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Progress in The Application of Nursing Care Based on ERAS Concept after Thoracolumbar Fracture Surgery

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Abstract: Thoracic spine fracture is a common orthopedic injury that is usually caused by external forces acting directly on or transmitted to the thoracic spine through other parts of the spine. Thoracic spine fractures can be divided into two types: stable and unstable. An unstable fracture means that the relationship between the vertebral bodies is no longer stable, which may cause serious consequences such as spinal compression, nerve root compression, or spinal cord injury. Surgical treatment is often needed for patients with unstable fractures, nerve root compression, or spinal cord injury to restore stability and function to the thoracic spine. The probability of complications after thoracolumbar fracture surgery is high, which affects the outcome of surgical treatment. To improve postoperative rehabilitation outcomes, this article analyzed the value of nursing care based on the enhanced recovery after surgery (ERAS) concept for patients undergoing thoracolumbar fracture surgery.

Keywords: ERAS concept; Nursing; Thoracolumbar fracture surgery; Application progress

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1. Introduction

Thoracolumbar fracture is one of the most common clinical spinal traumas. The thoracolumbar spine transition is located between the thoracic and lumbar vertebrae. There is great mobility in this area and the anatomical structure is relatively less stable than the lower lumbar vertebrae. Therefore, fractures can easily occur at this location when exposed to various external forces and factors [1]. Surgery is an important means of treating thoracolumbar fractures. Experts have pointed out that to improve surgical outcomes, it is crucial to provide effective nursing interventions during thoracolumbar fracture surgery [2]. The concept of Enhanced Recovery After Surgery (ERAS) was proposed by Danish surgeon Henrik Kehlet in 1997. It emphasizes optimizing perioperative care and management, significantly reducing the impact of surgical trauma on patients, and accelerating the recovery process. The ERAS concept has received widespread attention and its application has gradually become one of the international clinical practice standards [3]. The ERAS concept has been applied in the optimal treatment of perioperative patients in orthopedics. Based on this phenomenon, the spinal surgery

nursing discipline requires the guidance of advanced concepts to ensure continuous improvement.

1.1 Current status of ERAS application in patients with thoracolumbar fractures

The ERAS concept is relatively well-known in the orthopedics field in European countries. Many European countries and regions have widely applied the fast-track surgery (FTS) concept and achieved remarkable results. ERAS has been continuously improved, promoted, and developed in orthopedic surgery in China. With the advancement of medical technology, medical institutions across China have begun to realize the importance of perioperative management and have gradually utilized the ERAS concept. Although China is relatively late in the application and development of the ERAS concept, with the improvement of domestic medical standards and emphasis on patient rehabilitation, ERAS has gradually gained importance in the field of orthopedics in China. Through continuous efforts, we will improve the ERAS guidelines, strengthen teamwork, optimize management processes, and improve patient surgical results and recovery. Duan pointed out that by adopting the ERAS nursing model, the perioperative management of patients with thoracolumbar compression fractures could better promote recovery and improve the quality of care and treatment [4]. Du *et al*. pointed out in research that adopting the FTS concept in perioperative care for patients with thoracolumbar burst fractures effectively reduced pain and the occurrence of complications [5]. This new nursing model has broad application prospects in spinal surgery and can help improve patient surgical outcomes and promote recovery.

2. Application of ERAS in the perioperative period of patients with thoracolumbar fractures

2.1. Preoperative care

2.1.1. Health education

The ERAS concept of nursing emphasizes the importance of preoperative health education. In ERAS nursing, preoperative health education is regarded as a key link. Comprehensive preoperative education can help patients understand the surgical process, perioperative management, and rehabilitation plan. Furthermore, the decisions that patients need to make during the entire process can be clarified to increase patient participation and compliance in the treatment process. Anxiety and fear are often associated with surgery. By providing patients with detailed and clear information about surgical procedures, anesthesia methods, and possible complications, they can better cope with their anxiety and fears. Preoperative health education can introduce patients to self-management skills such as postoperative pain management, early activities, diet plans, and medication use. Patients can be encouraged to participate in rehabilitation training to actively improve treatment effects. Nurses can also relay the importance of preventing patient complications through preoperative health education and provide relevant knowledge and guidance. For example, patients can be educated on proper breathing exercises to prevent deep vein thrombosis and pressure ulcers. Yu pointed out that preoperative health education improved patient understanding and compliance towards surgery and perioperative care through individualized guidance, thus promoting better recovery and reducing postoperative complications [6].

