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Clinical Study on the Choice of Surgical Operation for Young Patients with Inguinal Hernia

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Abstract

Objective: To evaluate the outcomes and postoperative recovery of different surgical approaches for young patients with inguinal hernia, providing a clinical reference. **Methods:** A total of 90 young patients with inguinal hernia admitted between July 2021 and August 2025 were enrolled. Thirty patients underwent open non-tension hernia repair (traditional group), 30 received laparoscopic total extraperitoneal non-tension hernia repair (TEP group), and 30 underwent laparoscopic transabdominal extraperitoneal non-tension hernia repair (TAPP group). **Results:** The TAPP group demonstrated shorter operative time compared to the traditional and TEP groups, with lower hospitalization costs in the TEP group. Comparative analysis showed statistically significant differences ($P<0.05$). However, no significant differences were observed in intraoperative blood loss, 24-hour VAS score, postoperative hospitalization duration, complication rates, or Barthel Index between the TEP and TAPP groups ($P>0.05$), though both groups showed superiority over the traditional group ($P<0.05$). **Conclusion:** Minimally invasive treatments for inguinal hernia demonstrate reliable efficacy. While both TEP and TAPP techniques have their respective advantages and limitations, clinicians should make informed surgical choices based on individual patient conditions and financial considerations.

Keywords

Inguinal hernia; TEP and TAPP; traditional open operation; postoperative recovery; effect observation

The inguinal region, located in the triangular area where the abdominal wall meets the thigh, is clinically defined as a hernia where abdominal organs protrude through a defect in the inguinal region. This condition, also known as "hernia" [1], primarily manifests in two types: indirect and direct inguinal hernias. In young patients, the condition is mainly caused by congenital factors such as underdeveloped internal ring openings or patent processus vaginalis. Surgical treatment for young patients is more complex compared to middle-aged and elderly cases, requiring careful selection of surgical approaches. As a common general surgery procedure, inguinal hernia repair accounts for approximately 50,000 annual cases in China, according to incomplete statistics [2]. With the advancement of laparoscopic minimally invasive techniques, laparoscopic hernia repair has seen rapid development, leading to multiple surgical options. However, there remains ongoing debate in China regarding the optimal surgical approach for inguinal hernia treatment. This article compares the effectiveness of minimally invasive techniques (TEP, TAPP) versus traditional open surgery, with specific details as follows:

1. Data and Methods

1.1 Case Selection

(1) Inclusion criteria: 1) Age 18-45 years; 2) Clinical diagnosis of unilateral inguinal hernia [3] confirmed by CT/MRI;

3) ASA classification Grade I-II; 4) The study was approved by the hospital's ethics committee, with informed consent from patients and their families.
(2) Exclusion criteria: 1) history of lower abdominal surgery; 2) severe organ dysfunction; 3) active bleeding; 4) malignant tumor; 5) pregnancy and lactation; 6) family history of mental illness or refusal to cooperate with the study.

1.2 General Information

A total of 90 young patients with inguinal hernia were treated at our hospital's General Surgery Department between July 2021 and August 2025. The patients were divided into three groups of 30 cases each based on surgical methods. The traditional group included 30 male patients aged 22-43 years (mean 32.8±3.7 years), with hernia types: Type I (12 cases), Type II (15 cases), and Type III (3 cases). The TAPP group comprised 29 male and 1 female patients aged 19-44 years (mean 33.4±4.0 years), with hernia types: Type I (10 cases), Type II (16 cases), and Type III (4 cases). The TEP group included 29 male and 1 female patients aged 18-45 years (mean 34.8±4.2 years), with hernia types: Type I (13 cases), Type II (15 cases), and Type III (2 cases). Pairwise comparisons of basic demographic data among the three groups showed no statistically significant differences ($P>0.05$).

1.3 Methods

1.3.1 Traditional Group

Open non-tensioning hernia repair was performed under local or epidural anesthesia. A diagonal incision of appropriate length was made beside the affected umbilicus, and the hernia sac was identified by dissecting layer by layer in a predetermined sequence. The posterior aspect of the spermatic cord within the hernia sac was dissected up to its neck and ligated at a high level. If the hernia sac was found to be relatively large, it was transected transversely and hemostasized distally, followed by left-hanging. A polypropylene mesh (10cm×5cm) was then placed posterior to the spermatic cord to fix the combined tendon, pubic tubercle, internal oblique muscle, and inguinal ligament. The incision was closed layer by layer, and a sandbag was applied for postoperative compression.

