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Research Advances on Lumbar Square Muscle Block vs. Transverse Abdominis Plane Block for Postoperative Pain Management in Hernia Repair Surgery

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Abstract

This paper systematically reviews research progress on lumbar quadratus lumborum block and transverse abdominis plane block for postoperative pain management following hernia repair. It compares the similarities and differences in clinical application between lumbar quadratus lumborum block and transverse abdominis plane block techniques, and thoroughly analyzes the role and efficacy of both block techniques in postoperative pain management. The study explores factors influencing postoperative pain and evaluates the comparative efficacy of different analgesic methods, revealing key determinants for selecting analgesia. Based on prior research, it synthesizes postoperative pain management strategies for hernia repair, including challenges in managing and applying these block techniques, along with optimization strategies. This study summarizes the application prospects, advantages, and disadvantages of quadratus lumborum block and transverse abdominis plane block in postoperative pain management following hernia repair, providing clinicians with more precise guidance for analgesic selection.

Keywords: Hernia Repair; Quadratus Lumborum Block; Transverse Abdominis Plane Block; Postoperative Pain; Pain Management; Block Techniques; Research Progress

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Hernia repair is a common surgical procedure used to treat conditions such as inguinal hernias and abdominal wall hernias [1]. However, postoperative pain often poses a significant challenge for patients, impacting their recovery and quality of life. Therefore, effectively managing postoperative pain has become a collaborative challenge for surgeons and anesthesiologists.

Traditional postoperative analgesic methods include intravenous analgesia and oral analgesic medications [2]. However, these approaches carry varying degrees of side effects and complications. In recent years, quadratus lumborum block and transverse abdominis plane block have emerged as novel postoperative pain management techniques, gradually attracting the attention of surgeons and anesthesiologists. This paper aims to systematically summarize and analyze research progress on quadratus lumborum block and transverse abdominis plane block for postoperative pain relief following hernia repair. It explores the advantages and disadvantages of these two analgesic methods to provide anesthesiologists with more scientific and rational postoperative pain management strategies. Subsequently, the analgesic principles, clinical applications, and existing challenges of quadratus lumborum block and transverse abdominis plane block will be analyzed and discussed.

Overview of Postoperative Quadratus Lumborum Block

Quadratus Lumborum Block Technique

The quadratus lumborum block is a commonly used postoperative analgesia method [3], particularly widely applied after hernia repair. This technique achieves postoperative pain relief by injecting local anesthetics into the quadratus lumborum muscle tissue. Key advantages include effective analgesia, prolonged postoperative pain relief, reduced patient demand for analgesics, and decreased incidence of postoperative complications. Consequently, this technique has become a primary method for postoperative pain management [4]. However, some studies indicate that transverse abdominis plane block provides inferior analgesia compared to quadratus lumborum block following hernia repair [5]. When performing a quadratus lumborum block, careful selection of the injection site is essential. Typically, the injection point is located 3-4 cm below the spinous process of

the lumbar vertebrae. During injection, meticulous confirmation that the needle has reached the quadratus lumborum muscle is necessary to prevent misplacement. Additionally, precise control of the local anesthetic dosage is crucial to avoid adverse effects from overuse [6]. Additionally, the duration of postoperative analgesia provided by quadratus lumborum block must be considered. Research indicates [7] that its analgesic effect may persist for 8-12 hours or longer, a factor requiring careful attention in clinical practice.

Clinical Application of Quadratus Lumborum Block

With the continuous advancement of postoperative pain management techniques in hernia repair, the quadratus lumborum block has gained increasing attention as a novel analgesic method. It achieves targeted pain relief by injecting local anesthetics into the nerve plexus surrounding the quadratus lumborum muscle [8]. Compared to traditional general anesthesia and intravenous analgesia, the quadratus lumborum block offers distinct advantages, such as reducing the incidence of postoperative nausea and vomiting, alleviating gastrointestinal dysfunction, and minimizing adverse reactions to anesthetic drugs. Consequently, it holds significant clinical value for postoperative pain management following hernia repair. The quadratus lumborum block can be performed via multiple approaches, including the inguinal route and the paraspinal route. In clinical practice, physicians can select the most appropriate block technique based on individual patient circumstances to achieve optimal analgesic outcomes. Research indicates [9] that quadratus lumborum block significantly alleviates postoperative pain intensity, enhances patient satisfaction with the procedure, and shortens hospital stays following hernia repair surgery.

