Int Surg 2015;**100:**1403–1407
DOI: 10.9738/INTSURG-D-15-00089.1

Single Surgeon Experience With Repair of Occult Inguinal Hernias Using the TAPP Approach: A Prospective Study

Fatih Ciftci

Vocational School of Health Services, Avcılar, Istanbul, Turkey

The trans-abdominal preperitoneal (TAPP) approach provides access to the contralateral groin for exploration and repair of occult hernias. Previous studies have shown that the total extraperitoneal (TEP) approach also provides access to the contralateral groin for inguinal hernia repair. The aim of the current study was to document the rate of contralateral occult inguinal hernias diagnosed during the TAPP procedure. Data from all cases of TAPP inguinal hernia repair in our hospital were recorded prospectively for 3 years. Follow-up appointments included physical examinations. A total of 302 patients underwent TAPP inguinal hernia repair. We excluded 3 patients from the study and 299 were included. A total of 204 (68%) patients were scheduled for unilateral hernia repair and contralateral occult hernias were detected in 44 (21%) patients in this group. Of the 74 patients scheduled for bilateral repair, 60 (81%) underwent bilateral repair. In the remaining 29 patients, the diagnosis was changed to unilateral hernia. In this group, unilateral hernia repair was planned along with the possibility of contralateral hernia in 18 (6%) patients. Of these patients, 5 (27%) were subsequently found to have contralateral defects, 1 of whom underwent femoral repair. Our clinical diagnoses were 78% accurate. Identifying the actual incidence of contralateral occult inguinal hernia will enhance the planning of the treatment preoperatively and favor resource allotment planning for utilization of the operating room. TAPP allows preoperative diagnosis and treatment of contralateral occult hernias, saving the patient from additional symptoms and reoperations.

Key words: Contralateral hernia – Laparoscopic hernia repair – TAPP – Occult hernia

Corresponding author: Fatih Ciftci, Assistant Professor, Basak mah. 2.etap D-35/24 34306, Basaksehir, Istanbul, Turkey. Tel.: +90 505 6164248; Fax: +90 212 462 70 56; E-mail: oprdrfatihciftci@gmail.com

Background

Laparoscopic inguinal hernia repair is one of the most common laparoscopic surgical operations in practice. In developed countries, only 15% to 20% of all hernias are repaired laparoscopically. However, this approach is now gaining more preference,[1,4] given its advantages over conventional open repair, including decreased postoperative pain and earlier return to work and normal daily activities.[2] With the trans-abdominal preperitoneal (TAPP) approach prior to dissection, there is a clear view of the defect (Fig. 1). Laparoscopic exploration is recognized for the successful intraoperative identification of occult hernias. Moreover, for repairs of recurrent hernias, the laparoscopic approach provides easy access to the defect and a good view of the peritoneal cavity, facilitating better placement of the mesh.[3] The approach also decreases the risk of injury to the spermatic cord if it is enclosed in scar tissue resulting from a previous open surgery. Bilateral repairs are performed through the same incisions used for unilateral repairs, reducing morbidity. Therefore, the National Institute for Health and Clinical Excellence (NICE) proposes laparoscopic repair as the first-line approach for unilateral hernias.[4]

Debate exists on the advantages and disadvantages of a total extraperitoneal (TEP) approach versus TAPP for laparoscopic hernia repair.[5] Some argue that because of the larger surgical field, TAPP should be the method of choice for patients who have large scrotal or recurrent hernias and have not previously undergone prostate or urinary bladder surgery. This study was performed in a center that performs TAPP repairs frequently.