1.3.2 TAPP Group

Under general anesthesia with tracheal intubation, an arc-shaped incision approximately 1.2 cm long is made along the umbilical trunk margin. A pneumoperitoneum needle is inserted to establish CO2 pneumoperitoneum (12-14 mmHg), followed by the placement of a laparoscope. The patient is positioned in a head-low foot-high position. Five-mm trocar instruments are inserted at the right lateral rectus muscle level, 4 cm below the left umbilicus. An arc-shaped peritoneal incision is made from the medial umbilical fold to the anterior superior iliac spine, 6-8 cm above the absence of the internal ring opening, to bluntly dissect the preperitoneal space. A fascial incision is made at the root of the inferior abdominal wall vessels to separate the spermatic cord fascia. The diseased sac and spermatic cord are separated and repositioned using a combination of blunt and sharp dissection techniques. The peritoneum is retracted, and the spermatic vessels and vas deferens are dissected, maintaining a 5cm distance from the internal ring opening. A pre-cut mesh is rolled and inserted through the umbilical trocar. After unfolding, the mesh is laid flat to cover the pubic muscle foramen. The superior portion extends 2-3 cm lateral to the pubic symphysis to the inguinal ligament, crossing the medial aspect of the pubic tubercle, and extends 2-3 cm inferior to the pubic symphysis. The peritoneal incision is continuously sutured to ensure normal abdominal cavity formation, followed by gas evacuation and routine suture puncture.

1.3.3 TEP Group

Under general anesthesia with tracheal intubation, the patient was placed in the supine position. A 10 mm cannula was inserted at the puncture site, followed by 5 mm cannulae positioned at the external rectus abdominis muscle and umbilical level. The skin was incised in layers 1cm below the umbilicus, and loose tissues were mobilized. The preperitoneal space was dissected to expose the pubocristal ligament, Cooper's ligament, spermatic cord, and blood vessels. The affected sac was repositioned into the abdominal cavity, and the spermatic cord was repaired. A polypropylene mesh was placed in the preperitoneal space. During these procedures, care was taken to ensure the mesh completely covered the femoral ring, the right angle of the rectum, and the internal ring. After confirming proper positioning, CO2 was released from the abdominal cavity, the mesh was secured, and the peritoneal flap was sutured as standard.

1.4 Observation Indicators

The study recorded the following parameters for three patient groups: surgical duration, hospitalization costs,

intraoperative blood loss, postoperative 24-hour Visual Analogue Scale (VAS) score, postoperative hospital stay duration, complication incidence, and Barthel Index. The Barthel Index [4] assesses patients' ability to perform daily activities, with a total score of ≥60 indicating self-sufficiency, and higher scores reflecting greater independence. The Visual Analogue Scale (VAS) ranges from 0 to 10, where 0 indicates no pain and 10 indicates severe pain, with higher scores indicating more intense pain.

1.5 Statistical Processing

The SPSS 16.0 software package was used to analyze the data. The independent $(\bar{x} \pm s)$ variable $(\bar{x} \pm s)$ was the age of the patients, the independent variable was x^2 the age of the patients, the independent α variable was the age of the patients.

2. Results

2.1 Comparison of Basic Information of Three Groups of Patients

Patients in the TAPP group required shorter surgical times than those in the conventional and TEP groups, with the TEP group incurring lower hospitalization costs than both the conventional and TAPP groups. Statistical analysis showed significant differences (P<0.05) in all these aspects. However, no statistically significant differences were observed in intraoperative blood loss, 24-hour postoperative VAS scores, postoperative hospitalization duration, or Barthel Index between TEP and TAPP groups (P>0.05). All these outcomes were significantly better than those in the conventional group (P<0.05) (see Table 1).

Table 1. Comparison of basic information of operation $(\bar{x} \pm s)$ in three groups$(\bar{x} \pm s)$

Group (n)	Operation time (min)	Intraoperative blood loss (ml)	VAS score 24 hours postopera-tive	Length of hospital stay after surgery (days)	Hospitalization expenses (yuan)	Bartherl index (points)
TAPP group (30)	45.8±5.9	10.1±1.4	2.6±0.8	3.3±0.4	7236.4±400.2	84.2±11.2
TEP group (30)	63.5±7.8	9.8±1.5	2.5±0.9	3.4±0.6	7053.4±365.4	84.0±10.7
Traditional group (30)	72.5±8.0	14.7±3.0	4.1±1.3	5.6±1.2	7452.1±420.5	72.5±8.5

2.2 Comparison of Postoperative Complications

The incidence of postoperative complications in the TEP group, TAPP group, and traditional group was 6.7%, 10.0%, and 26.7%, respectively. The incidence of postoperative complications in the traditional group was lower than that in the other two groups, and the difference was statistically significant (P<0.05). The difference between the TEP group and the TAPP group was not significant (P>0.05).

