

Single incision laparoscopic totally preperitoneal hernioplasty (SIL-TPP)

Lessons learned from 102 procedures and initial experience

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Abstract

Background: The abdominal wall in groin area is conventionally considered that it was comprised by 9 layers. Single incision laparoscopy totally extraperitoneal hernioplasty (SIL-TEP) reported before were operated through the front of the posterior rectus sheath.

Method: 102 SIL-TPP were conducted from October 2018 to October 2020 at The Affiliated Hospital of Medical School of Ningbo University using a self-made single-port device and standard laparoscopic instruments. Clinical data, demographic and intraoperative findings, and short-term postoperative outcomes were analyzed.

Results: Of the 102 hernias treated, 46 were right inguinal hernias, 33 were left inguinal hernias and 23 were double-side inguinal hernias. All patients received the SIL-TPP and no conversion happened. The mean left-side and right-side hernia operative time was almost same. The left-side and right-side operative time were 75.48 ± 26.95 and 76.24 ± 26.09 minutes, respectively. The mean operative time was 75.92 ± 26.45 (range, 29–170 minutes) in unilateral inguinal hernia. Mean operative time was 104.17 ± 28.58 minutes (range, 67–180 minutes) in double-side inguinal hernia. The intraoperative complications rate was 21.57 (22/102) and all the complications were Peritoneum or sac tearing. Postoperative complications occurred in 3 cases (1 case wound seroma, 1 case urinary retention and 1 case upper respiratory infection) and were successfully treated conservatively. The mean hospital stay was 2.8646 ± 1.38 days. The 24 hours Visual analogue scale score was 2.28 ± 0.77 . During follow-up to June 2022, no recurrence case occurred.

Conclusion: SIL-TPP is safe and feasible. SIL-TPP has its unique skills and advantages to treat inguinal hernia. Large-scale randomized controlled trials comparing SIL-TPP inguinal hernia repair with conventional single port and conventional three port laparoscopic totally extraperitoneal hernioplasty with short-term outcome and long-term recurrence rate are needed to confirm these results.

Abbreviations: BMI = body mass index, CL = conventional laparoscopic, PPS = preperitoneal space, SD = standard deviation, SIL = single incision laparoscopic, SIL-TEP = single incision laparoscopy totally extraperitoneal hernioplasty, SIL-TPP = single incision laparoscopic totally preperitoneal hernioplasty, TEP = totally extraperitoneal.

Keywords: hernia, hernioplasty, laparoscopic totally preperitoneal, preperitoneal space, single incision

1. Introduction

Inguinal hernia is a common disease. Many operative versions have been reported to treat the disease. Since laparoscopic hernia repair was introduced in 1990s,^[1,2] hands of laparoscopic hernia repair study verified the recurrence rate of them were similar to open tension-free inguinal hernioplasty.^[3] Nowadays, laparoscopic inguinal repair has become a well-established operation following with less surgical trauma, less postoperative pain, faster recovery, and cosmetic benefit.^[4]

In 2009, Filipovic-Cugura et al^[5] reported the first single-incision laparoscopy totally extraperitoneal hernioplasty (SIL-TEP). For the potential benefits of SIL-TEP in terms of cosmesis, pain

reduction and recovery speed, the surgical technique has become increasingly popular.^[6–8] Recent years, numbers of studies comparing SIL-TEP with conventional TEP have been published.^[6–8] Their results verified the SIL-TEP is a feasible and safe surgical procedure.^[6,7] In addition, the results also showed SIL-TEP had less invasive surgery and better cosmetic results than conventional laparoscopic TEP.^[7,9]

The abdominal wall in groin area is conventionally considered that it was made up by nine layers.^[10] The anatomic feature has got attention.^[11] Consequently, there may be several layers could establish extraperitoneal space for extraperitoneal inguinal hernia. The preperitoneal space (PPS) belongs to abdominal wall in hypogastrium is a whole and soft space

The authors have no conflicts of interest to disclose.

All data generated or analyzed during this study are included in this published article [and its supplementary information files].