However, quadratus lumborum block carries certain risks and complications in analgesia, such as local nerve injury and hematoma formation. Therefore, its clinical application requires healthcare providers to possess extensive experience and advanced technical skills to ensure patient safety [10]. In recent years, the use of novel anesthetic agents and adjunctive analgesic techniques has further enhanced the efficacy of quadratus lumborum block in post-herniorrhaphy settings.

Postoperative Application of Quadratus Lumborum Block

Postoperative pain management is critical following hernia repair surgery. The quadratus lumborum block has garnered significant attention in recent years as an effective analgesic method. Numerous studies [11] demonstrate its distinct advantages in alleviating postoperative pain and shortening recovery time. Therefore, it is essential to gain a deeper understanding of the application and efficacy of quadratus lumborum block in hernia repair surgery. The postoperative application of quadratus lumborum block primarily focuses on two aspects: postoperative pain relief and promoting patient recovery. First, in postoperative pain management, quadratus lumborum block effectively reduces postoperative pain intensity and decreases patients' demand for analgesic medications. Compared to traditional analgesic methods, quadratus lumborum block delivers more sustained and uniform pain relief, lowering the incidence of postoperative complications. Postoperative pain often impairs patients' mobility and quality of life; the analgesic effects of quadratus lumborum block enable patients to resume normal activities sooner, reduce discomfort during recovery, and prevent pain-related complications [12]. Although the quadratus lumborum block technique is well-established, risks of complications such as local nerve injury, bleeding, and infection persist. Therefore, strict adherence to proper technical procedures is essential to ensure surgical safety when performing this block.

Overview of Transverse Abdominal Plane Block

Transverse Abdominal Plane Block Technique

The Transverse Abdominal Plane block (TAP) is a nerve block technique that effectively reduces postoperative pain by injecting medication into the transverse abdominal plane to achieve analgesia [13]. The technique is relatively straightforward and reduces complications associated with local nerve blocks. The following details the procedural steps and precautions for trans-transversus plane block. Preoperative preparation is essential. The patient should be positioned supine, with a urinary catheter inserted to ensure timely voiding, and maintain effective communication with the anesthesiologist [14]. Next, disinfect the abdominal skin and identify the injection site under ultrasound guidance. Ultrasound visualization clearly delineates the distribution of the transverse abdominis, external and internal oblique muscles, and rectus abdominis, significantly reducing the risk of nerve, vascular, or visceral injury [15]. After confirming the injection site, administer local anesthesia. Under ultrasound guidance, sequentially penetrate the rectus abdominis and transverse abdominis muscles with the needle until reaching the anterior abdominal wall. Verify needle placement at the target location by performing a test injection. If the patient experiences significant numbness and analgesia, proceed with the formal injection. Adhere strictly to medication protocols during drug administration to prevent toxic side effects from overdose.

Following injection, monitor the patient for analgesic efficacy and potential adverse reactions [16]. Vital signs and analgesia levels require close observation to prevent inadequate or excessive pain relief, allowing timely dose adjustments. Finally, based on postoperative analgesic outcomes, necessary modifications to analgesic agents and dosages may be implemented to ensure effective pain control, enhance postoperative comfort, and improve recovery quality.

