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Comparative study of laparoscopic Total Extraperitoneal Herniorrhaphy (TEP) and lichtenstein herniorrhaphy for the treatment of unilateral primary inguinal hernia in adults

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Abstract

Objective: To compare the clinical efficacy of laparoscopic Total Extraperitoneal Herniorrhaphy (TEP) and Lichtenstein herniorrhaphy in treatment of unilateral initial inguinal hernia patients.

Study design: The subjects were randomly divided into two groups, one group underwent TEP and the other group underwent Lichtenstein herniorrhaphy. The surgical time, intraoperative bleeding, hospital stay, treatment costs, and incidence of postoperative complications were compared between the two groups Place & duration of the study: This study was conducted at the General Surgery Department of the People's Liberation Army 967 Hospital from January 2024 to July 2024.

Methodology: 90 patients with unilateral initial inguinal hernia admitted to the General Surgery Department of the People's Liberation Army 967 Hospital from January 2024 to July 2024 were recruited. And compare the indicators then.

Results: The operative time for the two groups was (62.29±23.20) minutes and (99.64±27.10) minutes, respectively (t=6.918, P=0.0000<0.05); the hospitalization expenses were (24172.62±2972.65) RMB and (17552.24±3362.70) RMB, respectively (t=12.555, P=0.000<0.05). The differences were statistically significant. The intraoperative bleeding volume was (13.78±16.00) ml and (14.56±10.16) ml, respectively (t=0.275, P=0.7838>0.05); the hospitalization time was (9.44±2.20) days and (9.13±2.60) days respectively (t=0.613, P=0.5416>0.05); The incidence of postoperative complications was 0.02 and 0.24, respectively (χ^2=7.7885, P=0.0053<0.05). The differences were not statistically significant.

Conclusion: Laparoscopic TEP and Lichtenstein herniorrhaphy have their respective advantages in the treatment of unilateral initial inguinal hernia in adults. The selection of operation should be comprehensively analyzed.

Introduction

Inguinal hernia is a common disease in general surgery. If not treated in time, the hernia mass will gradually increase, even leading to incarceration or strangulation. Therefore, active surgical treatment should be taken. There are many operations for treating inguinal hernia, but traditional herniorrhaphy are seldom applied due to its drawbacks such as high tension, poor healing, and obvious traction. At present, lichtenstein herniorrhaphy and laparoscopic Total Extraperitoneal Herniorrhaphy (TEP) have become the main operations in clinical practice due to their advantages of tension free and good recovery. Between them, TEP is considered to be more effective than Lichtenstein herniorrhaphy in treating patients with recurrent inguinal hernia [2,3]. There is a consensus in that laparoscopic inguinal her-

niorrhaphy is the first choice for bilateral inguinal hernia and recurrent inguinal hernia, while the better operation for unilateral initial inguinal hernia in adults is still controversial [4]. This study conducted a preliminary evaluation of these two operations from several aspects, including operative time, intraoperative bleeding volume, hospital stay, treatment costs, and the incidence of postoperative complications, in order to provide reference for surgeons.

Methodology

Ninety patients with inguinal hernia who were treated at the 967 Hospital of the People's Liberation Army from January 2024 to July 2024 were selected, and each patient was numbered. Then, using a random number table method, the patients were divided into two groups: the TEP group and the Lichtenstein group. Both groups underwent TEP surgery and Lichtenstein surgery, respectively.

Inclusion criteria:

1. Unilateral inguinal hernias

2. Initial patient

3. Age>18 years old

4. Voluntary enrollment and signing of informed consent form.

Exclusion criteria:

1. Bilateral inguinal hernias

2. Recurrent inguinal hernias

3. Inguinal hernias, umbilical hernias, and white line hernias

4. Patients with severe cardiovascular or cardio-cerebrovascular diseases or mental abnormalities

5. Age<18 years old.

This study has been approved by the Ethics Committee of PLA 967 Hospital, with project number PLA967-GC2024-010. Comparing the baseline data of two groups, there were no differences in age, gender, Body Mass Index (BMI), hernia type, etc., indicating comparability. Please refer to (Table 1) for details.

Both groups of surgical materials were made of polypropylene and polylactic acid composite patches. 15 cm x 9 cm size were used in TEP group, while 12 cm x 8 cm size were used in Lichtenstein group. Both sizes were cut to appropriate sizes according to the operations.

The operations for both groups of patients were performed by the same group of three surgeons. Among them, the chief surgeon has more than ten years of relevant work experience.

