

Conversion to Stoppa Procedure in Laparoscopic Totally Extraperitoneal Inguinal Hernia Repair

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ABSTRACT

Background and Objectives: Conversion to open surgery is an important problem, especially during the learning curve of laparoscopic totally extraperitoneal (TEP) inguinal hernia repair.

Methods: Here, we discuss conversion to the Stoppa procedure during laparoscopic TEP inguinal hernia repair. Outcomes of patients who underwent conversion to an open approach during laparoscopic TEP inguinal hernia repair between September 2004 and May 2010 were evaluated.

Results: In total, 259 consecutive patients with 281 inguinal hernias underwent laparoscopic TEP inguinal hernia repair. Thirty-one hernia repairs (11%) were converted to open conventional surgical procedures. Twenty-eight of 31 laparoscopic TEP hernia repairs were converted to modified Stoppa procedures, because of technical difficulties. Three of these patients underwent Lichtenstein hernia repairs, because they had undergone previous surgeries.

Conclusion: Stoppa is an easy and successful procedure used to solve problems during TEP hernia repair. The Lichtenstein procedure may be a suitable option in patients who have undergone previous operations, such as a radical prostatectomy.

Key Words: Totally extraperitoneal hernia repair, Conversion, Stoppa.

INTRODUCTION

Many surgical procedures have been developed and performed for inguinal hernia repair. Laparoscopy, especially the laparoscopic totally extraperitoneal (TEP) approach, has gained popularity for inguinal hernia repair.^{1,2} Randomized controlled studies and metaanalyses comparing TEP hernia repair with other laparoscopic procedures and conventional open surgery have shown better results with TEP in terms of less postoperative pain, earlier ambulation, earlier return to work, better cosmetic results, and improved cost-effectiveness compared with other hernia repair procedures.²⁻¹⁰ However, surgeons performing TEP hernia repair should be thoroughly familiar with the posterior anatomical view of the laparoscopic approach and must have enough advanced laparoscopic experience to prevent complications, conversions, and to correction defects.^{4,10,11}

Most the data published on laparoscopy in hernia surgery have focused on patient outcomes and surgical data. Although these endpoints are important, most of those studies, it seems, have ignored conversion as an intraoperative complication, which may occur in up to 10.6% of cases. Although selected conversion types included transabdominal preperitoneal (TAPP), Lichtenstein, Shouldice, anterior preperitoneal, Kugel, and Stoppa repair in these studies, authors offered no guidance on the optimal conversion type during laparoscopic TEP hernia repair and no explanation as to why they prefer one of those technique specifically.²⁻¹⁹ Thus, we undertook this study to evaluate conversion to the modified Stoppa procedure during laparoscopic TEP inguinal hernia repair through an analysis of our data.

METHODS

Outcomes of patients who underwent conversions to open surgery during laparoscopic TEP inguinal hernia repair between September 2006 and May 2010 at Malatya State Hospital and Turgut Ozal Medical Center were evaluated retrospectively with regard to conversion type.

Data of patients who underwent conversion were analyzed, including age, sex, type of hernia, operative time, perioperative complications, conversion type and reason, use of drains, postoperative morbidity, length of hospital

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stay (days), mean follow-up period (months), and recurrence rate. All surgical procedures were performed by the first author in the 2 hospitals. He is experienced in both the Stoppa procedure and laparoscopic hernia repair. The study protocol was approved by the ethics committee and institutional review board of the Medical Faculty of Inonu University with a reference number 2010/84.

Surgical Technique

General anesthesia was administered to all patients. Patients were positioned on the operation table in a neutral supine position. All patients received cefazolin 1g IV intraoperatively. The surgical site was shaved just before the operation, and the skin was prepared with 10% povidine-iodine solution. A 2-cm vertical infraumbilical incision was made, and the ipsilateral anterior rectus sheath was opened. The rectus muscle was retracted laterally, and the space between the rectus muscle and posterior rectus sheath was enlarged by blunt digital dissection to allow insertion of a 10-mm trocar with a balloon dissector in the preperitoneal space to the pubic bone. After replacing the balloon with a Hasson trocar, CO₂ was insufflated up to 14mm Hg, and a 30° laparoscope was introduced via a 10-mm trocar. After 2 trocars had been introduced at the midline between the umbilicus and pubis into the preperitoneal space, anatomical landmarks including the os pubis, the retropubic space of Retzius, Cooper's ligament, and the space of Bogros were identified by laparoscopy. After dissecting free and retracting the hernial sac, a 14-cm × 10-cm polypropylene heavy weight mesh equipped with a horizontal slit was inserted into the preperitoneal space, covering the inguinal floor and the spermatic cord, and fixed by titanium helical tacker (mesh fixation staples) to the groin margins through the 5-mm port. CO₂ was desufflated, and the anterior rectus sheath was closed with 2-0 polyglactin. When there was a need for conversion, because of, for example, peritoneal breach/laceration or vessel injury, the laparoscopic TEP procedure was converted to Stoppa or Lichtenstein hernia repair.