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also has been drawn attention by many scholars.^[12,13] The space could be expanded for its soft connection between the posterior sheath of rectus abdominis and peritoneum. Consequently, we speculated the procedure of SIL-TEP may also be conducted in PPS. However, almost all SIL-TEP study reported before were operated through the space of the front of the posterior sheath of rectus abdominis and then enter the PPS for further operation.^[5,9,14,15] Though many physicians have focused on the preperitoneal (posterior) space many years,^[12,13] there was few evidence verified SIL-TEP through PPS was feasible and safe for inguinal hernia repairing. For our SIL-TEP procedure is conducted all in PPS, the procedure was named as SIL-TPP, for distinguishing with SIL-TEP.

Therefore, the aim of study was to introduce the procedure of SIL-TPP and to show the safety and feasibility of SIL-TPP.

2. Methods

During October 2018 and September 2021, 102 inguinal hernia patients received SIL-TPP in the affiliated hospital of medical school of Ningbo university. All patients received physical examination and diagnosed in outpatient clinic, and received an ultrasonogram or abdominal computed tomography if necessary. All inguinal hernia patients admitted to our institute were considered for SIL-TPP hernia repair. Exclusion criteria were as follows: patients age < 20 years, patients with compromised cardiopulmonary function or others cannot tolerate general anesthesia. All the operations were performed by a single surgical team. The team were experienced in SIL-TEP. The demographics, clinical characteristics (age, sex, body mass index [BMI], side of hernia, type of hernia, and previous lower abdominal surgery history), intraoperative findings (operation time, amount of bleeding, conversion status, and intraoperative peritoneal injury), and postoperative course (mesh infection, wound infection, seroma, hematoma, sanguineous apoplexy, stroke, upper respiratory infection, urinary retention, urinary tract infection, hydrocele of testes, pain score, postoperative hospital day, and mortality, chronic pain, recurrence and others) of patients were prospectively recorded during study. The surgical procedure was conducted with conventional surgical instruments including conventional 30-degree laparoscope (STORZ, Tuttlingen, Germany), 45 cm in length and 10 mm in diameter. The single-port used in our study was design by doctors in our department, sample as Figure 1. In addition, the design single port was suitable for SIL-TPP and has overcome the troubles such as air leakage, smoke exhaust, parallel effect and suture difficulty in SIL-TPP procedure. The operative time in our study was record from cut skin to finishing suture skin. The main

anatomic landmarks were identified including the pubic bone, inferior epigastric vessels, anterior superior spine, Cooper's ligaments. Patients conventionally received postoperative intravenous Cyclooxygenase-2 analgesic.

Written informed consent was obtained from all the patients in this study. This study was approved by the Ethics Committee of the Affiliated Hospital of the Medical School of Ningbo University.

2.1. Preoperative preparation

Patients were in supine position with arms adducted if necessary and received endotracheal general anesthesia. Patients did not receive antibiotic prophylaxis routinely. If the estimated operation time would exceed 2 hours, the patient received indwelling urinary catheter before operation. The surgeon and camera operator stood on the offside of the inguinal hernia. The monitor was placed on the side of the hernia and at the foot patients. For bilateral hernia patients, the monitor conventionally was replaced to another side after separating one side PPS. In procedure, patient was placed in a Trendelenburg position and the hernia opposite side was tilted down.

2.2. SIL-TPP preperitoneal single incision

A single 2.0 to 2.5 cm infra-umbilical cambered skin incision around umbilicus was made with towel clips assistance and sharpened scalpel (Fig. 2A). The linea alba and anterior rectus sheath was exposed after subcutaneous dissection with electrotome. Incise anterior rectus sheath transversely (Fig. 2B) and expose the rectus abdominis and bilateral side posterior sheath of rectus abdominis (Fig. 2C). The length of opened anterior rectus sheath was parallel to the skin incision about 2.0 to 2.5 cm. Drag the left rectus abdominis to lateral side and expose the posterior sheath of rectus abdominis (Fig. 2D). Then transversely incise open the left side posterior rectus sheath and expose left PPS (Fig. 2D). Similarly, drag right side rectus abdominis to lateral side and transversely incise open right side posterior sheath of rectus and expose the right PPS (Fig. 2E). Then incise open the fusion part between the linea alba and peritoneum with electrotome (Fig. 2F) or cross and lift up the fusion with a small vessel clamp and then incise the linea alba below the fusion (Fig. 2G). Then the PPS single incision is incised open and established (Fig. 2H). The preperitoneal adipose tissue and peritoneum should preserve unbroken. If the peritoneum was opened, close the broken peritoneum through suture. Next is expanding PPS with index finger carefully. After expanding, a multiple instrument access single port device was inserted into PPS (Fig. 2I). Preperitoneal pneumoperitoneum was established through the insufflation channel of port and the pressure was maintained at 10 to 13 mm Hg.