Patients in TEP group received general anesthesia with their heads low and feet high. Take a cambered incision 0.5 cm to the right of the lower edge of the navel, approximately 1.5 cm long, and separate it layer by layer into the superficial surface of the posterior sheath of the rectus abdominis. Separate the anterior peritoneal space using fingers preliminarily, and place two 5 mm operating cannulas using reverse puncture method. Inject a 12.5 mm cannula under the navel. Connect a carbon dioxide pneumoperitoneum machine, maintain a pneumoperitoneum pressure of 12 mmHg, place a laparoscope, and fully separate the anterior peritoneal space using an ultrasound knife and non-invasive grasping forceps. First, enter the anterior bladder space behind the ossa pubis, then separate outward, open the separating ligament, separate the Bogrous space, and separate the hernia sac. Pay attention to the spermatic cord structure. And make the spermatic cord abdominal wall turn. Ligate the hernia sac with No. 7 silk thread and remove it. Place a patch in the anterior peritoneal space. After flattening, slowly release the pneumoperitoneum and lay the patch flat around the inner ring. Check that there is no bleeding around the Trocar, the 2-0, 3-0, 4-0 round absorbable surgical suture are used to suture the anterior sheath of the rectus abdominis, the subcutaneous area, the dermis of the skin respectively, and the draw glue is used to tighten the skin.

Patients in Lichtenstein group were treated with a combination of epidural and spinal anesthesia, in a supine position. Take a parallel incision 1.5 cm above the midpoint of the inguinal ligament, approximately 5 cm long, and cut through the skin and subcutaneous tissue layer by layer to carefully stop bleeding. Cut the fascia of the external oblique muscle of the abdomen, open the external ring, passively separate the cremaster, locate the hernia sac on the inner side of the spermatic cord, and explore the hernia sac. Send the hernia sac back to the coeliac cavity, free the spermatic cord, and place a self-fixed suture less hernia patch. The patch covers the spermatic cord at the inner ring, and the marked area and pectineal ligament are sutured and fixed with suture 7 for 1 needle. Flatten the patch, and fully bond the patch to the inguinal ligament, internal oblique muscle, and musculus trasversus abdominis tendon surface behind the spermatic cord. Intermittent suture of the external oblique muscle fascia with absorbable surgical suture 2-0 can be used to reconstruct the outer ring, which can accommodate a fingertip, 3-0 absorbable surgical suture intermittently sutures subcutaneous tissue, 3-0 absorbable surgical suture sutures skin, covered with sterile dressing.

Collect relevant data on surgical time, intraoperative bleeding, length of hospital stay, hospitalization expenses, and postoperative complications for two groups of patients through the hospital medical record system from February 20 to February 25, 2024. Follow up all patients by phone for 3 months after surgery to understand their recovery status.

SPSS21 software was used for data analysis. Measurement data using $\bar{x}\pm s$ represents, using t-test; The counting data is expressed in terms of rate, using χ^2 inspection. When $P<0.05$, the difference is considered statistically significant.

Results

The operative time in the TEP group was longer than that in the Lichtenstein group ($P=0.0000<0.05$); The hospitalization expenses of the TEP group were higher than those of the Lichtenstein group ($P=0.0000<0.05$). The differences was statistically significant. The intraoperative bleeding volume in the TEP group was less than that in the Lichtenstein group ($P=0.7838>0.05$); The hospitalization time in the TEP group was longer than that in the Lichtenstein group ($P=0.5416>0.05$). The difference was not statistically significant. Please refer to (Table 2) for details. The incidence of postoperative complications in the TEP group

Table 1: Baseline data and comparative results of two groups of patients.

Groups	Number of cases in group	Age	BMI	Gender		Hernia type	
				Male	Female	Indirect hernia	Direct hernia
TEP group	45	56.47±18.70	24.77±2.90	42	3	43	2
Lichtenstein group	45	56.71±19.04	4.20±3.12	43	2	44	1
Statistics		t=0.061	t=0.892	X^2=0.2118	X^2=0.3448		
P-value		0.9512	0.3749	0.6454	0.5571		

Table 2: Observation indicators and comparative results of two groups of patients during hospitalization treatment.

Groups	Number of cases in the group	Operative time			
min (1U.S.dollar≈7.186RMB)	intraoperative bleeding volume ml	hospitalization time d	Hospitalization expenses RMB		
TEP group	45	62.29±23.20	13.78±16.00	9.44±2.20	24172.62±2972.65
Lichtenstein group	45	99.64±27.10	14.56±10.16	9.13±2.60	17552.24±3362.70
Statistics t		6.918	0.275	0.613	12.555
P-value		0.0000	0.7838	0.5416	0.0000

Table 3: The incidence and comparative results of complications in two groups of patients.

Group	Number of cases by group	Urinary retention	Incision infection	Scrotal edema	Chronic pain (for more than 3 months)	Neurosensory abnormalities	Total
TEP group	45	1	0	0	0	0	1
Lichtenstein group	45	2	0	2	4	3	11
statistic χ^2							7.7885
P-value							0.0053

was lower than that in the Lichtenstein group (P=0.0053<0.05), and the difference was statistically significant. Please refer to (Table 3) for details. All patients in the TEP group had taken their original job after about a week of discharge; All Lichtenstein group patients had taken their original job about two weeks after discharge; All patients can engage in physical labor for about 3 months; There was no recurrence in both groups after operations. (Due to factors such as preoperative examination appointment time and surgery application appointment time, both groups have slightly longer hospital stays).

