 70 ml/dL, Creatinine: 2.26 ml/dL. The current diet is the usual low-protein diet (MBRP): 1700 cal plus 52 grams of protein in the form of regular low-protein foods to prevent severe kidney function. The frequency of eating remained 3 times, but the food consumed was only 1/2 serving, the state of the mouth appeared to be plagued, the patient had not brushed his teeth and did not take a bath for 3 days after surgery, fluid intake was 1000-1500 cc/day.

The patient does not feel the sensation of bowel movements and urinary function, so he is currently using a urine catheter and diapers, with urine production of 1500 cc/14 hours, bright yellow color. History of bowel movements: 3 times/day, mushy consistency. The patient's medical diagnosis is Post (L) THR (POD1) d/t AVN (L) Hip +AKI stg II dd CKD stage IIIB. Medical therapy: attached drips fentanyl 300 mcg +50 cc NaCl 0.9 % as much as 3cc/hour, IVFD RL 20gtt/I, Inj. Ceftriaxone 1gr/12 hours, Inj. Ranitidine 50mg/12 hours, and Inj. Ketorolac 30mg/8 hours if fentanyl has been discontinued.

Assessment postoperative: complaints of pain, weakness, stiffness, and swelling in the left pelvic abductor muscle area, wound dressed on the first-day post-surgery total hip replacement, wound drain with a volume of 30 cc/24 hours, urine catheter 1000-1500 cc/24 hours, clear yellow color. The patient's body weight was 65 kg, height was 170 cm, and BMI was 22.4 kg/m2. Musculoskeletal physical examinations carried out by nurses include inspection, palpation, muscle strength assessment, and range of motion (ROM). The results of the patient's posture inspection were symmetrical and normal, there were no postural abnormalities such as scoliosis, kyphosis or lordosis. Atrophy occurs in the pelvic abductor muscle and lower left extremity muscle.

The results of palpation of pain and stiffness in the left pelvic area, muscle strength of the two upper extremities 5, left lower extremity 3 (limited due to pain), and right side 5. Passive active ROM can be performed on both the lower extremities and the lower right extremity, while passive ROM can only be performed in the lower left extremity due to pain complaints. Decreased muscle strength, decreased range of motion. On the last day, the patient complained of not being able to move his left leg. The patient felt relaxed and the stiffness in his knee decreased after light mobilization. The patient was able to sit up in bed. The assessment of THR post-operative wounds uses a design-R worth 10 points (Depth=4, Exudate=1, Size=3, Infection=0, Granulation=2). The level of patient independence is worth 12 points, namely all

activities starting from eating/drinking, toileting, dressing, mobility in bed, moving, and ambulation are still assisted by family.

Nursing Care

Nursing diagnoses

Nursing diagnoses in AVN patients with post-operative THR using the standards by Indonesian Nation Nurses Association. This standards in carrying out nursing care of Indonesian Nursing Diagnosis Standards, Indonesian Nursing Output Standards, and Indonesian Nursing Intervention Standards. The diagnoses are: acute pain (D.0077), impaired physical mobility (D.0054), impaired skin integrity (D.0129) and self-care deficit (D.0109). Several goals are achieved such as pain reduction, increased physical mobility, and improved self-care (Rahmaningrum, 2023).

Nursing intervention

Diagnoses: acute pain (D.0077)

Nurses carry out nursing interventions related to pain management including in postoperative. Day 1: identifying the location, characteristics, duration, frequency, quality, and intensity of pain, patients are given fentanyl drips therapy 300 mcg +50 cc NaCl 0.9 % as much as 3cc/hour and, provides a non-pharmacological technique to reduce pain, namely music therapy. Outcome: The patient's pain expression is according to the patient's designated scale, which is a visual analogue scale of 3, blood pressure: 155/75 mmHg, heart rate: 83x/i, respiratory rate: 22x/i.

Day 2 and 3: identifying the location, characteristics, duration, frequency, quality, and intensity of pain, patients are given Inj. Ketorolac 30 mg/8 hours, provides music to reduce pain. Outcome: visual analogue scale of 1, blood pressure: 125/85 mmHg, heart rate: 84 x/I, respiratory rate: 22 x/i.

