

## Transabdominal preperitoneal repair for obturator hernia

A short running head: TAPP for obturator hernia

Takahide Yokoyama MD<sup>1), 2)</sup>, Akira Kobayashi MD, PhD<sup>1)</sup>, Toshiki Kikuchi MD, PhD<sup>2)</sup>, Ken Hayashi MD<sup>2)</sup>, Shinichi Miyagawa MD, PhD<sup>1)</sup>

1) First Department of Surgery, Shinshu University School of Medicine, Matsumoto, Japan.

2) Department of Surgery, Showa-inan General Hospital, Komagane, Japan

Address for correspondence: Akira Kobayashi M.D.

First Department of Surgery, Shinshu University School of Medicine,

3-1-1 Asahi, Matsumoto, Nagano 390-8621, Japan.

Tel: +81-263-37-2654, Fax: +81-263-35-1282

e-mail: [kbys@shinshu-u.ac.jp](mailto:kbys@shinshu-u.ac.jp)

Authors Takahide Yokoyama, Akira Kobayashi, Toshiki Kikuchi, Ken Hayashi, and Shinichi Miyagawa have no conflicts of interest or financial ties to disclose.

## ABSTRACT

**Background:** Laparoscopic surgical approach for obturator hernia (OH) repair is uncommon. The aim of this study was to assess the effectiveness of laparoscopic transabdominal preperitoneal (TAPP) repair for OH.

**Methods:** From 2001 to May 2010, 659 patients with inguinal hernia underwent TAPP repair at in our institutes. Among these, the 8 patients with OH were the subjects of this study.

**Results:** Three of the eight patients were diagnosed as having occult OH, while the others were diagnosed preoperatively, by ultrasonography and/or computed tomography, as having strangulated OH. Bilateral OH was found in 5 patients (63%), and combined groin hernias, either unilaterally or bilaterally, were observed in 7 patients (88%), all of whom had femoral hernia. Of the 5 patients with bowel obstruction at presentation, 4 were determined not to require resection after assessment of the intestinal viability by laparoscopy. There was one case of conversion to a two-stage hernia repair performed to avoid mesh contamination: addition of mini-laparotomy, followed by extraction of the gangrenous intestine for resection and anastmosis with simple peritoneal closure of the hernia defect in the first stage, and a Kugel hernia repair in the second stage. There was no case of postoperative morbidity, mortality, or recurrence.

**Conclusions:** Considering that it allows assessment of not only the entire groin area bilaterally, but also assessment simultaneously of the viability of the incarcerated intestine with a minimum abdominal wall defect, we believe that TAPP is adequate for the treatment of both occult and acutely incarcerated OH. Two-stage hernia repair is technically feasible in patients requiring resection of the incarcerated intestine.

Key words: obturator hernia, transabdominal preperitoneal repair, two-stage hernia repair

## **Introduction**

Obturator hernia (OH) is a relatively rare type of hernia, accounting for 0.05% to 2.2% of all hernias [1-3]. Because of its ambiguous clinical features, preoperative diagnosis is difficult [3], and the consequent treatment delay may result in a high rate of morbidity and mortality [4-6]. Although the role of laparoscopy is well established in the treatment of groin hernias [7-9], its usefulness in the treatment of OH still remains unclear, because results of laparoscopic surgery for OH have been reported only sporadically, or only in the context of an entire cohort of patients undergoing herniorrhaphy [10-14].

We have performed 659 transabdominal preperitoneal laparoscopic herniorrhaphies (TAPPs) since 2001, and 8 of the patients were diagnosed as having OH. The current study was aimed at evaluating the efficacy of TAPP for the repair of OH.

