New Method of Laparoscopic Incisional Hernia Repair with Double Circumferential Transfascial Sutures

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Background: Although, laparoscopic incisional hernia repair (LIHR) provides an alternative method for managing incisional hernias, the ideal procedure for reducing the incidence of postoperative complications remains unclear.
Patients and Methods: We have developed a new method of LIHR that involves a double transfascial suture and does not require the use of spiral tackers. We performed this procedure consecutively in five patients (four males and one female with a mean age of 65.6 years). We describe our new method of LIHR, and present preliminary clinical results.
Results: The mean defect size was 26.2 ± 15.8 cm², and the mesh size that was used was 121.7 cm² in all cases. An occult hernia was found in one patient during laparoscopic observation. The mean operative time was 198.4 ± 49.3 minutes with a blood loss of 12.2 ± 24.6 mL. Postoperative courses were uneventful with a median postoperative hospitalization period of 8 days. No patient required mesh removal and none developed a recurrent hernia during the median follow-up period of 13 months.
Conclusion: Although, larger number of patients and longer follow-up will be required to prove the operative adequacy of our new procedure, it appears to represent a feasible option for LIHR.

Key words: laparoscopy, ventral hernia, prosthetic mesh, suture

INTRODUCTION

Since 1993 when LeBlanc and Booth [1] first described the laparoscopic incisional hernia repair (LIHR) by intraperitoneal insertion of a mesh without closure of the fascial gap, increasing numbers of reports have confirmed that the procedure can be successfully applied and has low rates of complication and recurrence [2–11]. With the advent of bioprosthetic materials and their related surgical techniques, the laparoscopic approach is an established technique that offers an alternative means of managing incisional hernia, and it continues to gain acceptance among general surgeons [12]. However, in the absence of a defined standard technique, it is difficult to compare the results of the open and the laparoscopic incisional hernia repair techniques [13]. We describe a new method for securing the composite mesh in a LIHR that is intended to reduce postoperative pain resulting partly from transfascial suture, and does not require the use of spiral tackers.

PATIENTS AND METHODS

Between November 2007 and March 2008, we performed LIHR in five consecutive patients at the Tokai University Tokyo Hospital. Patient demographic data and intraoperative and postoperative data were collected. We describe in detail our new method of LIHR with double circumferential transfascial sutures, and we present our preliminary clinical results. Data are expressed as mean ± SD (for an even distribution) together with ranges where appropriate.

OPERATIVE PROCEDURE

With the patient in a supine position and legs apart, a first trocar was introduced by the Hasson Technique, usually at a position lateral to or below the hernia defect, away from scar tissue or sites of previous surgery. Laparoscopic adhesiolysis was performed by using a flexible videoscope and sharp dissection was performed by adding two more trocars (5 mm and 12 mm) in positions bilateral to the first trocar (Fig. 1). During adhesiolysis with sharp dissection, any serosal defects were marked with Piocutanin, and the lesions were delivered one by one, maintaining pneumoperitoneum, through the 12-mm port site for extraperitoneal repair; we named this procedure the “incarceration technique” (Fig. 2). After completion of adhesiolysis, the hernia contents were reduced, and the size of the hernia hilum was measured under the laparoscope. An inspection for the presence of an occult hernia was also conducted. The size of the composite mesh (Bard Composix Mesh, E/X Type, CR Bard, Inc.) was selected by taking into consideration the need for the mesh to overlap the intact abdominal wall by at least 3 cm. First, we inserted four stitches with 0-Surgilon

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Fig. 1 Placement of trocars for laparoscopic incisional hernia repair
The rolled mesh was inserted through a 12-mm port.

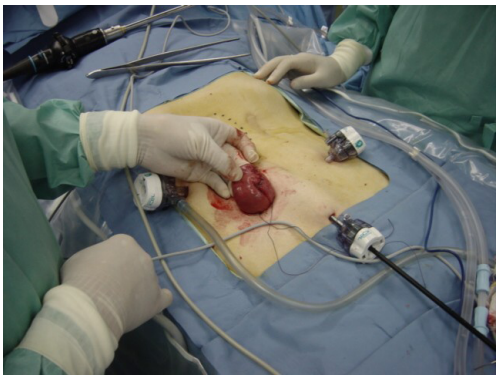

Fig. 2 The "incarceration technique"
Any serosal defect created during adhesiolysis was repaired extraperitoneally by delivering the lesion through a 12-mm port site maintaining a pneumoperitoneum.