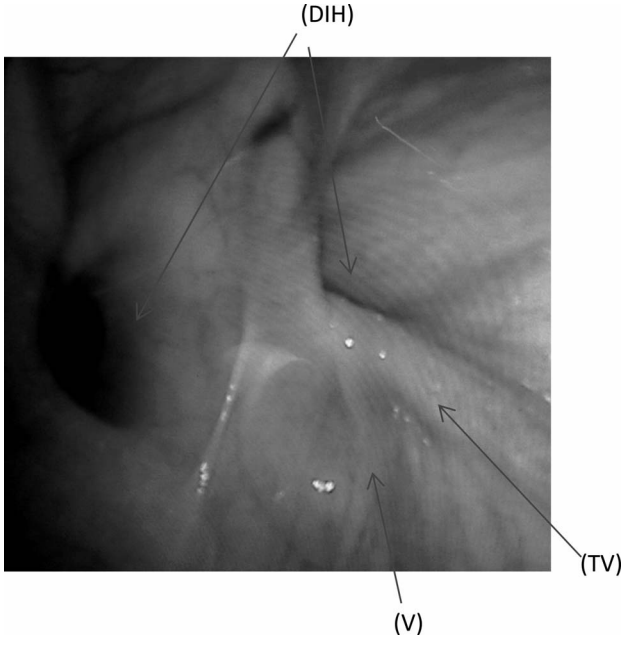

Fig. 1 Direct + indirect inguinal hernia, laparoscopic view. TV, testis vessels; V, vas deferens.

Laparoscopic hernia repair allows for the exploration of the contralateral groin to diagnose and repair an occult hernia. Most previous studies have focused more on the TEP method for diagnosing contralateral hernia defects.[6–8] However, some authors argue that the high rate of false-positive contralateral hernias is partially due to improper dissection during TEP repair[9,10]; the TAPP approach does not necessitate such dissection. This study evaluated the incidence of contralateral occult hernias found during laparoscopic herniorrhaphy with the TAPP approach.

Patients and Methods

A total of 302 patients who underwent TAPP repair between October 2010 and December 2013 were enrolled in the study. Three patients were removed from the study. In 2 of these patients, the scheduled procedures were not well defined. The other patient was only scheduled for diagnostic laparoscopy, but required a unilateral hernia repair. Therefore, 299 patients were included in the final analysis. All participants were aged >18 years with planned surgeries and had the ability to give informed consent. All surgical procedures were performed by the same surgeon. This prospective study included patients with only TAPP procedures. All laparoscopic hernia repair patients were contacted in person at postoperative weeks 1 and 8. Operation time was defined as the period between the first incision and final wound dressing (Table 1).

The male-to-female ratio was 9.5:1.0 and the mean age was 57 years. All operations were performed by the same laparoscopic general surgeon. The TAPP approach was used for all cases. In all patients, both sides of the groin were examined and any contralateral occult hernias were repaired. Patients who underwent procedures unrelated to the contralateral inguinal defect were classified as receiving unilateral repair (*e.g.*, spermatic cord lipoma excision; umbilical, paraumbilical, femoral, spigelian, or obturator hernia repair). Although stated in the operation notes, we did discriminate between direct and indirect hernias. Patients who were scheduled for bilateral repair (due to suspicion

Table 1 Operative and demographic findings of patients with inguinal hernia

	Unilateral hernia (n = 204)	Bilateral hernia (n = 74)	Unilateral ± bilateral hernia (n = 18)	Femoral hernia (n = 3)
Age, y (median, range)	57.9 ± 9.6 (18.91–90)	57.8 ± 11.1 (19.81–89)	55.8 ± 11.1 (19.81–89)	53.9 ± 7.6 (18.91–83)
Sex, F/M	189/15	67/7	14/4	2/1
Operative time, min	57.5 (24–114)	81.1 (40–142)	69.5 (23–109)	55.5 (27–111)

of a contralateral hernia) but had unilateral repair were classified in a different group.

Surgical Technique

The standard 3-portal technique was employed. To reach the intra-abdominal cavity, an initial supraumbilical port was inserted as in the modified Hasson technique. On both sides of the umbilical port, a 5-mm port was inserted at the same level. Pneumoperitoneum was established using carbon dioxide at 10 to 12 mmHg. A transverse incision was made into the peritoneum over the groin defect and a preperitoneal space was created by blunt dissection. When possible, the sac was completely reduced or resected (in rare cases). Care was taken to protect the vas deferens and vessels from injury in the male patients.