2.3. SIL-TPP procedure

The 30-degree endoscopic camera was advanced into the middle 10 mm channel. Two regular laparoscopic instruments were advanced into the bilateral 5 mm channels. Monopolar diathermy and graspers were used to expand the soft PPS. The soft space was expanded from medial to lateral side with optical system (Fig. 3A). Medial PPS was dissected from incision toward foot side until finished dissecting the pubic bladder space. During dissecting the Retzius space, the symphysis pubis and cord structures were identified (Fig. 3B). Dissected the lateral space (Bogros space) toward the anterior superior iliac spine. During dissected the Bogros space, inferior epigastric vessels (Fig. 3C) should be protected from injury. During expanding the right side Bogros space, our left hand was conventionally as the master operating hand and hold monopolar diathermy. Our right hand was as auxiliary hand holding a grasper thus assisting left hand to expand



Figure 1. The sample of single port.

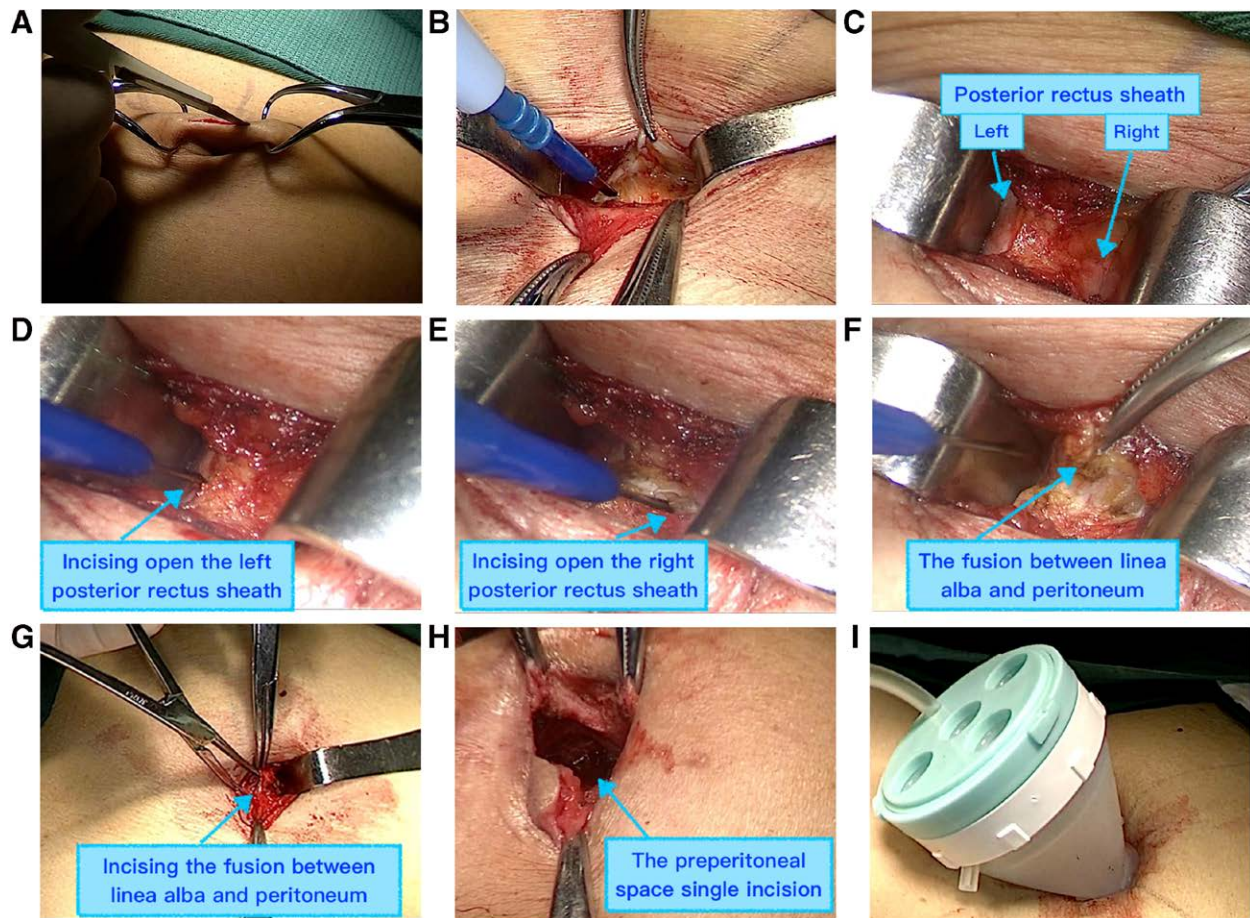


Figure 2. Major procedure of establishing PPS single incision. (A) Establishing single incision with towel clips assistance and sharpened scalpel. (B) Exposing the linea alba, anterior rectus sheath and incising open anterior rectus sheath. (C) Exposing the left and right posterior rectus sheath. (D) Incising open the left posterior rectus sheath. (E) Incising open the right posterior rectus sheath. (F) The fusion between linea alba and peritoneum. (G) Incising the fusion between linea alba and peritoneum. (H) The preperitoneal space single incision. (I) Single port inserted in PPS space. PPS = preperitoneal space.

Bogros space. All potential hernia locations were performed to eliminate the potential missed hernias. After completing preperitoneal space dissection, sac isolation and reduction or amputation (in case of large scrotal hernias) beyond the internal ring were carefully conducted for indirect hernias patients. The hernia sacs were routinely ligated freed from the spermatic cord more than 5 cm. For female patients, the round ligament of uterus was routinely reserved. The broken peritoneum or sac was closed by endoloop, hemlock or suturing (Fig. 3D).

