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Application of deep breathing relaxation technique in a child with acute pain following laparotomy for obstructive ileus: A case study

Arum Winantu*, Istinengtyas Tirtasuminar

Universitas Aisyiyah Yogyakarta

Corresponding author: *Email: Winanarum21@gmail.com

Abstract

Background: Obstructive ileus is a gastrointestinal emergency caused by mechanical obstruction of the intestinal tract and may require surgical intervention. Acute postoperative pain is one of the common problems following laparotomy and may interfere with comfort, mobility, and recovery.

Purpose: To describe comprehensive nursing care for a child following laparotomy for obstructive ileus with acute pain as the primary nursing diagnosis and to describe the application of deep breathing relaxation as a complementary intervention for pain management.

Method: This study used a descriptive case study approach. Data were collected through interviews, observation, physical examination, documentation, and medical record review. Nursing care was developed according to the Indonesian Nursing Diagnosis Standards (SDKI), Indonesian Nursing Outcome Standards (SLKI), and Indonesian Nursing Intervention Standards (SIKI).

Results: The patient was a 9-year-old boy who reported postoperative pain with an intensity of 5 on the Numeric Rating Scale (NRS). The patient demonstrated grimacing, protective behavior toward the surgical wound, and anxiety during movement. After three days of nursing care combining pharmacological therapy and deep breathing relaxation, pain intensity decreased from 5 to 4. The patient appeared more relaxed, showed reduced grimacing and protective behavior, and was able to perform the deep breathing relaxation technique independently.

Conclusion: Deep breathing relaxation provided positive complementary effects in managing acute postoperative pain in this pediatric patient. Although pain was not completely resolved, the intervention was associated with reduced pain intensity and improved behavioral responses and pain-control ability.

Keywords: Acute Pain; Child; Deep Breathing Relaxation; Laparotomy; Nursing Care; Obstructive Ileus.

INTRODUCTION

Obstructive ileus is a condition characterized by impaired intestinal contents flow due to a mechanical obstruction in the gastrointestinal tract, resulting in the accumulation of fluid and gas within the intestinal lumen. This condition can increase intraluminal pressure, impair intestinal function, and reduce intestinal tissue perfusion. Obstructive ileus is a gastrointestinal emergency that requires prompt management to prevent further complications (Subroto & Prabowo, 2023). In children, one of the causes of obstructive ileus is Meckel's diverticulum. Meckel's diverticulum is a congenital gastrointestinal

anomaly that occurs in approximately 1–3% of the general population. Approximately 60% of symptomatic cases occur in children, with small bowel obstruction accounting for approximately 30% of cases (Izhar et al., 2021).

Common signs and symptoms of obstructive ileus include intermittent colicky abdominal pain caused by increased intestinal peristalsis as the bowel attempts to propel its contents through the obstruction, accompanied by nausea, vomiting, abdominal distension, constipation or difficulty defecating, and inability to pass flatus. Physical examination may

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A case study

reveal hyperactive, high-pitched bowel sounds and abdominal tenderness. In more severe cases, patients may develop dehydration, electrolyte imbalance, hypovolemia, and shock due to fluid loss and impaired circulation (Su'un et al., 2024).

Management of obstructive ileus includes conservative and surgical approaches depending on the patient's condition. Initial management focuses on identifying signs of emergency, such as peritonitis, strangulation, and intestinal ischemia, through physical examination, laboratory investigations, and computed tomography (CT) scans. Non-operative management includes bowel rest, fluid administration and electrolyte correction, and intestinal decompression using a nasogastric tube (NGT) to reduce the accumulation of fluid and gas in the stomach and intestines. In addition, water-soluble contrast agents (WSCA) can help assess the success of conservative treatment and reduce the need for surgical intervention. However, if the obstruction does not resolve, signs of intestinal strangulation or ischemia develop, or conservative treatment fails, surgical intervention such as laparotomy or laparoscopy is required to relieve the obstruction and prevent further complications (Amara et al., 2021).

