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Nursing Interventions for a 35-Year-Old Man with Diffuse Axon Injury Caused by Fall: A Case Report

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ABSTRACT

Traumatic brain injuries are significant cause of disability and mortality worldwide, with Aceh having the highest incidence of head injuries at 14 percent, ranking 12th in Indonesia. This case report focuses on providing nursing care to patients with traumatic brain injuries at Dr Zainoel Abidin General Hospital in Banda Aceh. The patients had decreased consciousness, increased blood pressure, irregular breathing, pain due to increased intracranial pressure, decreased muscle strength, and grade II posterior ulcers. Common nursing issues included decreased intracranial adaptive capacity, pain, impaired physical mobility, impaired skin integrity, and self-care impairments. Interventions included monitoring vital signs, observing elevated intracranial pressure, elevating the head by 30 degrees, murottal therapy, muscle strength training, repositioning, wound care, and skin care. The nursing evaluation showed a significant increase in consciousness, reduced pain severity, improved muscle strength, and reduced skin layer damage. Nurses should follow recommendations for positioning patients with inadequate intracranial adaptive capacity and encouraging range of motion exercises.

Keywords: Nursing care, diffuse axonal injury, severe head trauma, Traumatic brain injury

INTRODUCTION

Traumatic Brain Injury (TBI) is the primary cause of mortality and morbidity for children and young people, which makes trauma the leading cause of mortality. According to the Centers for Disease Control and Prevention (CDC), there are more than 1.5 million documented cases of TBI in the US each year[(1)]. Based on a 2018 report from the Regional General Hospital Dr. Zainoel Abidin in Banda Aceh, 60 patients received treatment for TBI at the emergency unit. Among these patients, 53% had mild brain injuries, 32% had moderate brain injuries, and 15% had severe brain injuries[(2)]. One kind of TBI that occurs from a blunt brain injury is diffuse axonal injury (DAI). The prevalence of Diffuse Axonal Injury (DAI) remains indeterminate. However, the DAI occurs in approximately 10% of patient with head trauma. Out of all instances of DAI, 25% result in mortality. It is also the leading cause of posttraumatic coma, disability, and a chronic neurovegetative state[(3)].

The Glasgow Coma Scale (GCS) is used to classify TBI into three categories: mild, moderate, and severe. The vast majority of individuals with TBI are classified as mild if their GCS is between 13 and 15. Individuals

with a GCS of eight or less are category as having a severe traumatic brain injury. In contrast, those with a GCS of nine to twelve are thought to have a mild traumatic brain injury[(4)(5)]. DAI is characterized by a state of prolonged unconsciousness lasting at least 6 hours following a TBI, except in cases involving brain edema or ischemic lesions. Diffuse axonal damage results in cognitive, physical, and behavioral alterations that hinder the ability of patients and their families to reintegrate into society, resume productive activities, and maintain a high quality of life. These alterations endure beyond the initial phase of treatment and remain for an extended duration following the traumatic incident. Because of functional impairment rather than damage to brain tissue, the brain may gradually return to normal function once the patient's condition stabilizes and neuronal connections change shape through plasticity[(6)].

Considering the significant consequences of a TBI, it is crucial to prioritize safety measures in the workplace in order to prevent such incidents. If a head injury has already happened, it is crucial to provide intensive care and support systems, along with thorough intervention through the nursing foster care process. This approach addresses the difficulties that arise and prevents potential complications early[(6)].

Patients with severe traumatic brain injury commonly experience nursing issues such as decreased intracranial adaptive capacity, increased risk for seizures, acute confusion due to elevated intracranial pressure, deficient knowledge, impaired physical mobility, pain, inefficiency in clearing the airways, memory impairment, self-care deficit, and changes in cerebral tissue perfusion[(6)(7)(8)]. According to the a bove descriptions, the existing literature is limited in its coverage of nursing care methods for patients with diffuse axon injury. Subsequently, this case report was composed following the medical intervention of a 35-year-old male patient in the neurological ward at dr. Zainoel Abidin Banda Aceh District Hospital.