The technique for conversion to the modified Stoppa procedure with some minor modifications was as follows: a midline incision extending infraumbilically between 5-mm trocars was made, and the umbilico-prevesical fascia was cut along its entire length. The preperitoneal space was entered with blunt dissection due to TEP operations. The dissection included the retropubic space of Retzius and extended laterally behind the iliopubic ramus in the space of Bogros. The dissection proceeded laterally under the rectus abdominalis and posterior to the inferior epigastric vessels on the side opposite the surgeon until

the external iliac vessels and the iliopsoas were identified. After dissecting free and retracting the hernial sac, a 14-cm × 10-cm polypropylene heavy weight mesh equipped with a horizontal slit was inserted into the preperitoneal space, covering all potential hernias of the inguinal floor and the spermatic cord, and fixed to the groin using a hernia stapler. A closed-suction drain was then placed between the mesh and the abdominal wall, and umbilico-prevesical fascia was closed using 2-0 polypropylene sutures. The skin was closed separately using 3-0 polypropylene sutures.

The technique for conversion to the Lichtenstein procedure was as follows: a standard groin incision was made into the external oblique aponeurosis, and the spermatic cord was elevated from the posterior wall of the inguinal canal. The hernia sac was opened, inspected, and ligated. A sheet of polypropylene mesh measuring 14cm × 7cm was placed into the groin and secured to the lateral border of the rectus sheath, the aponeurotic tissue over the pubic tubercle (overlapping the pubic tubercle), and the inguinal ligament using a running 2-0 Prolene suture. The mesh was split to re-create the internal ring. The 2 tails of the mesh were crossed, sutured together, and attached to the inguinal ligament, lateral to the cord. The superior portion of the mesh was secured to the rectus sheath and internal oblique muscle using 3 interrupted sutures. After meticulous hemostasis, a closed suction drain was placed beneath the external oblique aponeurosis. All fascias and skin were then closed. The drain was removed after 24 hours and the patients were discharged. They returned for follow-up after 10 days for suture removal, and a further 3-month follow-up at the outpatient clinic was advised.

Statistical Analyses

Continued variables are reported as means ± standard deviations, and categorical variables are reported as number and percent in this study.

RESULTS

A total of 259 consecutive patients with 281 inguinal hernias who underwent laparoscopic TEP inguinal hernia repair and were prospectively followed-up were recruited to the study. In all, 31 of 281 laparoscopic TEP hernia repairs (11%) were converted to open conventional surgical procedures, because of dense adhesion, vascular injury, or technical difficulties that prevented further laparoscopic dissection. Of these, 25 patients were men, 1 was a woman, and the median age of the patients was 46 ± 8.9 years. Five (19.23%) patients had bilateral hernias; among

unilateral inguinal hernias, 15 (57.69%) were on the right side, and 6 (23.08%) were on the left side. Two (7.69%) patients had had a recurrent inguinal hernia, and 5 (19.23%) had previous lower abdominal surgery (1 right pararectal incision, 1 caesarian delivery, 2 radical prostatectomy, 1 midline incision).

Twenty-eight of 31 laparoscopic TEP hernia repairs were converted to modified Stoppa procedures, 5 of which were bilateral hernias. Two of the 28 hernia repair patients had undergone previous abdominal operations (1 right pararectal incision, 1 caesarian delivery), and 2 patients had a recurrent hernia. One case of bilateral pneumothorax with hemodynamic instability occurred during laparoscopic TEP hernia repair, which was converted to the Stoppa procedure. The pneumothorax was successfully treated by bilateral chest tube insertion. The last 3 patients with previous lower abdominal operations (2 radical prostatectomy, 1 midline incision) were converted to a Lichtenstein hernia repair, because the previous operation scars were dense, which could interfere with the midline incision in the Stoppa procedure. Perioperative data and reasons for conversion of these patients are presented in Table 1.

Seroma developed in 3 patients who underwent Stoppa procedures, urinary retention in 5, and testicular pain and swelling in 2; all resolved completely with conservative treatment. The mean operative time for unilateral hernia

repair with conversion was 74.45 ± 6.54 minutes, that for bilateral was 95.22 ± 4.34 minutes, and the mean hospital stay was 2.2 ± 1.1 days. The mean follow-up of the patients was 18 ± 1.8 months without recurrence.