Laparotomy in patients with obstructive ileus may result in various postoperative problems due to abdominal surgery. Common problems include acute pain, gastrointestinal motility dysfunction, anxiety, limited physical mobility, and the risk of infection. Postoperative patients may also experience nausea, discomfort around the surgical wound, reduced activity levels, and impaired nutritional intake. Therefore, comprehensive nursing care is required to support recovery, prevent complications, and improve patient comfort (Hendrawati & Amalia, 2022).

Nurses play an important role in the management of patients following laparotomy for obstructive ileus through nursing interventions such as pain management, mobilization support, promotion of adequate rest and sleep, monitoring of gastrointestinal function, wound care, and infection prevention. These interventions aim to accelerate recovery, improve patient comfort, and prevent postoperative complications.

One non-pharmacological intervention that can be provided by nurses to manage postoperative pain is deep breathing relaxation. This technique is a simple

relaxation method involving slow and deep inhalation followed by regular exhalation. Deep breathing relaxation stimulates the parasympathetic nervous system, thereby reducing muscle tension, decreasing stress hormone production, improving tissue oxygenation, and reducing pain perception. In pediatric patients, this technique can also help divert attention from pain and improve comfort during hospitalization. Previous research has demonstrated that deep breathing relaxation is effective in reducing pain intensity in postoperative patients (Jarrah et al., 2022).

RESEARCH METHOD

This study employed a descriptive method with a case study approach based on observations, interviews, and physical examinations of the patient. A cross-sectional approach was used to provide comprehensive nursing care to a pediatric patient diagnosed with obstructive ileus following laparotomy in the Ibnu Sina Ward, Hospital PKU Muhammadiyah Yogyakarta. The subject of this case study was An. Y, whose primary nursing problem was acute pain.

Primary data were collected through direct observation of the patient's condition, including general condition, level of consciousness, vital signs, and physical examination findings. Physical examination was performed using inspection, palpation, percussion, and auscultation to comprehensively assess the patient's condition. The assessment included abdominal condition, bowel sounds, postoperative wound condition, pain intensity, mobility, sleep patterns, nutritional status, and elimination.

In addition to observation, data were obtained through interviews with the patient and family regarding the chief complaint, medical history, activity patterns, sleep patterns, nutritional intake, and the patient's response to nursing interventions. Pain intensity was measured using the Numeric Rating Scale (NRS), a 0–10 pain scale used to assess the level of pain experienced by the patient. Secondary data were obtained through documentation, including the patient's medical records, laboratory examination results, medication therapy, and electronic medical records related to the patient's condition during hospitalization.

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Data analysis was conducted through three stages: data reduction, data presentation, and conclusion drawing. Data reduction was performed by focusing on relevant information obtained from interviews, observations, and physical examinations of the patient with obstructive ileus following laparotomy. Data analysis was guided by the Indonesian Nursing Diagnosis Standards (SDKI), Indonesian Nursing Outcome Standards (SLKI), and Indonesian Nursing Intervention Standards to determine appropriate nursing diagnoses, outcomes, and interventions.

The data were presented narratively, including assessment, data analysis, nursing diagnoses, interventions, implementation, and evaluation of the patient in the Ibnu Sina Ward, RSU PKU Muhammadiyah Yogyakarta. Conclusions were drawn based on the results of nursing care evaluation to determine the effectiveness of the non-pharmacological deep breathing technique in managing acute pain in a pediatric patient following laparotomy.

RESEARCH RESULTS

Assessment

The assessment of An. Y, a 9-year-old boy with a medical diagnosis of obstructive ileus following laparotomy, showed that the patient continued to experience pain at the surgical wound site. Based on the PQRST assessment, the patient reported that the pain increased with movement (provocation), felt like a cutting sensation (quality), was located at the surgical site (region), had an intensity of 5 on the Numeric Rating Scale (NRS) (severity), and occurred intermittently (time). The patient also reported that the pain had not completely subsided and continued to interfere with his comfort during hospitalization.