## Materials and Methods

From 2001 to May 2010, 659 patients with inguinal hernia underwent TAPP at the Department of surgery, Showa-inan General Hospital (2001-2006) and the First Department of Surgery, Shinshu University School of Medicine (2007-2010). We consider TAPP as the procedure of choice for groin hernias, even in emergency situations, unless the patient is unfit for general anesthesia, or has undergone previous extensive pelvic surgery. One experienced laparoscopic hernia surgeon (T.Y) performed all the preoperative evaluations and subsequent operations. Among these, 8 patients were diagnosed as having OH, accounting for 1.2% of all the operated patients and 24% of the female patients aged 80 years or over. All the patients were elderly emaciated women with a median age of 85 years (range, 82 to 90) and a median body weight of 36 kg (range, 30 to 47). The clinical features at presentation were as follows: intestinal obstruction in 5 patients (63%), positive Howship-Romberg sign in 2 patients (25%), and a history of previous attacks in 4 patients (50%). The patient characteristics are shown in Table 1.

### Surgical techniques

The TAPP repair technique for OH is not different from that for groin hernia repair. Using a standard three-port technique, a peritoneal incision is made at a point on the internal ring. The obturator space is exposed by sweeping away the preperitoneal fat overlying the Cooper's ligament, which allows visualization of the obturator artery and vein leading to the obturator foramen along with the obturator nerve. The hernial sac is grasped and pulled back. Two pieces of polypropylene flat mesh are placed extraperitoneally: one measuring 7.5 x 7.6 cm in size for securing the obturator foramen, and the other measuring 8.5 x 13.7cm in size for all potential groin hernia sites. The former is stapled to Cooper's ligament, and the latter is fixed to Cooper's ligament, the rectus sheath medially, and the anterior abdominal wall laterally.

Incarcerated small bowel, if present, is reduced by gentle traction, using a pair of non-traumatic forceps. Subsequently, bowel viability is confirmed by careful laparoscopic observation. In case of bowel gangrene, a two-stage hernia repair is performed, to avoid mesh contamination. In

the first stage, the hernia defects are repaired by simple peritoneal closure without mesh placement. Mini-laparotomy is added, followed by extraction of the non-viable intestinal loop for resection and anastomosis. After the inflammatory reaction has subsided, usually several weeks later, a Kugel hernia repair is performed, in the manner described elsewhere, as the second-stage operation[15].

#### Definition of occult hernia

Occult inguinal hernia is defined as intraoperative laparoscopic finding of significant peritoneal protrusion at the site of the hernia orifice, which is not diagnosed preoperatively [16].

## Results

Three of the eight patients were diagnosed as having occult OH, with the preoperative diagnosis of femoral hernia in two patients and bilateral inguinal hernia in one patient. In the remaining 5 patients, a preoperative diagnosis of strangulated OH was made by ultrasonography (US) and/or computed tomography (CT), and emergency operation was undertaken within 1 hour of the establishment of the diagnosis in all cases.

Five patients (63%) had bilateral OH and 7 patients (88%) showed combined groin hernias, either unilaterally or bilaterally, and all had femoral hernia. In the 5 patients with intestinal obstruction at presentation, two were diagnosed as having incarcerated small intestine, which could be easily reduced by gentle traction without a releasing incision, while the remaining cases were free from incarceration, and reduced spontaneously during the surgery or even before. Upon assessment of the intestinal viability, one patient was found to require gangrenous bowel resection, and a two-stage hernia repair was undertaken to avoid mesh contamination. The median operative time and total hospital stay were 119 minutes (range, 73 to 198) and 10 days (range, 3 to 23), respectively. No morbidity or mortality was noted postoperatively. No case of recurrence was observed after a median follow-up time of 33 months. The surgical findings and postoperative outcomes are shown in Table 1.

## Discussion

One of the most striking features of the present study was that two-thirds of the patients had bilateral OH, which is in clear contrast to the findings of a previous study reporting a bilateral hernia rate of 6% [17]. In addition, 7 out of the 8 patients (88%) had combined groin hernias either unilaterally or bilaterally, and all had a femoral hernia. The most likely explanation for the results is the diagnostic advantage of laparoscopy, which allows inspection of both the myopectineal orifices and the obturator foramina bilaterally. Indeed, previous studies have shown that laparoscopic assessment reveals a high incidence of bilateral inguinal defects during hernia repair [18-21]. Considering these results, scrutiny of the entire groin area bilaterally is indispensable for patients diagnosed as having OH or those with inguinal hernia who have predisposing factors for OH, such as advanced age, nutritional wasting, and women [1, 6]. In this respect, TAPP is beneficial for the treatment of OH, because it allows simultaneous assessment and repair of occult hernias [16].