2.1.2. Psychological care

The ERAS nursing concept believes that psychological guidance before surgery can improve the treatment outcomes of patients. Preoperative psychological guidance can help patients better cope with surgery-related stress and anxiety. The ERAS nursing concept emphasizes that psychological guidance conveys information to patients on preventing complications and matters needing attention during recovery to increase their awareness of self-care measures and proactively adopt preventive behaviors. At the same time, preoperative psychological

guidance provides patients with emotional support and comfort by listening to the patient's feelings, alleviating their loneliness and fears, cultivating an optimistic recovery mentality, establishing correct recovery goals, increasing their confidence in the recovery process, and helping them cope with difficulties during recovery. Du pointed out in research that effective communication and support with patients could alleviate anxiety, enhance compliance, and promote a good recovery mentality [7]. This will help improve clinical outcomes and improve the overall quality of care for patients.

2.1.3. Preoperative bowel preparation

The ERAS concept emphasizes personalized assessment and preoperative preparation based on the patient's condition. For example, nurses assess whether the patient has gastrointestinal problems, intestinal obstruction, and other contraindications to make a comprehensive judgment based on factors such as the type of surgery and expected surgery duration. Patients undergoing thoracic fracture surgery should not eat solid food 6 hours before anesthesia to reduce the risk of vomiting and aspiration during surgery. At the same time, they were required to consume carbohydrates 2 hours before surgery, where 200–400 mL of carbohydrates is provided to meet the patient's basic energy needs, prevent the occurrence of hypoglycemia, and establish a safe and smooth operation. Shi has shown that giving high-energy mineral water to patients 2 hours before surgery could reduce insulin resistance induced by surgical anesthesia, relieve postoperative stress reactions, help reduce complications, and accelerate recovery [8].

2.2 Intraoperative

2.2.1. Intraoperative heat preservation

Heat preservation is one of the important aspects of the ERAS concept in perioperative nursing care. Heat preservation can help prevent hypothermia, promote patient recovery, and reduce postoperative complications. During surgery and anesthesia, patients often lose their normal body temperature regulation ability, which can easily lead to hypothermia. Hypothermia may increase the risk of infection, delay wound healing, and increase cardiovascular complications. Therefore, in the ERAS concept, it is important to adopt thermal insulation measures to maintain the patient's normal body temperature during surgery [9,10]. Recently, a large number of studies have shown that effective perioperative hypothermia management greatly reduces complications during surgery. Application of appropriate thermal insulation measures and maintaining the patient's normal body temperature improved surgical safety, reduced the risk of complications, and improved the patient's recovery and treatment outcomes [9,11]. The utilization of electric blankets, heating blankets, heating equipment, etc., can effectively maintain the patient's normal body temperature, reduce the body's heat production, increase heat dissipation, and avoid adverse effects caused by hypothermia.

2.3. Postoperative care

2.3.1. Dietary guidance

The ERAS concept guides the postoperative diet of patients undergoing thoracolumbar fracture surgery. According to the patient's condition and post-operative recovery progress, an individualized diet plan is developed to provide appropriate nutritional support [12]. The ERAS concept of nursing emphasizes that after patients with thoracolumbar fractures wake up from general anesthesia, the duration of water deprivation should be shortened to maintain water and electrolyte balance and promote the recovery of intestinal function. In addition, appropriate water intake can also help prevent complications such as constipation and urinary tract infections [13]. For patients undergoing surgery for thoracolumbar fractures, if they are fully awake, their swallowing function has recovered, their bowel sounds are normal, they have a desire to eat, and they

can successfully swallow 10–30 mL of warm water without choking or aspiration, they can gradually start consuming liquid foods including soup, juice, soy milk, boiled rice porridge, mushy noodles, etc. The patient's reaction and physical condition are closely observed during this procedure. If discomfort or adverse reactions occur (such as vomiting, bloating, etc.), the patient is told to stop eating immediately and report to a doctor.