Physical examination showed that the patient frequently held the surgical wound area and demonstrated protective behavior toward the abdomen. The patient also appeared anxious when asked to change position or move because of fear that the pain would worsen. Vital signs showed a pulse rate of 110 beats/minute, body temperature of 36.5°C, oxygen saturation of 100%, and a compos mentis level of consciousness with a Glasgow Coma Scale (GCS) score of 15 (E4V5M6). The patient weighed 22 kg and was 138 cm tall. During

hospitalization, the patient's appetite remained decreased, allowing only small portions of soft porridge and small amounts of fluids. Nutritional needs were also partially supported through gradual administration of milk via a nasogastric tube (NGT).

Laboratory examination showed a hemoglobin level of 14.1 g/dL, hematocrit 41%, leukocyte count $11.8 \times 10^3/\mu\text{L}$, neutrophils 81%, and random blood glucose 101 mg/dL. Based on the supporting examinations, the patient was diagnosed with obstructive ileus following laparotomy. During hospitalization, the patient received ceftriaxone 1 g every 12 hours, metronidazole 3 cc every 8 hours, Antrain 200 mg every 8 hours, ranitidine 20 mg every 8 hours, and Ringer's lactate at 20 drops/minute, according to the prescribed medical treatment.

Nursing Diagnosis

Based on the assessment findings, subjective data indicated that the patient complained of pain at the postoperative laparotomy wound site. The pain was described as a cutting sensation, increased with movement, located at the surgical site, had an intensity of 5 on the Numeric Rating Scale (NRS), and occurred intermittently. The patient also reported that the pain had not subsided completely and continued to cause discomfort during hospitalization. In addition, the patient appeared worried about moving because of fear that the pain would worsen.

Objective data showed that the patient frequently held the surgical wound area, demonstrated protective behavior toward the wound, and appeared anxious during position changes and mobilization. The vital signs showed a pulse rate of 110 beats/minute, indicating a physiological response to pain. Based on these subjective and objective findings, the primary nursing diagnosis was Acute Pain related to physical injury agent (D.0077) resulting from the laparotomy procedure. This diagnosis was prioritized because pain was the patient's main complaint and could affect comfort, limit activity, and interfere with postoperative recovery. Therefore, nursing care focused on reducing pain intensity through pharmacological interventions according to the medical treatment plan and non-pharmacological intervention using deep breathing relaxation techniques.

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Nursing Outcome

Based on the nursing diagnosis of Acute Pain related to physical injury agent (D.0077), the expected nursing outcome referred to Pain Level (L.08066). The expected outcome after 3 × 8 hours of nursing interventions was a reduction in the patient's pain intensity. The achievement of the outcome was assessed using several indicators, including reduced pain complaints, decreased grimacing, and reduced protective behavior toward the surgical wound.

In addition, the patient was expected to demonstrate improved pain control following nursing interventions. This was indicated by the patient appearing more relaxed, no longer being afraid to perform light movements because of pain, and being able to follow and practice the deep breathing relaxation technique taught as a non-pharmacological method to reduce pain. Achievement of these outcomes served as the basis for evaluating the effectiveness of the nursing interventions provided during hospitalization.

Nursing Interventions

Nursing interventions were developed based on the diagnosis of Acute Pain related to physical injury agent (D.0077), with the aim of reducing pain intensity and improving patient comfort during hospitalization. The intervention plan referred to Pain Management (I.08238), which included assessing pain intensity using the Numeric Rating Scale (NRS), monitoring the patient's nonverbal responses to pain, and observing changes in vital signs associated with the patient's pain condition.

In addition to observation, the planned interventions included providing deep breathing relaxation techniques as a non-pharmacological therapy to reduce pain perception, collaborating in the administration of analgesics according to the prescribed medical treatment, and educating the patient and family about the causes of pain, factors that may aggravate pain, and how to perform deep breathing relaxation independently when pain occurs. These interventions were expected to reduce pain while improving the patient's comfort during postoperative recovery.

Implementation

Nursing implementation was carried out over three days of hospitalization, focusing on the management of acute pain through a combination of pharmacological and non-pharmacological interventions. Before the intervention, the nurse assessed pain intensity using the Numeric Rating Scale (NRS), identified pain characteristics, and observed nonverbal responses such as grimacing, protective behavior toward the surgical wound, and anxiety during movement. Vital signs were also monitored regularly to assess the patient's physiological response to pain.