A polypropylene mesh of 15 × 15 cm was placed in the preperitoneal plane to ensure the medial edge of the mesh reached or overlapped the midline. It was also ensured that the mesh covered all hernia defects (direct, indirect, and femoral). A tachs instrument was used to fix the medial edge to avoid displacement of the mesh before fibrous fusion. Next, a continuous surgical suture (Vicryl; Ethicon, Inc, Somerville, North Carolina) and tacks were used to cover the peritoneum. The intra-abdominal gas was then evacuated. Routinely, a J-needle and prolene sutures (PDS 3-0; Ethicon, Inc) or subcuticular sutures (Vicryl Rapide; Ethicon, Inc) were used to suture the deep fascia of the umbilical wound to close the portal site.

Results

The study protocol was approved by the ethics committee before the onset of the study. Informed consent was obtained from all patients. The participants were guaranteed privacy. Statistical analyses were calculated using commercial software (SPSS, release 15.0 for Windows; SPSS, Inc, Chicago, Illinois).

A total of 204 (68 %) patients were scheduled for unilateral repair. In 44 (21%) of these patients, ultimately bilateral repair was performed, which implied a 22% rate of contralateral occult hernias in our population (Table 2). We booked 74 patients (24.7%) for bilateral repair and of these patients, 60 (81%) underwent bilateral repair. The remaining 14 patients underwent unilateral repair upon perioperative reassessment due to clinical suspicion. We booked 18 patients (6%) for unilateral bilateral hernia repair. Most (72%) of the 18 cases with preoperative clinical suspicion of a contralateral defect had unilateral repair. Generally, in our series, the clinical diagnosis was 78% accurate.

The overall mean operation time was 66.3 minutes (range: 24–142). The mean operation time for unilateral repairs was 57.5 minutes (range: 24–114), as opposed to 81.1 minutes (range: 40–142) for bilateral repairs. At least 1 other procedure was done in 28 (14%) of the unilateral cases and 18 (16%) of the bilateral cases. The other procedures performed included cord lipoma excision and various hernia type repairs (paraumbilical, umbilical, femoral, spigelian, obturator, incisional, epigastric hernias). In 1 patient, 7 types of hernia were detected, 6 of which were repaired during the operation. Intra-abdominal organ and vessel injuries did not occur. One patient in whom reduction could not be achieved was converted from laparoscopy to open surgery.

Discussion

Many studies concerning the diagnosis of contralateral inguinal hernias via the TEP method have been published.[7–9] A Cochrane review study from 2005 reported high rates of port-site hernias and internal organ injuries in association with TAPP repair, and at the same time reported a high rate of conversion to open surgery in association with TEP repair. However, data are lacking on the relative efficiencies of these techniques.[8,10] In this study, we showed that the TAPP procedure could be used to detect occult contralateral hernias. There are also advantages concerning the utilization of medical resources, such

Table 2 Operation schedules according to clinical findings, and operation results

Scheduled procedure (depending on clinical findings)	Number of cases, n (%)	Performed procedure, n (%, calculated as performed/scheduled ratio)		
		Unilateral	Bilateral	Femoral
Unilateral	204 (68%)	159 (77%)	44 (21%)	1 (<1%)
Bilateral	74 (24%)	14 (18%)	60 (81%)	0
Unilateral + bilateral	18 (6%)	13 (72%)	5 (27%)	0
Femoral	3 (1%)	1 (33%)	0 (0%)	2 (66%)
Total	299	187	109	3

as reducing the operation time and operation. For instance, if there are 4 unilateral hernia cases in a daily surgery list, it can be estimated that at least 1 of the cases will be bilateral and the utilization of the operating room can be adjusted accordingly.