Since intestinal obstruction and necrosis are the most common presentations of OH [22], it is vital to assess the viability of the incarcerated intestine, if present, during surgery. Traditionally, laparotomy has been the only way to assess the viability of incarcerated organs [23]. TAPP has been considered to be contraindicated in cases with suspected visceral ischemia requiring emergency operation [24], however, with advances in laparoscopic techniques, several studies have shown the feasibility of TAPP for the management of incarcerated hernias [25-28]. One of the advantages of TAPP is that it allows evaluation of the viability of the incarcerated organs. According to Lavonius et al., the value of laparoscopy in this respect is similar to that of laparotomy [23]. In the present study, incarcerated small intestine was observed in two out of the 5 patients with intestinal obstruction at presentation, and one of these patients required resection of the gangrenous intestine. The uneventful postoperative courses of these patients may lend support to the accuracy of assessment of the bowel viability using a laparoscopic approach.

Although two types of laparoscopic approaches are available at present, previous studies have shown that TAPP has advantages over the totally extraperitoneal (TEP) approach, both in

terms of handling of the incarcerated organs and making a judgment of the viability. Felix et al. analyzed the data of 1,115 laparoscopic hernioplasties conducted by them, and showed that it is easier to handle incarcerated hernias by TAPP than by TEP [29]. In addition, even surgeons who prefer the TEP approach for hernia repair preferentially perform diagnostic laparoscopy in patients with suspected incarcerated or strangulated hernia [18, 30, 31].

Various procedures for closure of OH defects have been described [32], including simple peritoneal closure, local flaps using periosteum, bladder, or uterine ligament, and permanent prosthesis. Previous studies have suggested that peritoneal closure alone can be associated with hernia recurrence [33, 34], and placement of a three-dimensional plug [35] may increase the risk of aggravation of obturator neuralgia [36], because the device shrinks and converts into a rigid prosthetic tumor [37]. To this end, Bergstein et al. recommended the use of a synthetic mesh for OH repair, because it overcomes the lack of suitable local tissue and can encompass multiple defects [36]. We use two pieces of mesh to cover the obturator foramen and all potential groin hernia sites, separately, because this is easier to perform by the TAPP approach and the meshes fit over each area quite well. No recurrence was observed in any of our cases over a median follow-up period of 33 months.

In the presence of necrotic bowel after the reduction of the incarcerated intestine, which would necessitate resection of the affected segment and anastomosis, prosthesis placement at the time of the surgery may carry an increased risk of infection, even though these steps would be performed after closure of the parietal peritoneum. As we have described in the present report, we perform two-stage hernia repair in cases of bowel gangrene, to avoid mesh contamination. In the first stage, after repairing the hernia defects by simple peritoneal closure, mini-laparotomy is added, followed by extraction of the non-viable intestinal loop for resection and anastomosis. After the inflammatory reaction has subsided, usually several weeks later, a Kugel hernia repair is performed, in the manner described elsewhere [15], as the second-stage operation. This is the first report of two-stage hernia repair for patients with incarcerated OH.

Previous studies have shown a high mortality rate of about 30% in patients with OH [1, 38], which may be attributable, at least in part, to the delay in presentation, establishment of a correct diagnosis and proceeding with the surgical treatment. In the present study, we performed TAPP for all the 8 patients with zero morbidity and mortality, in spite of the fact that 5 of the patients were diagnosed as having incarcerated OH, and one required gangrenous bowel resection. The most likely explanation is that the delay in presentation was minimal, at the most one day, in the patients diagnosed as having incarcerated OH. In addition, early diagnosis using US and/or CT, which are regarded as the standard diagnostic modalities for OH [5, 39, 40], may have contributed to the favorable results.