The non-pharmacological intervention provided was the deep breathing relaxation technique. The nurse first explained the purpose and benefits of the exercise to the patient and family to ensure that the patient understood its role in reducing pain. The patient was then guided to inhale slowly through the nose for several seconds until the chest and abdomen expanded, hold the breath briefly, and then exhale slowly through the mouth. The exercise was repeated 5–10 times per session and was recommended whenever the patient experienced pain or before changing position or mobilizing. During the exercise, the nurse assisted the patient to ensure that each step was performed correctly and encouraged the patient to remain calm and relaxed.

On the first day, the patient still had difficulty following the exercise because the pain remained relatively intense and his attention was focused on the pain at the surgical wound site. After gradual guidance and repeated practice, the patient began to follow the instructions. On the second day, the patient appeared more cooperative and was able to perform the deep breathing relaxation technique with minimal assistance from the nurse. On the third day, the patient was able to perform the technique independently when pain occurred or before movement. In addition to providing deep breathing relaxation, the nurse collaborated in administering analgesics according to the medical treatment plan and provided education to the patient and family so that the exercise could be continued during recovery to help reduce pain and improve comfort.

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Evaluation

Nursing evaluation was conducted over three days to assess the patient's progress following pain management interventions. On the first day, the patient continued to complain of pain at the surgical wound site with an intensity of 5 on the Numeric Rating Scale (NRS). The patient appeared to grimace, hold the wound area, demonstrate protective behavior toward the abdomen, and remain anxious when preparing to move. Nevertheless, the patient began to understand the explanation of the deep breathing relaxation technique and was willing to participate in the exercise provided by the nurse.

On the second day, the patient reported that the pain had decreased, although it was still present during movement. The patient appeared more relaxed than on the previous day and was able to perform the deep breathing relaxation technique with minimal assistance from the nurse. Grimacing and protective behavior toward the wound had begun to decrease, and the patient appeared more cooperative throughout the nursing care process.

On the third day, the evaluation showed an improvement in the patient's condition. Pain intensity decreased from 5 to 4. The patient appeared more comfortable, was able to independently practice the deep breathing relaxation technique when pain occurred, and no longer demonstrated excessive anxiety during position changes. Based on these findings, the nursing goal was partially achieved, as indicated by decreased pain intensity, reduced grimacing and protective behavior, and improved ability to control pain through the deep breathing relaxation technique.

DISCUSSION

The assessment of An. Y showed that the patient complained of pain at the postoperative laparotomy wound site, with a pain intensity of 5 on the Numeric Rating Scale (NRS). The pain was described as a cutting sensation, increased with movement, was located at the incision site, and occurred intermittently. In addition, the patient was observed holding the surgical wound, demonstrating protective behavior toward the abdomen, and appearing anxious during position changes. These findings indicate that pain was the patient's main complaint during the postoperative recovery period.

The pain experienced by the patient represents a physiological response to tissue injury caused by the laparotomy procedure. Surgical incision activates nociceptors, followed by the release of inflammatory mediators such as prostaglandins and bradykinin. These mediators facilitate the transmission of pain impulses to the central nervous system, resulting in the perception of acute pain. Previous research has reported that postoperative pain is a consequence of tissue trauma caused by surgical procedures and may affect patient comfort, limit mobilization, and delay recovery if not adequately managed. This is consistent with the assessment findings in An. Y, who continued to experience moderate pain accompanied by protective behavior toward the surgical wound (Fuller et al., 2023).

The assessment also showed that the patient appeared anxious during movement and tended to avoid changing position because of fear that the pain would worsen. School-aged children are generally able to verbally describe the location, characteristics, and intensity of pain, but they may still demonstrate behavioral responses such as grimacing, protecting the painful area, and limiting movement (Hockenberry et al., 2021). This finding was consistent with An. Y, who was able to describe the pain using the PQRST method but continued to demonstrate a nonverbal response in the form of protective behavior toward the surgical wound. Such behavior represents a natural protective mechanism intended to minimize stimulation of the injured area and prevent worsening of pain.

