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Current Research Status on Postoperative Active Pain Management in Colorectal Cancer Patients

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Abstract

Postoperative activity-related pain is a common clinical manifestation that affects patients' early postoperative recovery and the incidence of chronic postoperative pain. This article reviews the current research status of postoperative activity-related pain in colorectal cancer patients, covering various aspects such as the characteristics of postoperative pain, pain assessment, pharmacological and non-pharmacological treatments, and barriers to pain management. The aim is to provide insights for optimizing clinical pain management strategies.

Keywords

Colorectal Cancer, Active Pain, Pain Management, Post-Surgery

1. Introduction

Colorectal cancer (CRC) is also known as colorectal cancer, which refers to the epithelial malignant tumor originating from the mucosa of the rectum and colon. It is one of the most common malignant tumors in the lower digestive tract [1]. According to the 2022 global cancer statistics [2], the incidence of colorectal cancer is about 1.9 million new cases and 930,000 deaths, making CRC the third most common cancer in the world and the second most common cancer in mortality [3]. This trend highlights the enormous social, public health and economic challenges facing colorectal cancer globally [4]. Studies have shown that the incidence of moderate to severe pain was about half on the day of surgery, 64% on the first day after surgery, 59% on the second day, and 51% on the third day [5]. Poor postoperative acute pain management is a related factor to the transition to post-

operative chronic pain, and 32.1% of CRC patients developed postoperative chronic pain within 3 months after surgery due to high pain intensity during activity within 24 hours after surgery [6], postoperative pain is the main concern of patients. Insufficient active postoperative pain management will affect patients' postoperative activities, thus increasing the risk of postoperative chronic pain and prolonging hospital stay.

2. Characteristics of Postoperative Active Pain in CRC

The occurrence of postoperative pain after CRC is closely related to surgical trauma, nerve injury, inflammatory response and central nervous system sensitization [7]. Postoperative activity-related pain in CRC involves multiple pathophysiological mechanisms. Surgical incisions and procedures may cause tissue damage, leading to mechanical pain; they can also trigger inflammatory pain; or they might injure nerves, causing postoperative neuropathic pain. When CRC patients change their position, cough, or get out of bed for activities, the pain intensifies. The pain includes that caused by surgery, as well as pain from the involvement of the bowel cavity and surrounding tissues and organs [8]. Due to the anatomical location of the intestines and the functional characteristics of frequent abdominal movement, pain management in CRC patients is specific. Patients with CRC not only experience pain from incision wounds but also from stoma sites and postoperative anal canal carrying. First, postoperative incision traction, physical activity, anal movement, or defecation can all cause or exacerbate pain. Second, the presence of a stoma can lead to pain when the patient changes position or when feces pass through a narrowed stoma [9]. Good postoperative pain management is reflected in the ability of patients to maintain preoperative activity levels after surgery, but the intensity of active pain after CRC surgery is highly variable, difficult to predict and manage, and active pain remains difficult to control [10].

3. Current Status of Assessment and Treatment of Postoperative Active Pain in CRC

3.1. Current Status of CRC Postoperative Active Pain Assessment

The expert consensus on pain assessment recommends [11] using the Digital Rating Scale (Numerical Rating Scale, NRS) or Visual Analog Scale (Visual Analogue Scale, VAS) to evaluate pain intensity. For children and elderly individuals with communication difficulties, the Facial Expression Scale (Faces Pain Scale, FPS) is recommended for pain assessment. For those who cannot self-assess, the Adult Pain Behavior Assessment Scale is recommended. Pain assessment is the foundation of pain management, accurate pain assessment enables targeted pain management measures. Controlling resting pain ensures patient comfort post-surgery, while managing active pain promotes recovery and reduces postoperative complications. Guidelines from institutions such as the American Pain Society (American Pain Society, APS) and the Swedish Medical Association (Swedish Society of

Medicine, SSM) all emphasize that a comprehensive postoperative pain assessment should include both resting and active pain assessments. Currently, the scoring of postoperative active pain primarily combines subjective pain evaluation tools with objective pain assessment tools, such as the numerical rating scale (Number Rating Scale, NRS) [12], and functional activity scoring sheet (Functional Activity Score, FAS) [13].