Although vulnerable tissues associated with old age generally pose difficulties for the surgeon, we had no intraoperative problems, for example in handling the peritoneum, in the present series. Separation of the cord structures from the adjacent peritoneum and recognition of the correct dissection plane were rather easier than expected, presumably because of the lower degree of fat deposition.

While reduced length of stay, in general, is one of the advantages of laparoscopic surgery over conventional open surgery, this study showed a rather long duration of hospitalization of the patients despite the uneventful postoperative recovery. The result can be explained by the features of the Japanese health care system.

The limitations of the present study include its retrospective nature and the small number of patients. Despite these, this study is unique, because it showed a high incidence of bilateral OH, the short- and long-term outcomes of TAPP, and the feasibility of two-stage repair in patient requiring resection of incarcerated intestine.

Considering that it allows assessment of not only the entire groin area bilaterally, but also assessment simultaneously of the viability of the incarcerated intestine with a minimum abdominal wall defect, we believe that TAPP is adequate for the treatment of both occult and acutely incarcerated OH. Two-stage hernia repair is technically feasible in patients requiring resection of

the incarcerated intestine.

Figure legend.

Fig. 1. Endoscopic view of the obturator hernia (OH). A The left-sided OH after the peritoneum was incised (patient no. 5). Arrow and arrowhead indicate the obturator vessels and nerve, and the hernia orifice of the OH, respectively; B The right-sided OH (arrow) in the same patient as that represented in A; C The left-sided OH (arrowhead) and the femoral hernia (arrow) in patient no. 7.