Clinical Application of Transverse Abdominis Plane Block

Transverse abdominis plane block achieves pain relief by injecting local anesthetics into the nerve-innervated regions of the abdominal wall. In postoperative pain management for hernia repair [17], this technique has garnered significant attention as an innovative analgesic approach. Its application encompasses preoperative preparation, selection of block techniques, assessment of analgesic efficacy, and management of complications. First, preoperative preparation is a critical step in the clinical application of transverse abdominis plane block. When selecting the block technique, individualized decisions should be made based on the surgical site and postoperative analgesic requirements. Depending on the specific surgical context, unilateral or bilateral transverse abdominis plane block may be chosen to achieve optimal analgesic efficacy [18]. Additionally, evaluating analgesic effectiveness is a key component of its clinical application. Through this assessment, analgesic regimens can be promptly adjusted to ensure patient comfort and rehabilitation outcomes.

Management of complications associated with transverse abdominal plane block is also indispensable in clinical practice. Although considered a relatively safe analgesic technique, complications such as local anesthetic toxicity and nerve injury may still occur during implementation [19]. Therefore, healthcare

providers must possess a clear understanding of these complications and establish corresponding management protocols to ensure patient safety and analgesic efficacy.

Postoperative Application of Transverse Abdominis Plane Block

Research indicates [20] that postoperative application of transverse abdominis plane block effectively reduces pain in patients undergoing hernia repair. Research has found [21] that TAP provides superior postoperative analgesia compared to traditional methods such as oral analgesics or intravenous pain relief. This demonstrates TAP's significant advantages and potential in postoperative pain management [22]. Postoperative application of TAP can also reduce the incidence of postoperative complications. By effectively controlling postoperative pain, TAP reduces the risk of complications like nausea and vomiting while promoting faster patient recovery. Clinicians continue to explore and refine TAP applications in practice. Some studies indicate [23] that TAP can be combined with other analgesic techniques - such as quadratus lumborum block - to further enhance pain relief. This approach offers expanded options and possibilities for postoperative pain management.

Evaluation of Analgesic Efficacy in Hernia Repair Surgery

Factors Influencing Postoperative Pain

The severity of postoperative pain following hernia repair is influenced by multiple factors [24]. First, the surgical technique and postoperative management significantly impact postoperative pain. The type of anesthesia used during surgery, the surgical site, and postoperative analgesic treatment all affect the degree of postoperative pain. Second, individual patient differences are also a key factor influencing postoperative pain. Patients of different ages, genders, and physical constitutions experience postoperative pain differently. Additionally, postoperative complications can exacerbate pain perception [25]. For instance, complications such as postoperative infection, bleeding, or intestinal obstruction intensify patients' pain sensations. Furthermore, patients' psychological tolerance for postoperative pain also influences their pain experience. Some patients may have excessive anxiety or fear regarding pain, thereby amplifying their perception of pain. Finally, postoperative analgesic treatment measures and their efficacy are also key factors influencing postoperative pain [26]. Different analgesic methods and treatment regimens yield varying degrees of pain relief, and the effectiveness of treatment directly affects patients' perception of pain.

In summary, postoperative pain is influenced by multiple factors, including surgical technique and postoperative management, patient variability, postoperative complications, psychological tolerance, and analgesic treatment measures and efficacy. Clinicians must comprehensively assess these factors to develop appropriate analgesic regimens and enhance postoperative pain management and intervention, thereby alleviating patients' pain and improving their quality of life.

Comparison of Analgesic Methods

When evaluating postoperative pain relief following hernia repair, comparing different analgesic techniques becomes particularly important. For postoperative pain management in hernia repair, currently common methods include quadratus lumborum block and transverse abdominis plane block [27]. Therefore, comparing the efficacy of these two approaches constitutes a significant research focus. Differences exist in analgesic effects between quadratus lumborum block and transverse abdominis plane block. Some studies indicate [28] that quadratus lumborum block provides superior early postoperative pain relief, effectively reducing patient discomfort. In contrast, transverse abdominis plane block may offer more sustained analgesia in the later postoperative period, providing prolonged pain relief.