For direct hernia patients, the hernia sac was reduced through gentle traction on the sac and the defect of transversalis fascia was reduced through suturing the defect of transversalis fascia with the surrounding toughness tissue to prevent seroma formation. For cases of femoral, or obturator hernia, we did not implement high ligation of sac. For these cases, only reduction was performed.

In the study, several types of Polyester mesh were used. The size of mesh placed into PPS was 10 cm (craniocaudal) × 15 cm (latero-lateral). In addition, we did not fix the mesh routinely (Fig. 3F and G). After the mesh was positioned properly, carefully deflated the space with direct visualization. The posterior and anterior sheath of rectus abdominis were sutured by absorbable 2-0 sutures. The incision wound was closed with absorbable 3-0 sutures via subcuticular methods (Fig. 3I).

2.4. Statistical analysis

The analysis included descriptive statistical methods: calculation of mean and range for continuous variables, and contingency

tables for categorical variables. The data are given as the mean ± SD, number, or number (%).

3. Results

SIL-TPP hernia repair was successfully implemented in 102 patients and no conversion happened. Patient demographics and hernia characteristics are summarized in Table 1. Of these 102 patients, 87 were males and 15 were females. Their average age was 60.9 years. Their mean BMI was 22.98 ± 2.77 kg/m² (range from 16.00 to 32.56 kg/m²). There were 4 types of hernia identified in the operation; indirect (69.60%, 71/102), direct (14.71%, 15/102), femoral (4%, 4/102), and obturator (<0.01, 1/102). Combined hernia was defined as any combination of 4 types of hernia in one side. There were 11 combined hernias (10.78%, 11/102). The rate of patients received surgical operation before in the region of SIL-TPP procedure was 18.63% (19/102). SIL-TPP was successfully implemented for 5 patients received open tension-free inguinal hernioplasty before without conversion. In addition, a left side SIL-TPP procedure was also successfully implemented for 1 patient had received right side SIL-TPP half 6 months ago through the same single incision.