DISCUSSION

The Stoppa procedure led to improvement in the laparoscopic TEP approach to preperitoneal placement tension-free mesh hernia repair in the early 1990s, because the procedure itself could now be exactly mimicked by laparoscopic means, and the mesh could be inserted in exactly the same plane for reinforcing the inguinal region, as described by Stoppa.²⁰ The laparoscopic TEP approach combines the benefit of the Stoppa procedure and minimally invasive surgery without injury to the peritoneal cavity.¹¹ In this context, the most important development in hernia repair surgery may be the laparoscopic TEP hernia procedure, which has lower recurrence and complication rates, a shorter hospital stay, a rapid return to normal activities, and more postoperative comfort than does open-repair and other laparoscopic techniques.²⁻¹⁰

Randomized trials undoubtedly support both surgeons and patients in making clinical decisions in favor of the laparoscopic TEP inguinal hernia repair procedure.^{2,7,8,10,14} Laparoscopic TEP inguinal hernia repair is, however, a challenge for surgeons, especially at the beginning of the learning curve, because of the unfamiliar posterior anatomical view of the inguinal wall anatomy and orientational technical difficulties of laparoscopy. These challenges may cause conversion and serious complications, such as major vascular injury, and bladder and bowel perforation.^{2,3,21} A problem unique to the TEP procedure is that technical difficulties can happen any time during dissection and reduction of the hernia sac, possibly resulting in conversion to open surgery. The conversion, a switch from the TEP repair operation to other techniques, can be defined as an intraoperative complication and leads to the need for longer administration of analgesics and postoperative hospital stay. This can be attributed largely to the technical difficulties of a narrow preperitoneal space and serious adhesions due to previous surgery.^{9,11-18} We believe that conversion is a difficult and serious situation for both surgeon and patient, because patients have great expectations for maximal cosmetic results with minimally invasive surgery, and the surgeon may be concerned that conversion to conventional open surgery may result in a disaster for patients, because of the need for a new incision. Under these conditions, choosing the best conversion approach and explaining the reason to patients is therefore a difficult problem for surgeons

Table 1.

Perioperative Data and Reasons for Conversion of These Patients

Parameters	Number and Percentage
Number of patients	26
Number of hernias	31
Mean age (years)	46 ± 8.9
Sex (woman/man)	1/25
Site of hernia	
-Right inguinal	15 (57.69%)
-Left inguinal	6 (23.08%)
-Bilateral inguinal	5 (19.23%)
Number of recurrent hernias	2 (7.69%)
Previous lower abdominal surgery	5 (19.23%)
- Right pararectal incision	1
-Caesarian delivery	1
-Radical prostatectomy	2
-Midline incision	1

during laparoscopic operations. Moreover, Inukai et al¹⁴ experienced these difficulties and reported that performing any conversion procedure can be extremely difficult during laparoscopic TEP hernia repair. For this reason, they suggested that excluding patients with a history of previous surgery would be a better way to prevent conversion, although some reviews have suggested that more than 30 cases are needed to achieve technical proficiency and to reduce the complication rate, in the experienced hand. Unfortunately, the conversion rate may reach 10.6%.^{9,11–19} Additionally, several studies and guideline reports, including a Cochrane review describing the technique of the TEP approach, reported their conversion rates; however, they had no clear data regarding the selected conversion types and did not offer an optimal method of conversion during laparoscopic TEP inguinal hernia repair.^{2,3,13,19,21,22} Most of them used TAPP and Lichtenstein for conversion procedures in their study and did not argue the reason for their choice.^{9,14–19,23–25} Lal et al¹¹ only suggested that converting to the unilateral Stoppa procedure during the TEP repair operation has improved the learning curve for TEP hernia repair and decreased the incidence of the initial conversion rate and complications in the last decade. We also preferred to use the Stoppa procedure when we required conversion during laparoscopic TEP repair in 28 of 282 hernia surgeries. In our opinion, the surgeon can identify and correct complications during the laparoscopic TEP hernia operation by the Stoppa procedure, which provides the advantage of open preperitoneal reinforcement of the inguinal region and avoidance of entering the peritoneal cavity, minimizing the risk of intraabdominal mesh adhesion formation. The Stoppa procedure can, thus, be used as an effective conversion during laparoscopic TEP hernia operations, especially in bilateral hernia cases with only middle incisional access, contrary to Lichtenstein.²⁶ However, in some patients who have had previous lower abdominal operations, such as a radical prostatectomy, neither laparoscopic TEP nor the Stoppa procedure may be useful. In our study, because 3 patients had had previous lower abdominal operations (2 radical prostatectomy, 1 midline incision) that caused dense adhesion, Lichtenstein hernia repair had to be performed when conversion was required during laparoscopic TEP hernia repair.

There are some limitations to this study. First, the number of patients in the conversion group was small. Second, there was no comparison with other conventional open techniques in the study. Further studies, including multicenter studies, may be useful to determine the effective conversion type in laparoscopic hernia repair. But, the

study was difficult to carry out, and no reported study has compared conversion types during laparoscopic hernia repair yet.

CONCLUSION

Use of the modified Stoppa procedure can be considered safe and effective when conversion is required due to technical difficulties during laparoscopic TEP hernia repair, and it provides the advantage of an open preperitoneal reinforcing inguinal region, especially in bilateral hernia cases that require conversion. Entering the peritoneal cavity can also be avoided by the Stoppa procedure, minimizing the risk of intraabdominal mesh adhesion formation. Conversion to the Lichtenstein procedure should be the first choice in cases of dense adhesions in the preperitoneal space, such as after previous lower abdominal operations and radical prostatectomy.

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