Moreover, comparisons of analgesic efficacy must account for individual patient variations. Research indicates [29] that some patients may exhibit greater sensitivity to quadratus lumborum block, while others may respond better to transverse abdominis plane block. Thus, selecting the optimal analgesic approach requires careful consideration of each patient's specific circumstances to achieve the best pain relief. With continuous advances in medical technology and accumulated clinical experience, novel analgesic techniques are increasingly being applied to postoperative pain management in hernia repair [30]. Compared to traditional local blocks, these new approaches may offer superior analgesic efficacy, enhancing patient comfort during recovery. Thus, comprehensive comparison and evaluation of different analgesic methods will assist clinicians in selecting more scientifically grounded pain management strategies.

In summary, comparing the efficacy of different analgesic methods is crucial when evaluating postoperative pain management outcomes in hernia repair. We must fully consider the analgesic effects of various methods across different postoperative stages, patient individuality, and the application prospects of new techniques to provide more effective pain management solutions. Future research should also delve deeper into the advantages and disadvantages of different analgesic approaches, offering more reliable evidence for clinical practice.

Factors Influencing Analgesia Selection

Analgesia is a critical management measure following hernia repair surgery. Multiple factors must be considered when selecting an appropriate analgesic approach. First, the patient's age and health status are key determinants of analgesia choice [31]. For elderly patients and those with underlying conditions, cardiovascular and renal function must be evaluated to select an analgesic method that avoids adverse effects.

Second, the preoperative pain level and postoperative analgesic requirements also significantly influence analgesia selection [32]. Patients with severe preoperative pain may require more potent postoperative analgesia to manage discomfort, whereas those with mild preoperative pain may benefit from milder analgesic approaches.

Third, the type and complexity of the surgery also influence analgesia selection. Different hernia repair procedures necessitate corresponding analgesic approaches to ensure efficacy. For instance, simpler hernia repairs may be managed with local anesthesia, whereas complex surgeries may require general anesthesia to achieve adequate pain relief. Finally, patient acceptance and personal preferences regarding analgesic methods must be considered. Some patients may be more comfortable with local anesthesia and have reservations about general anesthesia. Therefore, respecting patient preferences is crucial to enhance satisfaction and compliance. Medical resources and the skill level of healthcare providers also influence analgesia selection. In resource-limited settings, simpler and more cost-effective analgesic methods may be preferred. Conversely, when healthcare personnel expertise is limited, safer and more easily administered analgesic

techniques should be prioritized.

Treatment Protocol Research Analysis

Pain Management and Block Techniques

Currently, quadratus lumborum block and transverse abdominis plane block are two commonly used postoperative analgesia methods. Research indicates that the quadratus lumborum block, as a nerve block technique, achieves postoperative pain relief by injecting local anesthetics to interrupt nerve conduction in the quadratus lumborum muscle. Compared to traditional analgesics, this block reduces adverse effects like postoperative nausea and vomiting while providing longer-lasting pain relief. Consequently, it has gained widespread application in pain management following hernia repair.

On the other hand, the transverse abdominis plane block, as an emerging technique, has garnered increasing attention in recent years. This method involves injecting local anesthetics into the transverse abdominis plane to achieve analgesia in the abdominal surgical area. Studies indicate that the transverse abdominis plane block offers significant advantages in reducing postoperative pain and lowering the incidence of postoperative complications. Consequently, it is gradually emerging as a new option for postoperative pain management following hernia repair.

Comparative studies [33] reveal differences between the two techniques in postoperative pain scores, analgesic duration, and complication rates. Consequently, selecting the appropriate block for hernia repair patients presents a critical clinical challenge. In clinical practice, healthcare providers should select the appropriate block based on the patient's specific condition and surgical approach to achieve optimal analgesic efficacy.