Table 2. Comparison of postoperative complications in three groups

Group (n)	Hematoma of the scrotum	Retention of urine	Infection of the in-cisional wound	Amount to (%)
TAPP group (30)	1	1	1	3 (10.0)
TEP group (30)	1	1	0	2 (6.7)
Traditional group (30)	3	2	3	8 (26.7)

3. Discussion

Young men typically develop oblique inguinal hernias rather than direct ones. Clinical studies [5] indicate that congenital factors such as underdeveloped internal ring openings or incomplete closure of the processus vaginalis contribute to this condition. These hernias are usually large in size, extending into the scrotum and connecting to the hernial sac through the tunica vaginalis. Adhesions between the omentum and hernial sac may cause incarceration. Such cases are often accompanied by congenital conditions like cryptorchidism, incomplete testicular descent, or

hydrocele. For young women with inguinal hernias, the hernia typically involves the inguinal region. Given the potential infection risks due to the female pelvis' connection to the external environment, lightweight mesh patches are recommended. Therefore, preoperative evaluations and intraoperative management are essential for young patients with inguinal hernias.

Young adults are highly active, making non-tension repair a viable option for inguinal hernia in this demographic. The Lichtenstein procedure, renowned for its simplicity, is widely recognized as the gold standard in open non-tension repair, demonstrating effectiveness across all age groups, including younger patients. For young individuals with significant internal ring defects, mesh patching is clinically recommended [6]. However, open preperitoneal repair may be excessive for those with well-developed tissues. Double-layer mesh devices, due to their complexity involving multiple layers and materials, face limitations in clinical application for young hernia patients.

The adoption of minimally invasive techniques in healthcare has significantly accelerated the development of laparoscopic procedures. Laparoscopic inguinal hernia repair (LIHR) has demonstrated exceptional suitability for young patients with this condition. Compared to traditional open surgery, LIHR offers distinct advantages, including reduced postoperative pain and faster recovery of unrestricted mobility. As highlighted in the 2013 guidelines by the European Association for Endoscopic Surgery (EAES) [7], LIHR is particularly effective for active young patients with inguinal hernias. This underscores that the primary goal for young patients undergoing LIHR is not merely to perform preperitoneal repair or pursue minimally invasive surgery, but rather to facilitate swift return to normal activities such as education and work, thereby achieving optimal health-economics outcomes.

The TEP and TAPP procedures share the same fundamental principle but differ in their surgical approaches. TEP bypasses the abdominal cavity, performing hernia repair solely through the preperitoneal space, while TAPP requires intra-abdominal access for complete hernia closure. Both minimally invasive techniques are classified as preperitoneal repair. For inguinal hernia repair, both TEP and TAPP can place mesh in the inguinal region, effectively minimizing the risk of hernia recurrence by reducing the likelihood of missed repairs during treatment of oblique, rectoinguinal, and femoral hernias. Theoretically, TEP offers greater rationality for treating young patients due to its non-peritoneal approach [8, 9]. However, clinical application of TEP may damage peritoneal structures, potentially causing direct contact between intestinal loops and mesh, thereby increasing risks of complications like intestinal adhesions and perforations. In contrast, TAPP provides a larger surgical space with clear anatomical landmarks, enabling surgeons to more clearly visualize and identify occult hernias and their contents. This technique demonstrates particular advantages for female patients with uterine round ligament cysts, as it allows simultaneous diagnosis and treatment. If both hernia and cyst are identified during surgery, TAPP should be combined with cyst excision before hernia repair [10]. Compared with TAPP, TEP presents greater surgical complexity and a longer learning curve, resulting in a slightly longer procedure duration. In this study, TAPP surgery time was (45.8±5.9) minutes, shorter than the (63.5±7.8) minutes recorded for TEP. Previous research has identified TAPP as the most accessible laparoscopic hernia repair technique, offering minimal invasiveness, reduced pain, accelerated recovery, and enhanced quality of life. The TAPP group demonstrated comparable outcomes to the TEP group: intraoperative blood loss (10.1±1.4) ml, postoperative 24-hour visual analog scale (VAS) score (2.6±0.8), postoperative hospital stay (3.3±0.4) days, and Barthel Index (84.2±11.2) (9.8±1.5 ml, 2.5±0.9, 3.4±0.6, 84.0±10.7, respectively). Notably, TAPP showed advantages in reducing postoperative discharge time and improving daily functional capacity. However, TAPP also revealed limitations: requiring general anesthesia and higher hospitalization costs (7,236.4±400.2 yuan for TAPP vs. 7,053.4±365.4 yuan for TEP), with statistically significant differences.

In conclusion, minimally invasive treatment for inguinal hernia demonstrates proven efficacy. However, both TEP and TAPP minimally invasive techniques have their respective advantages and limitations. Physicians should evaluate the patient's clinical condition and clinical experience to weigh the pros and cons, thereby selecting the most suitable surgical approach to optimize treatment outcomes and promote patient recovery.

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