The mean operative time was 75.92 ± 26.45 minutes (range, 29–170 minutes) for unilateral hernia and 104.17 ± 28.58 minutes (range, 67–180 minutes) for bilateral hernia (Table 2). There was no conversion in the study. Intraoperative complication was defined as any unintended event that influenced operative procedures. A total of 22 intraoperative complications occurred in 102 patients. The intraoperative rate was 21.57%.

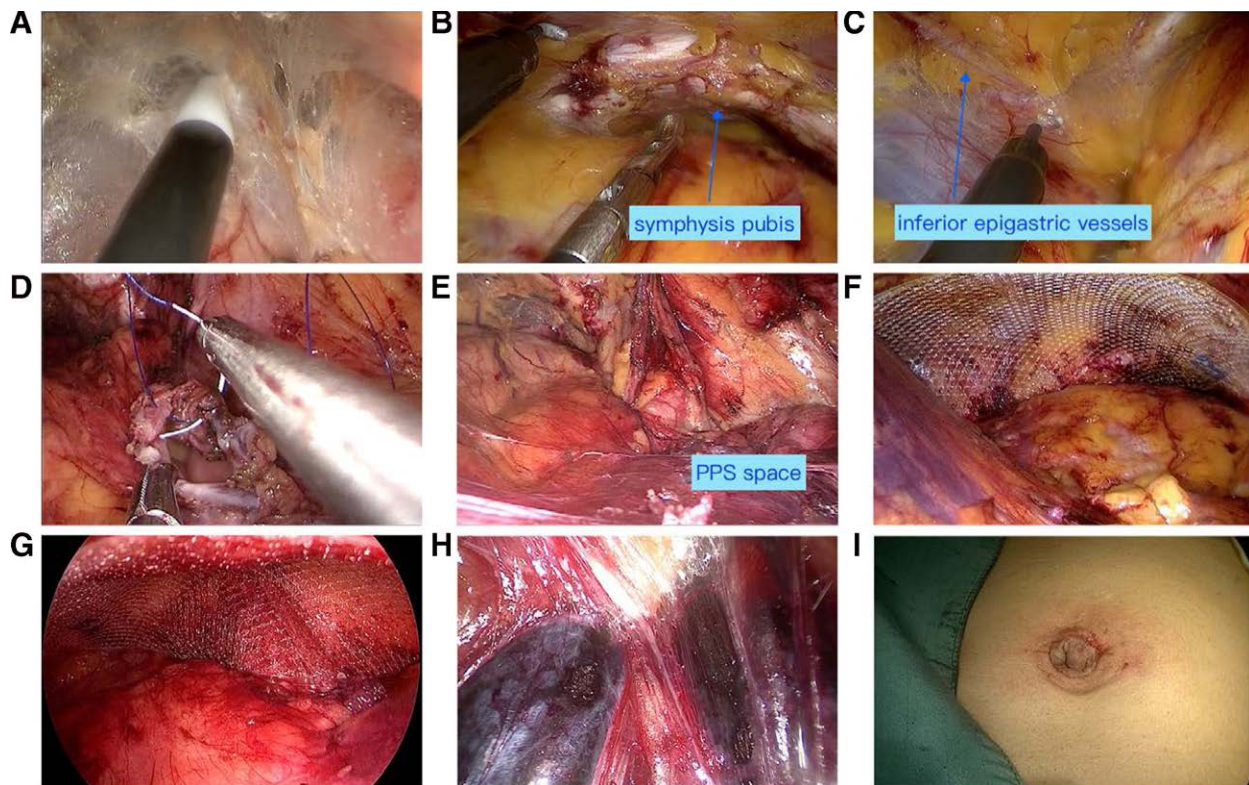


Figure 3. Partial SIL-TPP steps and remarkable characteristic in procedure. (A) The soft preperitoneal space. (B) The symphysis pubis and cord structures. (C) The inferior epigastric vessels. (D) Suturing of the peritoneum. (E) The stable PPS space for inelastic and naturally drooped peritoneum. (F) Mesh placement in left hernia without fixation. (G) Mesh placement in right hernia fixation. (H) The thin peritoneum in lateral abdominal wall below incision. (I) Single incision. PPS = preperitoneal space, SIL-TPP = single incision laparoscopic totally preperitoneal hernioplasty.