Challenges in Applying Block Techniques

In postoperative pain management following hernia repair, block techniques such as the quadratus lumborum block and transverse abdominis plane block are widely employed. However, these techniques also present practical challenges that require careful study and resolution. One difficulty lies in the complexity of the procedure. Whether performing a quadratus lumborum block or a transverse abdominis plane block, physicians must possess specialized knowledge and practical experience. Accurate identification of the block site, precise control of drug dosage, and avoidance of damage to surrounding tissues and organs all demand high proficiency from the practitioner. Therefore, cultivating skilled healthcare professionals and enhancing their operational capabilities in clinical settings is an urgent issue requiring resolution. Another challenge is the variability in analgesic efficacy. While quadratus lumborum and transverse abdominis plane blocks theoretically offer superior postoperative pain relief, patient responses often differ significantly in practice. Some patients may experience inadequate or even absent analgesia, which not only impedes postoperative recovery but also complicates medical care. Consequently, we urgently need to investigate the factors influencing this variability and develop more effective analgesic approaches.

The challenges in applying block techniques also involve the risk of postoperative complications. While these techniques can reduce surgical trauma and postoperative pain to some extent, they inevitably carry certain complication risks. For instance, complications such as local nerve injury, vascular damage, and peripheral tissue infection may occur, significantly hindering patients' postoperative recovery. Therefore, greater attention must be paid to risk management and preventive measures for postoperative complications to safeguard patients' health and ensure satisfactory postoperative outcomes.

The application of blockade techniques also faces challenges related to legal regulations and ethical considerations. In some countries and regions, while blockade techniques are recognized as a safe and effective method for postoperative pain management, they remain subject to controversy regarding legal frameworks and ethical standards. Thus, during the promotion and application of blockade techniques, strict adherence to relevant laws, regulations, and ethical standards is essential to ensure the legality and standardization of medical practices. The challenges in applying blockade techniques are multifaceted, requiring comprehensive consideration and continuous exploration and refinement of experience in clinical practice. Only through in-depth research and resolution of these challenges can the role of blockade techniques in postoperative pain management for hernia repair be fully realized, thereby providing better assurance for patients' postoperative recovery.

Optimization Strategies for Blockade Techniques

Optimizing blockade techniques is a key issue for post-hernia repair analgesia using quadratus lumborum blockade and transverse abdominis plane blockade. Addressing current limitations, several optimization strategies have been proposed and studied. First, for quadratus lumborum blockade, ultrasound guidance can enhance accuracy and safety by enabling precise localization and injection. Second, regarding drug selection, some studies propose combining local anesthetics with muscle relaxants. This approach can prolong efficacy while reducing drug dosage, thereby mitigating adverse reactions in patients. Additionally, for transverse abdominis plane blocks, some scholars have proposed applying continuous puncture techniques under ultrasound guidance to achieve sustained drug infusion, thereby prolonging the duration of analgesic effects. Regarding the implementation process of block techniques, scholars have also suggested operational optimization strategies, such as modifying patient positioning or adjusting injection angles to improve procedural success rates.

Conclusion

In summary, both quadratus lumborum block and transverse abdominis plane block have demonstrated clinical efficacy as postoperative analgesic methods for hernia repair. Regarding postoperative pain relief, quadratus lumborum block effectively reduces postoperative pain but exhibits certain limitations in terms of adverse reactions such as postoperative nausea and vomiting. The transverse abdominis plane block also demonstrates excellent postoperative analgesic efficacy and offers some preventive effect against adverse reactions like postoperative nausea and vomiting.

Furthermore, both analgesic methods are relatively simple to administer and can reduce the occurrence of side effects and complications associated with analgesic medications. Therefore, when selecting an analgesic approach, it is essential to fully consider the patient's specific circumstances and the type of surgery to develop a personalized analgesic plan. Developing a rational analgesia plan that combines the advantages of quadratus lumborum block and transverse abdominis plane block according to individual patient needs will enhance analgesic efficacy while reducing complications.

Further large-scale, multicenter clinical studies are needed to validate the application value of quadratus lumborum block and

transverse abdominis plane block in postoperative analgesia following hernia repair. Simultaneously, in-depth exploration of the indications and contraindications for both analgesic methods is required to provide clinicians with more scientific and rational guidance for postoperative pain management. While quadratus lumborum block and transverse abdominis plane block show potential as postoperative analgesic techniques for hernia repair, further in-depth research and clinical practice are necessary to refine their specific roles and value in clinical application.