2.3.2. Pain management

Pain is one of the common postoperative symptoms in patients with thoracolumbar fractures. Since most patients require the implantation of steel nails, iron plates, stents, and other devices during surgery, these devices may irritate and compress the surrounding tissues, leading to increased postoperative pain. ERAS care emphasizes multimodal analgesia, aiming to control postoperative pain, improve patient comfort, promote recovery, and reduce the length of hospitalization [14]. Zhao showed that severe postoperative pain was often associated with thoracic spine fracture surgery, and the use of multimodal analgesia strategies enabled the comprehensive application of different types of drugs and non-drug methods to control pain and reduce patient discomfort [15]. Traditionally, opioids (such as morphine) are commonly used in postoperative pain management, but long-term use may cause side effects such as dependence and respiratory depression. By using a multimodal analgesic strategy, the need for opioids can be reduced and the risk of side effects can be reduced.

2.3.3. Early postoperative activities

Patients undergoing surgery for thoracolumbar fractures are at risk of complications due to the need for long-term bed rest. Prolonged bed rest can slow the patient's blood circulation and increase the risk of deep vein thrombosis. Preventive measures include early mobilization, compression stockings, deep vein massage, and drug prophylaxis (such as heparin or warfarin). Long-term bed rest increases the risk of lung fluid accumulation and infection, especially for patients with impaired respiratory functions. Preventive measures include respiratory tract cleaning, coughing, and performing pulmonary physiotherapy to promote ventilation and eliminate secretions. Therefore, the ERAS concept advocates early post-operative mobilization to improve patient prognosis. Traditionally, postoperative patients are often required to stay in bed for a long time to reduce the burden and pain at the trauma site. However, studies have shown that excessive bed rest may lead to complications such as muscle atrophy, thrombosis, and lung infection, which prolongs the patient's hospital stay. In contrast, the ERAS concept encourages early postoperative activities, including waking up early, walking, performing functional exercises, etc., to promote blood circulation, prevent deep vein thrombosis, reduce postoperative muscle atrophy, and promote the recovery of digestive function. In addition, early mobilization can improve the patient's psychological state and help improve their quality of life. Yu *et al*. found that early ambulation was helpful for the recovery of bone and muscle function after surgery [16]. Moderate weight-bearing activities can promote the increase of bone density and recovery of muscle strength, and reduce the risk of postoperative functional degeneration and disability. Ye pointed out that there was no precise concept of getting out of bed in the early postoperative period [17]. Targeted guidance should be provided at appropriate times according to the patient's condition, and the walking distance and duration should be gradually increased to promote the patient's recovery.

2.3.4. Removal of urinary catheter

Patients with thoracolumbar fractures often need to stay in bed for a certain period after surgery to promote fracture healing and stability. Long-term indwelling catheters cause discomfort to patients and cause urethral irritation and damage, increasing the chance of bacterial infections. This leads to urinary tract infections, manifested by symptoms such as frequent urination, urgency, painful urination, and fever. In addition, long-

term indwelling urinary catheters may also lead to other complications, such as stone formation, renal function damage, etc. [18]. Therefore, in postoperative management, doctors usually evaluate whether an indwelling urinary catheter is needed at the appropriate time and remove it as soon as conditions permit. The ERAS concept advocates the removal of indwelling catheters as early as possible. With this, the ERAS concept can improve patient comfort, promote early mobilization and recovery, and reduce the occurrence of complications.

3. Prospects and outlook

The core concept of ERAS is patient prioritization. Through a series of measures, the surgical stress response can be effectively controlled, the patient's hospitalization time can be shortened, hospitalization costs and postoperative complications can be reduced, and the rapid recovery of patients can be promoted. By implementing individualized treatment plans, the ERAS concept strives to minimize the impact of surgery on patients and ensure optimal recovery outcomes. Non-implementation of the ERAS concept requires multidisciplinary collaboration and hospital management support. Through the joint efforts of multiple disciplines, a complete rapid recovery system can be formed to accelerate patient recovery. By implementing the ERAS concept, various disciplines must collaborate to formulate and implement treatment plans, form an efficient treatment process and high-quality nursing services, and promote rapid recovery for patients with thoracolumbar fractures.

Disclosure statement

The authors declare no conflict of interest.

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