Diagnoses: impaired physical mobility (D.0054)

Day 1: assess the strength of the extremity muscles, assess normal passive active ROM in both upper extremities and in both lower extremities can only be performed passive ROM according to evidence based nursing (Aprisunadi et al., 2023). Monitor the general condition during mobilization on the left hand and right leg only. Identify the presence of pain or other physical complaints. Facilitate mobilization activities with bed railings assisted by family and nurses, every 2 hours and sitting in bed. Involve the family to assist the patient in improving movement.

Outcome: the muscles of the two upper extremities are valued at 5, the strength of the muscles of the right leg of the lower extremities is valued at 5, the left leg is 4. Position changes can be done every 2 hours, sitting on the bed and extension flexion, rotation of the soles of the feet. The patient seemed relaxed and smiling. Patients can do right and left tilts per 2 hours. Patients can sit in bed without assistance. Wound post THR with wound bandage.

Day 2: after the mobilization support nursing intervention and joint strengthening exercise techniques, it is expected that physical mobility will increase, with the outcome criteria: limb movement increased, muscle strength increased, joint range of motion (ROM) increased, joint stiffness decreased, and physical strength increased. The implementation carried out includes assessing the strength of the muscles of the two extremities, examining passive active ROM, identifying a decrease in muscle mass, monitoring the general condition during mobilization, identifying pain or other physical complaints, facilitating mobilization activities with bed railings assisted by family and nurses every 2 hours, Engaging families to help patients improve movement, teaching Evidence Based Nursing: Muscle Relaxation Handheld Finger-Grip Relaxation Technique (Elnosary et al., 2024) to increase muscle energy and relaxation, as well as train patients in doing early mobilization including right and left tilt positions every 2 hours, sitting on the bedside, sitting on the edge of the bed with their legs outstretched (Aprisunadi et al., 2023).

Day 3: repeated intervention day 2 and follow the next step of early mobilization are moving from bed to chair and starting walking exercises (Aprisunadi et al., 2023). Patient can move from bed to the chair and start walking in day 3. Early mobilization can also prevent the risk of deep vein thrombosis in patients after orthopedic surgery (Raya-Benítez et al., 2024). In addition, nurses can also provide interventions to prevent the occurrence of deep vein thrombosis with venous foot pumps, this technique is more effective if there is a venous stimulation device on the legs of patients undergoing orthopedic surgery

Diagnoses: Impared skin integrity (D.0129)

Day 1, 2, and 3: Nursing interventions in impared skin integrity disorders include: identification of the cause of skin integrity disorders, monitoring of wound condition (including wound size, wound degree, bleeding, wound base color, infection, exudate, wound odor, wound edge condition), monitoring of signs and symptoms of infection in wounds, monitoring nutritional status (e.g. calorie intake, protein), helping patients change positions every 2 hours, and making alarms according to the patient's condition, Wound study with design-R, collaboration with

nutritionists in the administration of diet and enteral nutrition: regular low-protein diet (MBRP); 1700 cal plus 52 g protein, collaboration in administering IVFD RL 20gtt/i, and inj. ceftriaxone 1 gr/12 hours.

Diagnoses: Self-care deficit (D.0109)

Day 1, 2, and 3: Self-care deficit nursing interventions include: assessing self-care skills, identifying self-care activities, calculating the independence level score, teaching families to prepare toiletries in bed, namely a basin for damp wipes, haircaps, shampoo, damp towels and dry towels, new dry and comfortable clothes, teaching families to wash the patient's hair and wiping the patient's body, encourage consistent self-care according to the patient's ability, The nurse helps the patient to change diapers and bed sheets in the afternoon.

RESULT

Evaluation

The results of the implementation of priority-based nursing care can be concluded that the implementation of routine nursing coupled with the application of evidence-based nursing in relaxing muscles with the handheld finger-grip relaxation technique (Elnosary et al., 2024) and early mobilization to increase muscle energy and relaxation in the nursing diagnosis of physical mobility disorders. The criteria for the results of increasing early mobilization after THR surgery for indications of avascular necrosis were achieved with the following outcome indicators: the patient was able to perform right-and-left tilt mobilization per 2 hours on the first day postoperatively, the patient could sit in bed with 45^{o} on the second day and currently the patient could sit while holding the bed railing for 10-15 minutes, Move from bed to chair and walk on crutches on the third day. Lower left extremity muscle strength increased from 3 to 4 (Aprisunadi et al., 2023).