References

1. Xu YQ, Chen SC, Li CY. Application of Transverse Abdominal Plane Block Combined with Rectus Sheath Block in Postoperative Analgesia for Laparoscopic Hernia Repair. Chinese J Modern Drug Appl. 2023; 17(24): 118-120.
2. Jinhua B, Xinmei W, Yu'e. Analysis of the analgesic efficacy of transverse abdominal plane block in incisional hernia repair. J Nanjing Med University. 2023; 43(11): 1574-1577.
3. Liu L, Bao Y, Meng Y. Application of Ultrasound-Guided Lateral Approach Combined with Two-Point Block in the Plane of Iliohypogastric/Ilioinguinal Transversus Abdominis Muscle in Laparoscopic Inguinal Hernia Repair. J Clin Surg. 2023; 31(7): 686-689.
4. Peng Q, Wei H, Zhou X. Comparison of Ultrasound-Guided Quadratus Lumborum Block and Transversus Abdominis Plane Block in Inguinal Hernia Repair. Heilongjiang Med. 2023; 36(2): 441-444.
5. Ye B, Zhu J, Zhang X. Effect of Quadratus Lumborum Block Combined with Ketorolac on Postoperative Analgesia and Interleukin-6 Levels in Pediatric Hernia Repair. Jilin Med. 2022; 43(10): 2647-2650.
6. Hu S, Fu J, Ye Y. Application of Ultrasound-Guided Quadratus Lumborum Block with Ketorolac in Enhanced Recovery After Laparoscopic Hernia Repair. Shandong Med. 2022; 62(22): 65-68.
7. Luo W. Effects of Ultrasound-Guided Transversus Abdominis Plane Block with Different Concentrations of Ropivacaine on Early Postoperative Analgesia and Stress Response After Inguinal Hernia Repair. Chinese Prescript Drugs. 2022; 20(7): 93-95.
8. Ye B. Analgesic Effects and Impact on IL-6 Levels of Quadratus Lumborum Block Combined with Ketorolac in Pediatric Hernia Repair Surgery. Xinjiang Med University. 2022.
9. Zhang G, Zhao C, Wu H. Effect and Complication Observation of Ultrasound-Guided Transverse Abdominal Plane Combined with Ilioinguinal Nerve Blockade in Laparoscopic Inguinal Hernia Repair. Surg Res New Technol. 2022; 11(1): 35-38.
10. Du Z, Chen W, Huang J. Analgesic Effect of Transversus Abdominis Plane Blockade During Laparoscopic Oblique Hernia Repair and Its Role in Patient's Postoperative Rapid Recovery. Med Theory Pract. 2022; 35(6): 993-994.
11. Zhang J, Zhang K, Yang X. Comparison of Ultrasound-Guided Quadratus Lumborum Block and Transversus Abdominis Plane Block for Postoperative Analgesia in Inguinal Hernia Repair. Chinese J Hernia Abdomin Wall Surg. 2021; 15(6): 617-620.
12. Hong Y. Comparison of Ultrasound-Guided Rectus Sheath Block and Transverse Abdominis Plane Block for Postoperative Analgesia in TEP Surgery. Shantou University. 2021.
13. Ma Z, Deng J, Tian W. Effect of Hydrocodone Bitartrate Dosage Selection on Analgesia in Patients Undergoing Transversus Abdominis Plane Block for Inguinal Hernia Repair. Chinese Med J. 2021; 56(4): 451-453.
14. Gao S, Qin Y, Yan M. Ultrasound-guided transversus abdominis plane block for analgesia after open tension-free hernia repair. Med Theory Pract. 2021; 34(5): 810-812.
15. Chen H, Liu C, Ye Y. Ultrasound-guided right-sided dexmedetomidine combined with ropivacaine transverse abdominis plane block for postoperative analgesia in pediatric inguinal hernia repair. Chinese Med J. 2021; 56(2): 219-222.