In addition to pain, the assessment showed that the patient had decreased appetite and that nutritional needs were partially supported through a nasogastric tube (NGT). This condition is commonly observed in patients following laparotomy, particularly in cases of obstructive ileus, because gastrointestinal function may not have fully recovered after surgery. Previous research has indicated that patients following laparotomy may experience limitations in meeting nutritional requirements during the early postoperative period due to pain, decreased intestinal motility, and postoperative adaptation. Nevertheless, in this case, the primary assessment focus remained acute pain because it was the most prominent

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complaint and the priority problem in nursing care (Hendrawati & Amalia, 2022).

Based on the assessment findings, the primary nursing diagnosis established for An. Y was Acute Pain related to physical injury agent (D.0077) resulting from the laparotomy procedure. This diagnosis was supported by subjective data consisting of pain at the surgical wound site with an intensity of 5 on the *Numeric Rating Scale* (NRS), increased pain during movement, a cutting sensation, and intermittent occurrence. Objective data included holding the surgical wound, protective behavior toward the abdomen, and anxiety during position changes. These findings indicate that pain was the patient's primary problem and required appropriate management to prevent interference with the recovery process.

The diagnosis of Acute Pain was consistent with the Indonesian Nursing Diagnosis Standards, which define acute pain as an unpleasant sensory and emotional experience resulting from actual or potential tissue damage, with sudden or gradual onset and a duration of less than three months. The characteristics identified in An. Y, including pain complaints, increased pain intensity during movement, and a nonverbal response in the form of protective behavior toward the surgical wound, were among the major indicators supporting the diagnosis of acute pain. Therefore, this diagnosis was prioritized because it was directly associated with patient comfort and could affect the patient's ability to perform activities and the wound-healing process (Indonesian National Nurses Association, 2017).

The nursing outcome selected for An. Y was Pain Level (L.08066), corresponding to the primary diagnosis of Acute Pain related to physical injury agent. This outcome was selected to evaluate changes in the patient's condition following pharmacological and non-pharmacological interventions. The indicators included decreased pain complaints, reduced grimacing, decreased protective behavior toward the surgical wound, and improved ability to control pain using deep breathing relaxation techniques. These indicators were appropriate to the patient's initial condition, in which the patient reported a pain intensity of 5, frequently held the surgical wound, and appeared anxious during movement.

According to the Indonesian Nursing Outcome Standards, the Pain Level outcome is used to assess changes in pain intensity and patient responses following nursing interventions. In this case, the target was to reduce pain intensity within 3 × 8 hours, according to the patient's clinical condition during hospitalization. This target was considered realistic because the patient was still in the early postoperative phase; therefore, pain reduction was expected to occur gradually along with tissue healing and continuous nursing interventions (Indonesian National Nurses Association, 2017).

The nursing intervention selected for An. Y was based on the Indonesian Nursing Intervention Standards, namely Pain Management (I.08238). This intervention was selected because it was appropriate for the primary diagnosis of Acute Pain related to physical injury agent following laparotomy. Pain management aims to reduce pain intensity, improve patient comfort, and help the patient adapt to pain during the recovery process. The planned interventions included assessing pain characteristics, monitoring nonverbal responses and vital signs, providing deep breathing relaxation as a non-pharmacological intervention, collaborating in the administration of analgesics according to the medical treatment plan, and educating the patient and family on pain-control strategies (Indonesian National Nurses Association, 2017).

The initial intervention focused on comprehensive pain assessment using the *Numeric Rating Scale* (NRS) and observation of the patient's responses to pain. Regular pain assessment was important for identifying changes in pain intensity and served as a basis for determining appropriate nursing interventions.

In addition to pain assessment, the primary intervention provided in this case was deep breathing relaxation as a non-pharmacological therapy. This technique was selected because it is simple, has no significant adverse effects, and can be performed by pediatric patients with assistance from nurses or family members. Previous research has shown that deep breathing relaxation can help reduce pain intensity by promoting relaxation, improving pulmonary ventilation, and stimulating the parasympathetic nervous system, which plays a role in reducing pain transmission (Jarrah et al., 2022).