Table 1	
Patient demographics and hernia characteristics.	
Variable	Data (n)
No. of patients	102
Sex	
Male	87
Female	15
Age (yr)	60.9 ± 13.6
BMI (kg/m ²)	22.98 ± 2.77
Site of hernias	
Left	33
Right	46
Both	23
Main type of hernias	
Indirect	71
Direct	15
Femoral	4
Obturator	1
Combined hernia	11
Previous lower abdominal surgery	
Open tension-free inguinal hernioplasty	5
Appendectomy	6
Metrectomy	1
Prostatectomy	1
Laparoscopic radical resection of colorectal cancer	1
Radical resection of rectal cancer	2
Cesarean	1
Radical distal gastrectomy of gastric cancer	1
Another side of SIL-TPP	1

Values are presented as mean ± standard deviation or number (%).
 BMI = body mass index, SIL-TPP = single incision laparoscopic totally preperitoneal hernioplasty.

All intraoperative complications in our study were unintentional tearing of peritoneum and hernia sac or intentional amputating hernia sac in case of large scrotal hernias. For peritoneum and hernia sac tearing large than 5 mm, repair was done with a clip or suture. No case of major bleeding, bowel injury, ductus deferens injury, bladder injury, internal spermatic vessel injury, transection of vas deferens occurred in our study.

Table 3 shows postoperative complications. The postoperative complication rate was 3% (3/102). Three postoperative complications occurred: One seroma, one Hydrocele of testes and one upper respiratory infection. All of them were treated conservatively. For few patients received catheterization, there was no urinary retention case. Mean post-operative hospital stay was 2.8646 ± 1.38 days. Postoperative pain scores at 24 hours were 2.28 ± 0.77. Remarkably, there was little pain in wound for most of patients when they return home. Until June this year, there was no recurrence case happened in follow-up.

4. Discussion

Diverse hernia surgery has been generated by surgeons over the last century. Compared to open techniques, laparoscopic treatment has advantage in less postoperative pain, faster recovery, early return to daily activities, and enhanced cosmetic results. Since the first SIL-TEP reported by Filipovic-Cugura et al,^[5] the SIL-TEP has gained an increasing popularity worldwide.^[14-16] In addition, the results showed SIL-TEP had less invasive surgery and better cosmetic results than conventional laparoscopic TEP.^[7,9] The abdominal wall in groin area is conventionally considered that it was comprized by nine layers. The PPS in hypogastrium is a whole and soft space. However, SIL-TEP reported

Table 2
Operative data.

Variable	Data
Operation time (min)	
Left-side hernia	75.48 ± 26.95
Right-side hernia	76.24 ± 26.09
Unilateral hernia	75.92 ± 26.45
Bilateral hernia	104.17 ± 28.58
Conversion	0 (0)
Intraoperative complication	21.57% (22/102)
Major bleeding	0 (0)
Bowel injury	0 (0)
Ductus deferens injury	0 (0)
Bladder injury	0 (0)
Internal spermatic vessel injury	0 (0)
Minor bleeding	0 (0)
Transection of vas deferens	0 (0)
Peritoneum or sac tearing	21.57% (22/102)

Values are presented as mean ± standard deviation or number (%).

Table 3
Short-term results.

Variable	Data
Postoperative complication	3% (3/102)
Mesh infection	0 (0)
Wound infection	0 (0)
Hematoma	0 (0)
Seroma	<1% (1/102)
Sanguineous apoplexy/stroke	0 (0)
Upper respiratory infection	<1% (1/102)
Urinary retention	0 (0)
Urinary tract infection	0 (0)
Hydrocele of testes	<1% (1/102)
Postoperative hospital day	2.8646 ± 1.38
Visual analogue scale score (24 h)	2.28 ± 0.77
Recurrence (until June 2022)	0

Values are presented as mean ± standard deviation or number (%).

before were operated through the front of the posterior rectus sheath.^[5,9,14,15] There was few evidence verified SIL-TEP through PPS was feasible and safe for repairing inguinal hernia (SIL-TPP procedure). In this study, the results showed the SIL-TPP is also feasible and safe procedure. Our experience showed the SIL-TPP has its own advantages when compared to SIL-TEP.