3.2. Status of Drug Treatment for Postoperative Active Pain in CRC

According to the World Health Organization (WHO) "Three-Step Analgesic Treatment for Cancer Pain" principle, analgesics should be selected based on the patient's pain intensity. For patients with mild pain, nonsteroidal anti-inflammatory analgesics such as ibuprofen, diclofenac, acetaminophen, indomethacin, and celecoxib can be used; for moderate pain, weak opioids like codeine and tramadol can be prescribed, or low-dose strong opioids can also be used, in combination with nonsteroidal anti-inflammatory analgesics and adjuvant analgesics; for severe pain, strong opioids such as morphine and fentanyl are preferred, and can be combined with nonsteroidal anti-inflammatory analgesics and adjuvant analgesics [14]. The concept of postoperative analgesia has been updated from conventional analgesia to preemptive analgesia and then to preventive analgesia. Opioid analgesics are an important part of modern anesthesia and analgesia, but their high efficacy and specific pharmacokinetic characteristics are also more likely to induce acute tolerance and/or allodynia, which may be the cause of postoperative pain aggravation [15]. The management of post-CRC active pain is an important clinical issue, and a large number of studies have explored the efficacy of different drugs and regimens. Currently, multimodal analgesia is widely considered to be the best practice [16]. This multi-modal approach aims to optimize analgesic effects and reduce opioid use by blocking peripheral and central pain pathways through different mechanisms of action， local infiltration analgesia, regional nerve block analgesia techniques, and intravenous lidocaine infusion have demonstrated favorable analgesic effects in patients undergoing colorectal cancer surgery. Additionally, elderly individuals exhibit lower pain sensitivity compared to younger people, while women demonstrate higher pain sensitivity than men, necessitating personalized medication regimens [17].

3.3. Status of Non-Pharmacological Treatment of Post-CRC Active Pain

Non-drug therapy, such as psychological care, music therapy, acupuncture, transcutaneous electrical stimulation, nutritional support and relaxation training, can help relieve pain. Studies have shown that non-drug intervention has a good effect on postoperative pain relief in patients undergoing abdominal surgery, and ear acupressure can relieve abdominal pain in patients [18]. Studies have shown that pain in patients undergoing abdominal surgery can be improved by psychological intervention, among which cognitive behavioral therapy and relaxation

therapy are more commonly used [19]. Psychological care can help improve pain in patients with CRC after surgery. In the study of graded psychological nursing intervention for CRC patients, it is mentioned that graded psychological nursing can alleviate patient pain [20]. Relaxation techniques such as deep inhalation and slow exhalation, progressive muscle relaxation, and meditation to shift attention can help relieve physical and mental tension, thereby reducing the perception of pain in cancer patients. Demonstrated that music therapy can help reduce pain in CRC patients. Music therapy helps patients enhance their personal strength, interrupt the cycle of suffering, and improve pain [21]. In summary, non-pharmacological interventions have a positive regulatory effect on postoperative pain; however, physical therapy, psychological support, and other non-pharmacological methods have not been fully utilized in the treatment of active pain after CRC surgery.

4. Factors Affecting the Management of Postoperative Active Pain in CRC

4.1. Lack of Knowledge about Pain

4.1.1. Lack of Pain Knowledge among Patients and Primary Caregivers

A large cross-sectional study [22], showed that more than 50% of patients with pain refused to use analgesics due to fear of opioid addiction and adverse effects of analgesics. Due to the lack of understanding of pain, patients and their families are worried about increasing the dosage of drugs and drug addiction, so they do not report pain or deliberately reduce the subjective score [23], leading to postoperative pain assessment deviation and poor effect of pain control management. Some patients think that they only need to take medication when the pain symptoms are obvious, and do not follow the doctor's instructions to take painkillers [24]. The study indicates [25] that 52.6% of patients did not have medical staff introduce pain relief methods, and as high as 79.9% of patients did not have medical staff introduce pain assessment methods, causing 48.5% of patients to choose not to receive postoperative analgesic treatment. Studies show that the use of painkillers, lack of pain knowledge, negative beliefs, attitudes and psychological distress of patients and their primary caregivers lead to obstacles in pain management [26]. Patient and primary caregiver concern about the use of pain medication, lack of knowledge about pain, negative beliefs, attitudes, and psychological distress lead to barriers to pain management, while health care providers lack adequate explanation and information. Therefore, in order to carry out postoperative active pain management smoothly, it is necessary to conduct training and health education on rest and active pain assessment for patients and their families, improve their pain knowledge and self-efficacy, and change the concept of pain relief for patients and their caregivers.

4.1.2. Lack of Pain Knowledge among Medical Staff

Active pain can more sensitively reflect the effect of postoperative analgesia than resting pain. However, active pain is often not well controlled. For example, after