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This finding is supported by other research indicating that non-pharmacological interventions can serve as complementary therapies for postoperative pain management by promoting comfort, reducing muscle tension, and improving patients' ability to control pain (Zakinah et al., 2024).

Nursing implementation for An. Y focused on applying deep breathing relaxation as a non-pharmacological intervention to help reduce acute postoperative pain following laparotomy. Before the exercise, the nurse assessed pain intensity using the *Numeric Rating Scale* (NRS), identified pain characteristics, and observed the patient's nonverbal responses. The patient was then educated about the purpose and benefits of the exercise and guided to inhale slowly through the nose, hold the breath for several seconds, and exhale slowly through the mouth. The exercise was performed 5–10 times per session and was recommended whenever pain occurred or before changing position. Gradual assistance was provided until, on the third day, the patient was able to perform the deep breathing relaxation technique independently.

The application of deep breathing relaxation in this case was consistent with previous research demonstrating that deep breathing exercises can reduce postoperative pain intensity by promoting relaxation, stimulating the parasympathetic nervous system, and reducing sympathetic nervous system activity. These effects may decrease muscle tension, improve ventilation, and inhibit the transmission of pain impulses to the central nervous system, thereby reducing pain perception (Jarrah et al., 2022). These findings support the intervention applied to An. Y, who appeared more relaxed and cooperative and gradually became able to control pain before movement and when pain occurred.

However, the findings in this case showed that the patient's pain intensity decreased only from 5 to 4 after three days of intervention. In addition to the non-pharmacological intervention, the patient received analgesics according to the medical treatment plan; therefore, pain management was implemented using a multimodal approach.

The evaluation showed that after three days of nursing care, An. Y's pain intensity decreased from 5 to 4 on the *Numeric Rating Scale* (NRS). In addition to the reduction in pain intensity, the patient appeared

more relaxed, while grimacing and protective behavior toward the surgical wound decreased. The patient was also able to independently perform deep breathing relaxation when pain occurred. Although the pain had not completely resolved, these changes indicated clinical improvement and partial achievement of the established nursing goals.

According to the Indonesian Nursing Outcome Standards, achievement of the Pain Level (L.08066) outcome is assessed based on changes in several indicators, including decreased pain complaints, reduced pain-related expressions, decreased protective behavior, and improved ability to control pain. In An. Y, most of these indicators improved following nursing interventions; therefore, the nursing outcome was considered partially achieved in accordance with the established target (Indonesian National Nurses Association, 2017).

Furthermore, the ongoing healing process of the surgical wound may have contributed to the evaluation results. Fuller et al. (2023) reported that postoperative pain gradually decreases as tissue healing progresses and the inflammatory response subsides. In pediatric patients, successful pain management is influenced by various factors, including clinical condition, anxiety level, the child's ability to understand instructions, and family support during care. Therefore, although the nursing goal was not fully achieved, the findings in An. Y indicate that deep breathing relaxation was beneficial in helping reduce pain and improve patient comfort during postoperative recovery.

CONCLUSION

Nursing care for An. Y, a pediatric patient with obstructive ileus following laparotomy, was comprehensively implemented through assessment, nursing diagnosis, outcome planning, intervention, implementation, and evaluation, with Acute Pain related to physical injury agent as the primary nursing diagnosis. Pain management was provided through a combination of pharmacological and non-pharmacological interventions.

The application of deep breathing relaxation as a non-pharmacological intervention showed positive results in reducing pain intensity. After three days of implementation, the patient's pain decreased **from** 5 to 4 on the *Numeric Rating Scale* (NRS),

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accompanied by reduced grimacing and protective behavior toward the surgical wound and improved ability to perform the relaxation technique independently. Although the reduction in pain was not optimal, deep breathing relaxation can be used as a supportive intervention for postoperative pain management in pediatric patients following laparotomy for obstructive ileus, particularly when applied consistently in combination with pharmacological therapy as indicated.

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