CASE DESCRIPTION

The 37-year-old patient, identified as "Mr H," was transferred from the Northern Aceh General Hospital due to inadequate diagnostic support facilities. The patient's main complaint during the transfer was a fall from a tree above 4 meters. At 10:51 a.m. on January 20th, 2023, the patient went to dr. Zainoel Abidin's general hospital and was diagnosed with a severe diffuse axon injury of the third degree. The patient was unable to undergo a craniectomy due to a lack of approval for the anesthetic technique. Subsequently, he received treatment in the High Care Unit (HCU), where the protocol dictated that if there were a decrease in the Glasgow Coma Scale (GCS), surgical intervention would be deemed necessary.

After a 7-day therapy in the HCU, on January 28, 2023, at 10:00 a.m the patient was transferred to the Mina 1 Neurological ward. On January 31, 2023, the patient's GCS score was E3M4V4 (indicating delirium). The patient also experienced insomnia, reported pain, and had a history of seizures. The patient also indicates an eye hematoma, with a pupil size of 3mm/2mm and an asymmetrical head shape. The patient had a five on the R-FLACC pain scale. There is also an observable enlargement of the jugular vein.

Additionally, the patient exhibits chest retraction and irregular breathing during respiration. The patient has some wounds and a noticeable second-degree ulcer in the posterior region. The patient had wounds on their skin, nasal and ocular secretions, and an unpleasant bodily odor. Results of the physical examination: Blood pressure: 147/87 mmHg, pulse: 101 beats per minute, respiration rate: 24 breaths per minute irregular, temperature: 37 °C, capillary refill time more than 2 seconds, bowel sounds two times per minute.

The case study took place in the neurology ward of the Regional General Hospital, dr.

Zainoel Abidin Banda Aceh, from January 31st to February 5th, 2023. Nursing care begins with assessment, which involves analyzing data by presenting facts, comparing them with theories, and discussing them in detail. The analysis uses a narrative approach based on the assessment, implementation, and evaluation.

CASE DISCUSSION

Based on the assessment, there are four priority problems for "Mr. H" including decreased intracranial adaptive capacity, acute pain, impaired physical mobility, and impaired skin integrity.

Decrease in Intracranial Adaptive Capacity

The patient is experiencing overall weakness, the Glasgow Coma Scale (GCS) score of 11 (E4M3V4) and apathy. The patient has had a severe head injury with a diffuse axonal injury. The blood pressure is 147/87 mmHg, and the CT scan performed on January 20, 2023, detected a picture indicative of a brain hemorrhage. The intervention aimed to reduce intracranial adaptive capacity in patients with traumatic brain injury based on the SIKI guidelines (2018) for managing elevated intracranial pressure[(9)].

Nevertheless, not all interventions are implemented. These treatments are customized to suit the specific condition of the patient. They are subject to certain constraints imposed by the author. Observational patient treatment includes identifying the cause of increased intracranial pressure and monitoring the signs and symptoms of increased intracranial pressure. Therapeutic: To minimize stimulation, set the patient in a semi-Fowler's position and create a pleasant environment. The author implements the primary implementation by monitoring the decrease of intracranial pressure (ICP) by observing vital signs and detecting signs and symptoms indicating increased intracranial pressure (ICP). Vital sign monitoring measures the patient's physiological parameters over five days. The patient's vital signs show daily fluctuations, commonly observed indications of tachycardia and increased blood pressure. Ghandili, Mehrnoosh and Munakomi, Sunil (2023) said that headaches, vomiting, and altered mental status varying from drowsiness to coma alterations in vital signs could also present as additional signs and symptoms associated with high intracranial pressure. Subsequently, it is important to closely observe the escalation in intracranial pressure following the implementation of this technique for five days[(10)].

Furthermore, the patient displays other signs of elevated intracranial pressure, including headache and papilledema. Positionally elevating the head is a purposeful adjustment intended to improve cerebral blood flow and mitigate elevated intracranial pressure[(11)]. Consistent with Mokaden and Sayed (2020) research, the results showed that head position at 30° significantly impacts the intracranial pressure, especially on the level of consciousness and average arterial pressure in people who have had head trauma. Patients with head injuries are positioned with more than 30° to promote the drainage of intracranial reflux and decrease intracranial pressure[(12)(13)].