The problem of physical mobility disorders has been resolved. The results of the implementation of skin integrity disorders are as follows: design-R of 10 points, the post-operative wound of THR is wrapped in a bandage, the wound is odorless, the swelling has decreased, the patient has carried out the early mobilization protocol well, there are no signs of infection in the wound, the post-operative lab results of Hb 9.1 g/dL; Hematocrit 25.9%; Leukocytes 13.53*) $10^{3}/\mu L$ and no evaluation of lab results after administration of antibiotics inj. ceftriaxone 1 gr/12 hours for 3 days postoperatively. Educate patients and their families to continue to follow the diet protocol while in the hospital, namely regular low-protein meals (MBRP); 1700 cal plus 52 grams of protein. The procedure for giving diet has been taught by a

nutritionist when the patient is treated. The outcome criteria for the diagnosis of self-care deficit have also been overcome with the help of family which includes patients being able to take care of themselves assisted by tools, the previous independence score was 12 to 7, only ambulation that still needs others.

DISCUSSION

Tn. H was 63-year-old patient with a history of trauma such as falling on the hip while in the rice field, the pain was felt for 10 years and reduced if he went to a muscle masseuse in his village, the patient also had a history of consuming alcohol. The patient's medical history is a risk factor that aggravates the incidence of avascular necrosis (Ferri, 2018; Lohiya et al., 2023). The success of surgery and early mobilization post surgery is very surprising and can be a new spirit in the world of nursing and medicine (Mugheed et al., 2023).

When the nurse visited the patient on the first day after surgery, the patient seemed very anxious about his condition and afraid to move his legs, so the nurse found the patient's diapers wet and the patient did not want to be replaced by the family. The nurse changed the sheets, diapers, and positioned the patient on the left side which was the initial action of early mobilization, the nurse explained that early mobilization is one of the important points in improving healing and reducing pain, stiffness and swelling in the joint area, as well as reducing the length of hospital days without increasing side effects (Di Martino et al., 2023), the patient seemed excited and began to relax after early mobilization. The achievement of accelerating other orthopedic post-operative surgeries has also been researched (Zhang et al, 2020).

The success of improving physical mobility in patients includes: patients can already do right and left tilt mobilization per 2 hours on the first day postoperatively, patients can sit in bed with 45o on the second day and currently patients can sit while holding the bed railing for 10-15 minutes, move from bed to chair and walk on crutches on the third day (Aprisunadi et al., 2023). The strength of the lower left extremity muscle increased from 3 to 4. Skin integrity disorders have not been resolved, so further interventions are needed, including: monitoring the condition of the wound when the patient goes to the orthopedic polyclinic for treatment, reviewing the wound with Design-R, treating the wound according to hospital standards, and continuing to provide a low-protein regular diet (MBRP) of 1700 cal plus 52 grams of protein. The outcome criteria for the diagnosis of self-care deficit have also been overcome with the help of families, further education to families to improve patient self-care.

CONCLUSION

Patients with THR need long-term care to maximize physical mobility function, this is a challenge for nurses to choose the best evidence-based nursing practice, provide education to patients to continue to do walking mobilization exercises using crutches, so that patients can walk without the help of tools. Nurses must have a high commitment to provide comprehensive services for 24 hours to patients. This case report highlights the importance of implementing evidence-based nursing practices and supporting nurses in recovering patients' physical condition in improving the patient's physical mobilization to reduce pain, joint stiffness and swelling in the joints and muscles post THR. The more often patients are given support in carrying out early post-operative mobilization, the greater the potential for patient recovery.

LIMITATION

The implementation of evidence-based nursing in the diagnosis of acute pain has bias implications on pain reduction criteria, because when the intervention is carried out, the patient is still given 300 mcg + 50 cc NaCl 0.9% of 3cc/hour and then Inj. Ketorolac 30mg/8 hours if fentanyl has been discontinued. Furthermore, the implementation of nursing in this case report can only be reported in 3 days, namely from the first day of THR post-surgery to the third day because the patient goes home for outpatient treatment. The nurse also did not follow up on the continuation of the follow-up nursing care plan, so this case report did not show comprehensive nursing care. The outcome of the intervention was that pain control allowed earlier mobilization and can be a reference for professional nurses in improving the quality of services, especially for avascular necrosis patients who undergo Total Hip Replacement (THR) surgery.

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