Correct establishing the preperitoneal single incision below the umbilicus is one of most important factors to conduct the procedure of SIL-TPP successfully. The single incision of SIL-TPP should be carried out step by step and layer by layer thus establishing the correct operation channel. After establish single incision parallel to SIL-TEP and expose bilateral posterior sheath. For linea alba near the umbilicus is a close connection tissue and the relation between lateral posterior sheath and peritoneum is loosened, it is effortless to establish the bilateral lateral PPS space before separating the linea alba and peritoneum. Last but not least, separate tight fusion between the posterior sheath and peritoneum in linea alba with electrotome carefully is the key of establishing the single incision successfully. Certainly, for the tight fusion below the umbilicus is very short, avoid the tight fusion and incise the linea alba below the tight fusion is another choice to establish the correct incision. In a word, correct establishing the preperitoneal single incision is one of most important steps to conducted the SIL-TPP procedure efficient and smoothly.

Though SIL-TEP was first described in 2009,^[5] enthusiasm was restrained until recent few years due to insufficient

technical instruments. With special multilumen ports that allow multiple instruments insertion simultaneous such as gelports,^[17] single incision laparoscopic Multiple Instrument Access Port (Covidien, Mansfield, MA)^[18] introduction, SIL-TEP started reviving and has been frequently reported. However, these commercialized ports allow the introduction of multiple instruments through a single port^[4] are not available worldwide for their expensive charge. Besides, there were investigator implement SIL-TEP with their homemade glove port.^[15,19] However, their results showed they frequently encountered kinds of challenge such as the air leak, smoke filled, reduced triangulation, collision of instruments and so on when they conducted SIL-TEP with homemade glove port. The access of home-made glove port was fickle and lack role of support was also a disadvantage, thus difficult to conduct operation stably. In the study, we used the single port was cheap and the port has overcome a serious matter such as air leak, smoke filled, reduced triangulation. In addition, the access layout was reasonable. It is a favorable single port for SIL-TEP and SIL-TPP. Certainly, the single port cannot overcome collision of instruments completely for its diameter of shared tail access was only 2 cm. Consequently, the SIL-TPP procedure own the rule itself and should be conducted along the rule thus reducing these collisions. For instance, when expanded the Bogros space, the procedure of right side is different from the left side SIL-TPP. During separating right side Bogros space, our left hand was conventionally as the master operating hand and hold monopolar diathermy. Our right hand was as auxiliary hand holding a grasper thus assisting left hand to expand Bogros space.

We considered our research is worthwhile to clarify the safety of SIL-TPP. Although the study did not compare SIL-TPP with SIL-TEP or SIL transabdominal preperitoneal approach, our findings were comparable with their results in intraoperative, conversion rates, and postoperative complication rates. In our study, the intraoperative complication rate was 21.57% which is comparable to the results reported of SIL-TEP^[14] and conventional laparoscopic (CL) TEP.^[9,19,20] Our figures were also comparable after modifying by excluding peritoneum and sac tearing from intraoperative complication rates. Remarkably, there was no intraoperative complication happened after excluding sac and peritoneum tearing in current study. Hence, the intraoperative complication rate was relatively superior to SIL-TEP and CL-TEP.^[9,14,19,20] In our study, the peritoneum tearing usually occur in expanding the epigastric, lateral peritoneum, reducing sac or amputation the sac. However, the peritoneum below the arcuate line seldom occur peritoneum tearing because the peritoneum at the position was thickness relatively for there is a layer preperitoneal fat covering on the peritoneum.^[11] Consequently, the peritoneum tearing area was always away from the scope of placed Polyester mesh. The finding is consistent to Kim et al^[21] viewpoint. For some diabetes or thin patients, their lateral peritoneum below umbilicus was thin (as shown in Fig. 3H). For these patients, we usually expand a part of Bogros space and then return upper to separate the lateral peritoneum. The manner could protect the peritoneum from tearing. Besides, the crevasse of peritoneum was usual small and we did not close peritoneum tearing smaller than 5 mm in the study. Impressively, in SIL-TPP, the PPS is very soft and the peritoneum was inelastic and drooped naturally for the force produced by pneumoperitoneum pressure plus gravity. With assistance of the grasp instrument, the peritoneum drooped stably without fluctuation despite the peritoneum and sac occur tearing or amputation (as shown in Fig. 3E). In short, peritoneum tearing didn't make obvious difficulty to our operation for the favorable factors above. However, peritoneum or hernia sac tearing may raise the difficulty of surgery for the instability of operative field in SIL-TEP.^[21] However, whether mesh exposure to small peritoneum tearing cause bowel adhesion or not need further study. In SIL-TEP, Kim et al^[21] suggested operator should