After 5-day of nursing intervention, the patient's shown improved Glasgow Coma Scale (GCS) from score of 11 (indicating delirium) to 13 (indicating apathy). Additionally, the patient experienced a notable reduction in headache symptoms and improved blood pressure.

Acute Pain

The patient's overall condition is weak, showing irritability. And difficulty in communication. Pain assessment using the R-FLACC instrument indicates a pain level of 5, primarily in the head. The pain is sudden, intense, and persistent, more than 10 minutes. However, it can be alleviated with medication.

The primary intervention is promoting the use of non-pharmacological methods to

decrease the pain experienced by the patient. The therapy requires using the entire Qur'an as a means of healing. The murotal stimulation of the Quran significantly impacts awareness. The study found a p-value of 0.003 in the intervention group and a p-value of 0.000 in the control group, indicating a significant difference in the levels of consciousness among stroke patients before and after Murotal therapy of the Qur'an. Hence, the researchers proposed the feasibility of administering regular and prolonged murotal stimulation of the Qur'an to patients with diminished consciousness[(14)].

In a recent study conducted by Pristiadi, Chanif, Hartiti (2022), researchers investigated the effects of murotal reproduction on post-operative pain sufferers. The study used a sample of three patients, and the results indicated that after receiving murottal therapy from the Al-Qur'an for three days, all three patients saw a significant reduction in pain. Mr. A saw a reduction in pain intensity from level 5 to level 2, Mr. S from level 6 to level 3, and Mr. K from level 5 to level 2. Therefore, it can be inferred that the murottal therapy of the Qur'an is efficacious in diminishing the severity of pain[(15)].

In a comparison study between non-pharmacological murottal treatment and music therapy. The study found variations in signs of vitality between the two therapies, suggesting that murottals could be a viable option for non-pharmacological pain management[(16)]. During three days, Mr H underwent murotal therapy, which decreased pain intensity from the five R-FLACC pain scales to the three R-FLACC scales. The administration of metamizole medication helped this reduction in pain.

Impaired Physical Mobility

The patient showed general weakness, upper right extremity muscle strength of value 5, upper left extremity muscle value 2, lower right extremity value 4, and lower left extremity value 3, which supports the diagnosis. The author focuses on ambulatory or necessary mobilization actions when dealing with a significant dependency score patient. A straightforward mobilization procedure can help lower the risk of pulmonary embolism or venous thrombosis, strengthen muscle tone, increase the patient's dependence, and enhance gastrointestinal and genitourinary system function. Range of motion (ROM) exercise, which can be implemented by observing the patient in their comfortable head-up position (30–45°), is the mobilization action applied to the patient. Passive range of motion exercise at least 15 to 30 minutes everyday. The goal of both approaches is to enhance cerebral hemodynamics[(17)(18)].

The passive ROM is implemented twice a day for 15 to 20 minutes. Kusuma and Sara (2020) states that ROM exercise can be implemented twice daily, for 15–35 minutes. Regular ROM exercises have been demonstrated to prevent depression, enhance ADL and muscular strength, and enhance patient quality of life[(18)(19)]. Another study claim that ROM exercise can effectively increase muscle strength, doing so twice a day is more beneficial than doing so once a day[(20)]. The study by Nababan (2019), which found that patients' ratios were 2.50 before ROM intervention and 10.00 after a 5-day intervention (with a p-value of 0.059), indicates that ROM training has an impact on patients' muscle strength.

Impaired skin integrity

The diagnosis is based on the acquired data, which indicates the existence of injuries on the arms, body, face, and back. The patient exhibits localization, grade II pressure ulcers, and redness in specific areas of the posterior region. The skin appears dehydrated and coarse. According to SIKI (2018), nursing interventions should be implemented to address skin integrity disturbances, explicitly focusing on monitoring signs of trauma[(9)]. The ulcer wound is assessed to establish the appropriate treatment and therapy for the wound. Initial wound assessment is an

effective method for assessing the condition and determining appropriate treatment or therapy[21].