major thoracic surgery, the use of opioid drugs can make patients feel comfortable and fully relieve their resting pain, but it can't well relieve severe active pain. The results of a cross-sectional survey on nurses' cognition of pain intervention in China showed that only 57.9% of nurses had received special training in pain intervention, but 100% of nurses believed that they needed to strengthen their knowledge of pain intervention. Among them, nurses had a high demand for non-pharmacological pain intervention and pain assessment, accounting for 84.2% and 57.9% respectively [27]. The training in pain assessment for doctors and nurses is not sufficient [28]. The pain assessment is made by observing the facial expressions of patients and working experience, ignoring the complaints of patients, resulting in an objective pain assessment with subjective judgment [29], leading to a deviation of pain assessment, which is not conducive to the formulation of pain control plans for patients. In addition, clinicians may not fully realize the importance of postoperative active pain management in clinical practice, focusing on cancer treatment rather than pain treatment, and failing to provide targeted treatment for active pain in CRC patients after surgery [30]. According to the results of a study by Tong Yingge [31] *et al.*, nurses believe that lack of knowledge about pain assessment, fear of patient addiction to analgesics, and fear of adverse drug reactions are the main obstacles to the effective implementation of pain management. Similarly, Alsaiari [32] *et al.* also found that many doctors and nurses have a negative attitude towards pain management, lack of knowledge about opioid analgesics, and worry about drug addiction and side effects of analgesics. Research shows that [33], nurses "knowledge of pain is below the recommended 80% level. Pain knowledge is positively correlated with previous pain training, so continuing education initiatives are needed to improve healthcare providers" knowledge of active pain assessment, medication selection, and non-pharmacological pain treatment.

4.2. The Multidisciplinary Pain Management Organization Is Not Closely Connected

At present, in the field of pain management, the formation of multidisciplinary pain management team has become a widely adopted practice mode. This mode, through the collection of experts from different medical specialties, is committed to the comprehensive evaluation and effective management of patients' pain. Its superiority has been fully verified by many studies, and it has achieved remarkable results in improving analgesic effect. Despite the numerous theoretical advantages of multidisciplinary pain management teams, existing research has also revealed a series of challenges in their practical implementation. Poor communication among team members is one of the key factors limiting their effectiveness. Differences in professional background, work habits, and communication styles can lead to poor information flow, affecting decision-making efficiency and treatment outcomes [34]. In addition, the irrationality of the multidisciplinary team organizational structure is also an urgent issue to be addressed [35]. Some pain man-

agement teams failed to adequately consider the complementarity and collaboration needs among members during their initial formation, leading to a loose organizational structure that hinders the establishment of an efficient work system. Unclear division of labor further exacerbates this problem, blurring the boundaries of responsibilities among members, making it easy for overlapping or omissions in work to occur, thus affecting overall work efficiency [36].

4.3. Lack of a Protocol for Managing Post-CRC Active Pain

The CRC treatment guidelines [30] and expert consensus [37] address issues such as the diagnosis, treatment principles, and postoperative nutritional therapy for CRC, but do not cover specific management plans for postoperative active pain in CRC. Although some healthcare providers pay attention to postoperative pain in CRC patients, the lack of specific management plans for postoperative active pain has led to inadequate relief of postoperative pain. Accurate assessment is the foundation of pain management. According to research by Sun Jing [38] *et al.*, standardized pain assessment reduces pain perception, improves quality of life and satisfaction. However, 54% of nurses underestimate patients' pain levels, while 13% overestimate them. In recent years, despite the introduction of new drugs and analgesic techniques, overall postoperative pain treatment has not truly improved [39]. Improper choice of analgesic drugs, insufficient or excessive dosage, and improper timing of administration can lead to poor pain control [40]. Opioids play an important role in postoperative pain, but their adverse reactions such as drug dependence and respiratory depression increase the incidence and mortality of postoperative patients. Although opioids can relieve pain well, their adverse reactions delay recovery, so they are strictly controlled in clinical practice [41]. Currently, different guidelines both domestically and internationally provide vague descriptions of non-pharmacological pain interventions. In clinical practice, providers often adopt only one method, lacking specific approaches tailored to the characteristics of post-CRC active pain. There is also a lack of targeted non-pharmacological analgesic measures based on patient assessment results. Additionally, health education is limited to basic knowledge dissemination, lacking individualized and continuous counseling. Although recent years have seen deeper understanding of postoperative pain and the development of methods for its prevention and treatment, the incidence of moderate to severe acute postoperative pain remains as high as 30%, with 10% to 50% of patients progressing to chronic pain [28].

5. Conclusion

In summary, postoperative active pain in CRC patients has a significant adverse impact, and the current management of postoperative active pain in CRC patients is inadequate. Effective management of postoperative active pain can alleviate patient pain and promote recovery. However, no standardized postoperative active pain management protocols for CRC patients have been found domestically or internationally. In the future, subjective combined with objective pain assessment

tools will be employed to evaluate resting pain and activity-related pain. Medication will be administered based on the postoperative pain trajectory of CRC patients and the circadian biological rhythm of drugs. Concurrently, non-pharmacological interventions such as music therapy and environmental noise reduction will be integrated for activity-related pain management, to alleviate postoperative activity-related pain, facilitate early ambulation, and achieve the goal of enhanced recovery.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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