Discussion

In clinical practice, surgical treatment is the preferred treatment for inguinal hernia. Although there are numerous operations for hernia repair, none of them are recognized as standard [5]. In the 2009 European Hernia Association's "Guidelines for the Treatment of Adult Inguinal Hernias", Lichtenstein and TEP were recommended as two typical operations [6]. The former is to strengthen the anterior muscle repair of the posterior wall of the inguinal canal, while the latter is to strengthen the anterior peritoneum repair of the foramina pubis.

TEP is recommended by European guidelines as the preferred surgical method for laparoscopic inguinal hernia [7]. Because its operating space is in the anterior peritoneal space and does not enter the coeliac cavity, it can effectively avoid damage to blood vessels and other important tissue structures without having a significant impact on the coeliac cavity [8]. The placement of TEP patches in a deeper position can effectively reduce postoperative neurosensory abnormalities and recurrence of inguinal hernia. In this study, the incidence of chronic pain and neural sensory abnormalities in the TEP group was lower than that in the Lichtenstein group, indirectly demonstrating the superiority of this surgical method. Some study have shown that TEP has a smaller impact on sexual function than Lichtenstein surgery [9]. In addition, due to the advantages of the surgical procedure itself, the placement of the patch can effectively prevent the occurrence of various hernias such as indirect inguinal hernia, direct hernia, femoral hernia, and obturator hernia, playing a "once and for all" role [10,11]. Due to the minimally invasive nature of laparoscopic TEP surgery, the postoperative cosmetic effect is better. Some scholars believe that TEP is more effective than Lichtenstein herniorrhaphy in treating primary inguinal hernia in adults [12]. However, laparoscopic surgery requires the use of general anesthesia, which also leads to an increase in hospitalization expenses.

Lichtenstein herniorrhaphy was founded by Lichtenstein in 1984. It can repair damaged transverse fascia during operation without damaging the normal anatomical structure of the inguinal area. Due to its open procedure, simple steps, short operative time, minimal damage, and diverse anesthesia options, it has been widely used in clinical practice, especially for older patients with poor cardiopulmonary function [13,14]. In this study, the operative time and hospitalization expenses of the Lichtenstein group were significantly lower than those of the TEP group (P=0.0000<0.05). Lichtenstein herniorrhaphy has the advantages of short operative time, mild surgical site dam-

age, and high health and economic value. However, the pain problem after Lichtenstein herniorrhaphy is quite obvious [15]. Some scholars believe that the incidence of stubborn pain after Lichtenstein herniorrhaphy is much higher than that of laparoscopic herniorrhaphy [16], which also limits the application of this surgical method. With the promotion and application of Lichtenstein herniorrhaphy in clinical work, postoperative complications such as urinary retention, incision infection, scrotal edema, chronic pain, and neurosensory abnormalities are gradually emerging, suggesting the incidence of complications after Lichtenstein herniorrhaphy is higher than that of TEP. The RCT study conducted by Li Kai et al. [17] also confirmed that Lichtenstein hernia repair has a higher incidence of complications than TEP in the treatment of initial inguinal hernia patients in adults. This may be related to the smaller incision size of TEP, which causes less damage to the body [18]. In this study, the incidence of postoperative complications in the Lichtenstein group was significantly higher than that in the TEP group, and the difference was statistically significant (P=0.0053<0.05). This indicates that the postoperative complications of Lichtenstein herniorrhaphy should be paid attention, which requires our clinical doctors to explore together and strive to reduce the occurrence of postoperative complications [19].

Conclusion

In summary, laparoscopic TEP and Lichtenstein herniorrhaphy have their respective advantages in treating patients with unilateral initial inguinal hernia. Both of these surgical procedures can be safely and effectively used for the treatment of primary inguinal hernia [20]. Laparoscopic TEP has good cosmetic effects and fewer complications, but the operative time is long and the hospitalization expenses are high; Lichtenstein herniorrhaphy has short operative time, low hospitalization expenses, and high health economic value, but the incidence of complications is high. The choice of surgical procedure depends on the patient's cosmetic requirements, physical conditions, and economic situation. Before operation, the patient's physical condition should be fully evaluated, their personal wishes should be solicited, and the operation should be personalized and the plan optimized as much as possible.

Declarations

Funding: No funding was received.

Availability of data and materials: The data generated in the present study may be requested from the corresponding author.

Authors' contributions: There was only one author.

Ethics approval and consent to participate: This study has been approved by the Ethics Committee of PLA 967 Hospital, with project number PLA967-GC2024-010.

Patient consent for publication: Not applicable.

Competing interests: The authors declare that they have no competing interests.

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