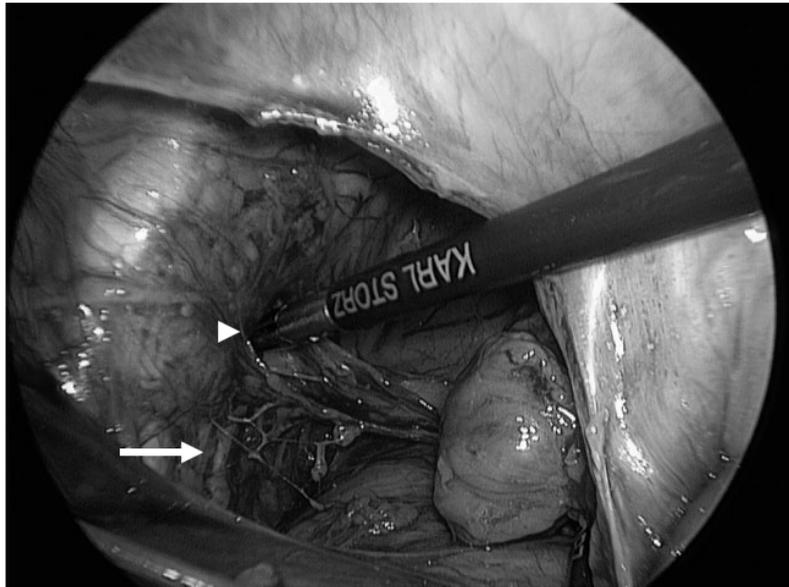


Fig. 1. A



Fig. 1. B

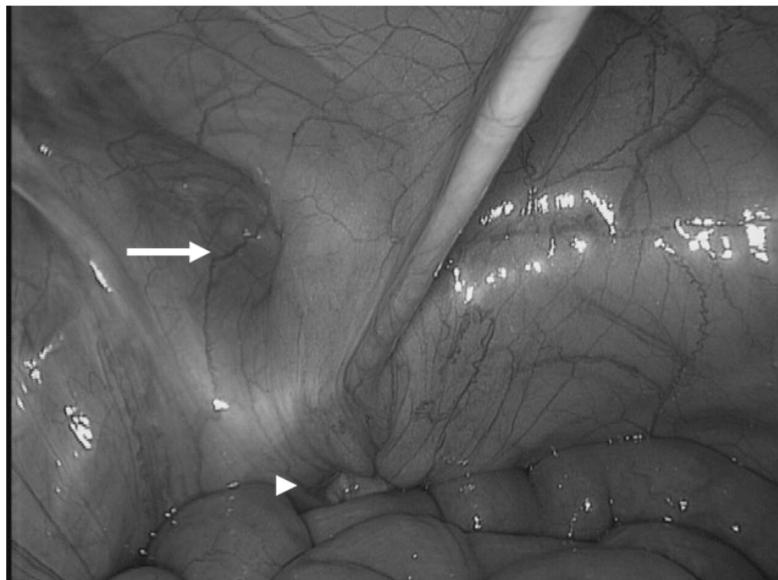


Fig. 1. C

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Table 1: Characteristics, surgical findings, and postoperative outcomes of the patients in this series

|                                   | Patients with incarcerated obturator hernia |                |         |                |                |
|-----------------------------------|---|----------------|---------|----------------|----------------|
|                                   | 1   | 2              | 3       | 4              | 5              |
| Age (year)/Gender                 | 85/F  | 84/F           | 86/F    | 90/F           | 82/F           |
| Hight (cm)/Body weight (kg)       | 140/36                                      | 139/20         | 145/35  | 139/37         | 155/40         |
| Intestinal obstruction            | +   | +              | +       | +              | +              |
| Howship-Romberg sign              | +   | -              | +       | -              | -              |
| Previous attacks/ Palpable mass   | +/-   | +/-            | +/-     | +/-            | -/-            |
| Duration of symptoms (days)       | 0   | 0              | 1       | 0              | 0              |
| Side of obturator hernia          | R   | Bi             | Bi      | R              | Bi             |
| Side of incarceration             | R   | R              | L       | R              | L              |
| Type of incarceration             | Richter                                     | - <sup>a</sup> | Richter | - <sup>a</sup> | - <sup>a</sup> |
| Combined groin hernias            | RF, RD                                      | LF             | LF      | RF             | -              |
| Gut resection                     | Yes   | No             | No      | No             | No             |
| Operative method                  | Two-stage                                   | TAPP           | TAPP    | TAPP           | TAPP           |
| Operative time (minutes)          | 118+32 <sup>b</sup>                         | 119            | 114     | 73             | 105            |
| Total hospital stay (days)        | 23  | 15             | 19      | 9              | 10             |
| Follow-up period (months)/Outcome | 58/A  | 58/A           | 47/A    | 23/A           | 17/A           |

<sup>a</sup> Incarcerated organs were spontaneously reduced during surgery or before

<sup>b</sup> The operative times for the first- and second-stage operation were 118 and 32 minutes, respectively

*F* female, *R* right, *Bi* bilateral, *L* left, *F* femoral hernia, *D* direct hernia, *I* indirect hernia, *A* alive

Table 1: Continued

|                                   | Patients with occult obturator hernia |        |             |
|-----------------------------------|---------------------------------------|--------|-------------|
|                                   | 6                                     | 7      | 8           |
| Age (year)/Gender                 | 83/F                                  | 87/F   | 84/F        |
| Hight (cm)/Body weight (kg)       | 144/47                                | 150/31 | 139/41      |
| Intestinal obstruction            | -                                     | -      | -           |
| Howship-Romberg sign              | -                                     | -      | -           |
| Previous attacks/ Palpable mass   | -/-                                   | -/-    | -/-         |
| Duration of symptoms (days)       | -                                     | -      | -           |
| Side of obturator hernia          | Bi                                    | L      | Bi          |
| Side of incarceration             | -                                     | -      | -           |
| Type of incarceration             | -                                     | -      | -           |
| Combined groin hernias            | BiL, RF, LD                           | BiF    | BiF, RI, RD |
| Gut resection                     | No                                    | No     | No          |
| Operative method                  | TAPP                                  | TAPP   | TAPP        |
| Operative time (minutes)          | 132                                   | 140    | 198         |
| Total hospital stay (days)        | 7                                     | 3      | 3           |
| Follow-up period (months)/Outcome | 52/A                                  | 7/A    | 2/A         |