In our study, we found that 22% of unilateral cases ultimately underwent bilateral repair, necessitating a second operation, increasing perioperative risks and treatment costs, and contributing to loss of manpower. The burden of a second operation cannot be overlooked, especially in patients with comorbidities such as cardiac and respiratory system disorders that may pose a high risk for anesthesia. The diagnosis and treatment of occult hernias helps to avoid complications such as incarceration and strangulation that may lead to increased morbidity and mortality. These findings are in agreement with those of Bochkharev and colleagues,[11] who found the rate of occult defects to be 22% in their series of TEP repair cases. Crawford and colleagues[9] used diagnostic laparoscopy and TEP to detect contralateral occult hernias in 50% of 73 patients. Soyad *et al*[7] also used TEP and found the rate of contralateral occult hernias to be 11.2%.

In all studies mentioned above, contralateral groin exploration was performed routinely and where necessary, hernias were repaired. Koehler[10] published a report that showed the rate of contralateral occult hernias to be 13% in a series of 100 patients. The author preferred employing transabdominal diagnostic laparoscopy together with TEP to avoid a second TEP dissection, a step that is unnecessary in the primary TAPP method.

The discrepancies in the reports of the clinical findings reflect the handicaps of our study. Some of the cases that were booked for bilateral repair may have had clinical suspicion for a contralateral defect. For this reason, such cases were classified as unilateral, bilateral repairs. However, our operation booking system includes an operation form completed by the surgeon at the time of clinical diagnosis. This decreases the risk. In rare cases (1%), before the operation, a USG or herniogram was used to confirm the clinical suspicion. The accuracy of our data was dependent on the accuracy of the operation notes and the epicrises. To reduce errors, generally the surgeons wrote the epicrises shortly after the operations. We chose not to discriminate between direct and indirect occult hernias. In their series of 100 patients, Bochkharev *et al*[11] reported that occult direct hernias were rare. Direct hernias are easily detected on physical examination.

Our study highlights the diversity of surgical evaluation, including the presence or absence of hernias and if present, whether they necessitate repair. Previous studies identified disparities between preoperative surgical examination findings and the actual presence of hernias.[12] These findings are 78% in line with our clinical positive predictive value.

Data that focus on diagnosis during laparoscopy by individual surgeons are rare, as are data concerning factors such as previous clinical experience, operation-room list pressure, the patient's symptoms, and occupation and perioperative risks (which may confound the results). Thumbe and Evans[13] provided evidence that supports routine treatment of occult hernias when found, depending on their finding that most untreated occult hernias would later become symptomatic. In their series of 21 patients, 28.6% of the cases developed apparent hernias over a 12-month follow-up period.[13–16] Hence, they reported that repair on time would be more reasonable. Because risks of anesthesia and reoperation could be prevented.

The general accuracy of the clinical diagnoses in our series was over 78%, and unilateral bilateral repair was scheduled in less than 7% of cases. Most (70%) of the 20 patients with suspicion for bilateral defect underwent a unilateral repair. These cases emphasize the advantage of the TAPP approach, which precludes a second dissection to reach the diagnosis.

Surgeons who have clinical suspicion for bilateral defects should perform bilateral repairs at lower frequencies. On the contrary, those with suspicion for a unilateral defect may perform a greater number of repairs. However, this is subjective and there is no definite consensus.

For the bilateral cases, the mean operation time was 66.3 minutes, and an average 81.1 minutes (range: 40–142). On the contrary, in the unilateral cases, the mean operation time was 57.5 minutes (range: 24–114). At least 1 other procedure was performed in 28 cases of unilateral repair and 18 cases of bilateral repair. These procedures included cord lipoma excision and other multiple hernia repairs. (In 1 case, 7 different types of hernia were diagnosed: right-sided femoral, indirect inguinal and spigelian, left sided direct and indirect inguinal, spigelian, and umbilical.) Most of these hernias were repaired during the operation, prolonging the surgical duration. Therefore, it is difficult to assess the effect of converting a unilateral to a bilateral repair on the surgical duration. We believe that because TAPP does not necessitate another dissection for a contralateral groin examination, the operation time is unaffected.