Subsequently, we will observe and assess the indications of infection. Monitoring wound treatment is contributes to reducing the occurrence of infections in patients' wound dressings during treatment in hospitals as the guidelines out- lined in SIKI (2018), it is imperative to promptly monitor signs and symptoms of infection to prevent infection in cases when the skin's integrity is compromised[9]. The author's subsequent step involves repositioning patients using right and left bending movements. Patients who have a complete dependency scale undergo family-assisted repositioning every 2 hours. Repositioning is a preventive and therapeutic approach that can help mitigate and decrease the occurrence of pressure ulcers in patients suffering from chronic laryngitis. Extended periods of immobility in bed increase the likelihood of injury to vulnerable regions of the body, particularly those that are more exposed[22], it has been discovered that using repositioning techniques helps decrease the severity of pressure ulcers in patients who are immobilized.

According to the National Clinical Guideline Centre (2014), the purpose of the repose action is to decrease or eliminate pressure on vulnerable areas, preserve muscle strength and overall tissue health, and provide sufficient blood flow to the at-risk area. Furthermore, the skin integrity disorder implementation is wound care using a medication of 0.9% sodium chloride and applying a 0.1g dosage of gentamycin ointment to the affected area on the back where a grade II ulcer has developed. Daily and regular wound care aims to cleanse the wound, mitigate the risk of infection, and expedite the formation of new tissue networks. The duration of wound healing varies based on the dimensions and profundity of the wound. Treatment will persist till the epidermal tissue regenerates flawlessly[23][24][25].

Additional remedies include the application of body creams and olive oil. Regular application of topical olive oil has proven to be an efficacious method for mitigating the likelihood of skin conditions such as dermatitis and decubitus ulcers. There are other reasons for using it, such as avoiding infection and treating dry skin diseases. Olive oil possesses anti-inflammatory properties, enabling it to regenerate cellular membranes on the skin[26]. In addition, olive oil can enhance skin smoothness and maintain moisture, thereby helping prevent decubitus ulcers. Furthermore, olive oil is rich in vitamin E, phenolic, and chlorophyll components, which function as antioxidants and anti-aging agents, promoting the rapid repair of the skin's outer layer[27].

The enhancement in skin integrity became noticeable on the fifth day of treatment. The ulcer has progressed to a grade 1 stage, characterized by a wound only on the epidermis without any exposed sores. The laceration on the wrist has also undergone desiccation.

CONCLUSION

1. The examination conducted on Mr H, who has suffered a diffuse axonal head injury, revealed the following findings: the patient's overall condition is weak, there is a decrease in consciousness, hematomas are present in both eyes, the patient experiences head pain, exhibits anxious behaviour, has reduced muscle strength and limited movement, and has a scratch wound on the body that is beginning to worsen, likely due to physical restraint. Reportedly, a second-degree ulcer is observed with evident redness in the posterior region. The nursing diagnoses identified in patients encompass diminished intracranial adaptive capacity, acute discomfort, impaired physical mobility, compromised skin/tissue integrity, and self-care deficit.
2. The intervention that involves assessing the use of advanced information and communication technologies (ICTs),

monitoring the cognitive function of the patient, examining the patient's medical history, implementing non-pharmacological therapy to decrease the growth of papilloma, and positioning the patient's head at a 30-degree angle. Next, the process involves identifying the precise location, characteristics, duration, frequency, quality, and intensity of pain. Additionally, non-pharmacological techniques are provided to alleviate pain. The family is educated on non-pharmacological techniques for pain relief. Physical tolerance of movement is assessed and facilitated, and passive range of motion (ROM) exercises are taught and administered. Patients are placed comfortably and taught how to reposition and wound care.

3. During the implementation, authors observed the increased in intracranial pressure in patients by monitoring consciousness, cognitive function, blood pressure and elevating the head by 30 degrees. Subsequently, the author implemented non-pharmacological interventions to alleviate pain, which included utilizing the Qur'an murottal for auditory treatment, range of motion exercises to improve the patient's muscular strength, and administering rehabilitative measures to mitigate the likelihood of decubitus. The author adopts a particular strategy that acknowledges and affirms the individuals' emotions. They encourage the family to support the patient and implement the knowledge imparted consistently.

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