16. Wang PP. Effectiveness of Ultrasound-Guided Anterior Quadratus Lumborum Nerve Block in Elderly Patients Undergoing Unilateral Oblique Inguinal Hernia Repair. Chinese J Sanatorium Med. 2021; 30(2): 186-188.
17. Kang T, Hu X, Wang K. Analgesic Effects of Quadratus Lumborum Block Anesthesia and Local Infiltration Anesthesia in Inguinal Hernia Repair. Zhejiang J Trauma Surg. 2020; 25(6): 1205-1206.
18. Gao M, Qin Y. Comparison of Ultrasound-Guided Continuous vs. Intermittent Transverse Abdominal Plane Nerve Block for Postoperative Analgesia in Inguinal Hernia Repair. J Inner Mongolia Med. 2020; 52(8): 944-946.
19. Xu J, An J, Hong Y. Analgesic Effects of Quadratus Lumborum Block Anesthesia and Local Infiltration Anesthesia on Patients Undergoing Inguinal Hernia Repair During and After Surgery. Chinese J Hernia Abdomin Wall Surg. 2020; 14(3): 228-232.
20. Zhang J, Yang X, Zhang K. Role of Transverse Abdominal Plane Block in Enhanced Recovery After Surgery for Inguinal Hernia Repair. Chinese J Hernia Abdomin Wall Surg. 2020; 14(3): 233-237.
21. Li Y, Mo P, Li Q. Clinical study of combined bilateral transverse abdominis plane and rectus sheath block for completely extraperitoneal laparoscopic inguinal hernia repair. J Qiqihar Med College. 2020; 41(8): 943-945.
22. Ye L, Gu L. Clinical Observation of Ultrasound-Guided Transverse Abdominal Muscle Plane Block for Postoperative Analgesia in Patients ≥70 Years Old Undergoing Inguinal Hernia Repair. Chinese J Clin. 2020; 14(1): 30-34.
23. Zeng Y, Chen M, Liu S. Effect of Transversus Abdominis Plane Block on Postoperative Analgesia in Elderly Patients After Laparoscopic Inguinal Hernia Repair. J Qiqihar Med College. 2019; 40(17): 2166-2168.
24. Wu C, Liu Q, Zhang R. Effect of different volumes of bupivacaine transversus abdominis plane block for postoperative analgesia in children with inguinal hernia. J Clin Anesthesiol. 2019; 35(8): 788-790.
25. Fu K, Wei J, Zhou F. Comparison of analgesic efficacy between two block techniques in elderly patients after inguinal hernia repair. Jiangxi Med. 2019; 54(5): 551-553.
26. Mu J, Ji C, Ji Y. Application of transversus abdominis plane nerve block anesthesia in elderly patients undergoing inguinal hernia repair. Med Equipment. 2018; 31(24): 109-110.
27. Cao J, Fang F, Wang W. Clinical study on the required effective dose of ropivacaine for postoperative analgesia using ultrasound-guided transversus abdominis plane block in inguinal hernia repair. Chongqing Med. 2018; 47(36): 4649-4651.
28. Jin Q, Tian Q, Liu Y. Effects of Ultrasound-Guided Transverse Abdominal Plane Block Anesthesia on Serum Tau Protein and Aβ-42 Expression in Patients Undergoing Laparoscopic Inguinal Hernia Repair. J Guangxi Med University. 2018; 35(12): 1663-1666.
29. Wang FY, Zhang WH, Shao XQ. Analgesic Effect of Transversus Abdominis Plane Block on Elderly Patients After Laparoscopic Inguinal Hernia Repair. Zhejiang Med. 2018; 40(23): 2568-2570.
30. Zhang L, Fang M, Zheng J. Application of Ultrasound-Guided Quadratus Lumborum Block for Postoperative Analgesia in Inguinal Hernia Repair. Modern Pract Med. 2018; 30(11): 1440-1441.
31. Gao X. Application of Ultrasound-Guided Pethidine-Containing Lumbar Quadratus Lumborum Blockade at Different Concentrations in Unilateral Hernia Repair. Fujian Med University. 2018.