Conclusion

We reported a 22% rate of contralateral occult hernia. The TAPP approach allows preoperative diagnosis and treatment of contralateral occult hernias, saving the patient from additional symptoms and reoperations. This supports the results of other studies and advocates the advantages of the TAPP approach, such as visualization of anatomic landmarks.

Acknowledgments

The authors declare that they have no conflicts of interest.

References

1. Stoker DL, Spiegelhalter DJ, Singh R, Wellwood JM. Laparoscopic versus open inguinal hernia repair: randomised prospective trial. *Lancet* 1994;**343**(8908):1243–1245
2. Kingsnorth A, LeBlanc K. Hernias: inguinal and incisional. *Lancet* 2003;**362**(9395):1561–1571
3. Griffin KJ, Harris S, Tang TY, Skelton N, Reed JB, Harris AM. Incidence of contralateral occult inguinal hernia found at the time of laparoscopic trans-abdominal pre-peritoneal (TAPP) repair. *Hernia* 2010;**14**(4):345–349
4. NICE. Laparoscopic surgery for inguinal hernia repair. Available at: https://www.nice.org.uk/guidance/ta83. Accessed May 25, 2016
5. Rath A, Bhatia P, Kalhan S, John S, Khetan M, Bindal V *et al*. Endoscopic TEP inguinal hernia repair in the management of occult obturator and femoral hernias. *Surg Laparosc Endosc Percutan Tech* 2014;**24**(4):375–377
6. van den Heuvel B, Beudeker N, van den Broek J, Bogte A, Dwars BJ. The incidence and natural course of occult inguinal hernias during TAPP repair: repair is beneficial. *Surg Endosc* 2013;**27**(11):4142–4126
7. Sayad P, Abdo Z, Cacchione R, Ferzli G. Incidence of incipient contralateral hernia during laparoscopic hernia repair. *Surg Endosc* 2000;**14**(6):543–545
8. Ward ST, Carter JV, Robertson CS. Herniography influences the management of patients with suspected occult herniae and patient factors can predict outcome. *Hernia* 2011;**15**(5):547–551
9. Crawford DL, Hiatt JR, Phillips EH. Laparoscopy identifies unexpected groin hernias. *Am Surg* 1998;**64**(10):976–978
10. Koehler RH. Diagnosing the occult contralateral inguinal hernia. *Surg Endosc* 2002;**16**(3):512–520
11. Bochkharev V, Ringley C, Vitamvas M, Oleynikov D. Bilateral laparoscopic inguinal hernia repair in patients with occult contralateral defects. *Surg Endosc* 2007;**21**(5):734–736
12. Bátorfi J. The treatment of inguinofemoral hernias with laparoscopic herniorraphy. Our experience of 1210 transabdominal preperitoneal (TAPP) reconstructions]. *Magy Seb* 2005;**58**(6):385–397
13. Thumbe VK, Evans DS. To repair or not to repair incidental defects found on laparoscopic repair groin hernia: early results of randomised control trial. *Surg Endosc* 2001;**15**(1):47–49
14. McCormack K, Wake B, Perez J, Fraser C, Cook J, McIntosh E *et al*. Laparoscopic surgery for inguinal hernia repair: systematic review of effectiveness and economic evaluation. *Health Technol Assess* 2005;**9**(14):1–203
15. Moldovanu R, Pavy G. Laparoscopic transabdominal preperitoneal (TAPP) procedure - step-by-step tips and tricks. *Chirurgia (Bucur)* 2014;**109**(3):407–415
16. Robinson A, Light D, Kasim A, Nice C. A systematic review and meta-analysis of the role of radiology in the diagnosis of occult inguinal hernia. *Surg Endosc* 2013;**27**(1):11–18