distinguish and enter the correct plane thus protecting patients from intraoperative complication. Operator usually incise the fascia below the arcuate line thus entering preperitoneal space. However, the arcuate line position is inconstant.^[22] The inconstance makes the SIL-TEP procedure difficult.^[22] The difficulty maybe one reason made intraoperative complication that adversely influenced patient recovery, such as, bowel or bladder injury, major bleeding, in their study.^[22] However, our procedure was totally implemented in soft PPS. Hence, our procedure was simpler than SIL-TEP procedure for SIL-TPP procedure was conducted in the single space. These distinguished advantages maybe the reason we did not make obvious intraoperative complication and there was no conversion in the study.

The mean operative time in SIL-TEP for unilateral and bilateral inguinal hernia repair were a bit longer than other authors.^[9,19,21,23] However, our mean operative time was also comparable to lots of authors.^[15,20,22] The operative time in our study was record from cut skin to suture skin. However, many studies did not define the operation time clearly. Consequently, a bit longer or shorter of operative time than SIL-TEP or conventional laparoscopic TEP is also acceptable and comparable. Tsai et al^[24] suggested the reason SIL-TEP operative time longer than laparoscopic TEP was SIL-TEP need extra-time to set up the single access platform. The single incision procedure of SIL-TPP in our study need more steps than SIL-TEP single incision procedure. Consequently, the SIL-TPP will spend a bit longer time than SIL-TEP when setting single incision. In our institution, the SIL-TPP was started in October 2018. The first case operative time of SIL-TPP was also recorded in the study. Hence, like Lo et al, the reason that our operative time was longer than SIL-TEP was the short experience in performing SIL-TPP.

In terms of short-term the postoperative complication, the rate was 3%. Remarkably, the complication was minor morbidity. In our study, there was no morbidity that need reoperation. Previous studies have reported the reoperation morbidity was 5.7% to 15.8% in SIL-TEP and 3.2% to 14% in CL-TEP studies.^[20,22,25–27] Consequently, the morbidity rate of this study was comparable. In our study, there were one seroma, one hydrocele of testes and one suffered upper respiratory infection. The morbidity rate was comparable to precious studies about the SIL-TEP and CL-TEP. In addition, the visual analogue scale score of the postoperative pain in 24 hour was 2.28. Postoperative hospital day was also comparable. During our short-term follow, there was no patient mentioned the discomfort in their daily life no recurrence case happened.

In summary, this study has the following limitations. First, it was a retrospective study. Second, the long-term outcome needs further study. Third, SIL-TPP hernia repair was not directly compared to other TEP hernia repair.

In conclusion, SIL-TPP hernia repair is a safe and feasible procedure with acceptable short-term outcomes. The procedure is simple and possess distinguished advantages. It might be a good option for hernia repair. However, large-scale randomized controlled trials comparing SIL-TEP and CL-TEP are needed to confirm these results.

Author contributions

Conceptualization: Encheng Zhou, Changlei Qi.

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Validation: Qing Huang, Encheng Zhou, Ting Fei.

Visualization: Qing Huang, Ting Fei.

Writing – original draft: Encheng Zhou.

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