Fig. 3 Four stitches corresponding to the cardinal points of the hernia defect were taken outside by using an EndoClose™.

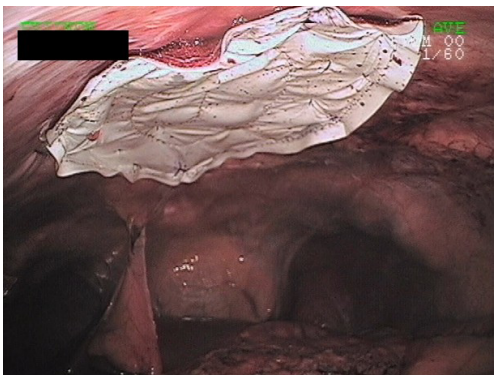

Fig. 4 A: Anchoring the mesh by the circumferential transfascial sutures using 2-0 nylon with a straight needle.
B: Laparoscopic view of the completed procedure

on the polypropylene side of the mesh at positions corresponding to the cardinal points of the border of the hernia. Then, the mesh was rolled and introduced into the abdominal cavity through the 12-mm port (Fig. 1). The mesh was unrolled intraperitoneally with the expanded polytetrafluoroethylene (ePTFE) side toward the abdominal cavity. It was then positioned correctly and the four stitches were withdrawn to the outside through a 3-mm skin wound by passing EndoClose™ (Covidien), and they were tied subcutaneously (Fig. 3). Circumferential transfascial sutures of 2−0 nylon were placed at 1-inch intervals through 3-mm skin wounds (Fig. 4); a straight needle with thread was introduced through the wound into the abdominal cavity. The needle was then taken outside with guidance from an 18G needle stabbed 1 cm away from the point where the straight needle was introduced. In this way, inner circumferential transfascial sutures were placed between the outer sutures. The 12-mm-diameter trocar sites required transfascial closure. The small skin incisions were approximated by using small strips of sterile adhesive tape, and a sterile dressing was applied. No drain was placed.

RESULTS

Five consecutive patients (four males and one female, with a mean age of 65.6 ± 11.1 years) were treated by LIHR using three ports with the composite mesh anchored by transfascial sutures. The hernia was located at the midline in four of the patients and in the left lower quadrant in the other. The patients' previous surgical history included cholecystectomy in one case, gastrectomy in two cases, and colectomy in two cases. Three of the patients showed recurrent hernias. All previous surgery for incisional hernias had been conducted by the direct suture method and had been performed one to three times. The mean defect size was 26.2 ± 15.8 cm^2 (range 3.1 to 42.4 cm^2), and the mesh size used was 121.7 cm^2 in all cases. An occult hernia was found in one patient during laparoscopic observation. There were no conversions to open repair, and no enterotomies were created during adhesiolysis. The mean operative time was 198.4 ± 49.3 minutes (range 122 to 244 minutes) with a blood loss of 12.2 ± 24.6 mL (range 0 to 56 mL); concomitant procedures were performed in four patients, and included four instances of adhesiolysis and one instance of serosal defect repair of the small intestine. Postoperative courses were uneventful with median postoperative lengths of hospitalization of 8 days. The median follow-up period was 13 months (range 12 to 16). Although seromas developed in two patients, these resolved spontaneously without aspiration. No patient required mesh removal and none developed a recurrent hernia during the follow-up.

DISCUSSION

In general, the procedure for laparoscopic incisional hernia repair (LIHR) consists of four steps: appropriate port placement, adhesiolysis, intraperitoneal measurement of the hernia size, and anchoring of the mesh. The first trocar should be placed away from scars and sites of previous surgery to prevent intraoperative bowel injury as well as to enable easy access to adhesiolysis. If serosal defects or enterostomies were created, they were repaired extraperitoneally through the 12-mm port site by the "incarceration technique". The incidence of intraoperative bowel injuries has been reported to be as high as 3.5% [5, 7, 14], and these could be caused by sharp dissection during adhesiolysis. Our original technique should prevent such defects, which could otherwise lead to serious complications. Intraperitoneal assessment of the hernia defect is important, because extraperitoneal measurement of the defect sometimes underestimates its actual size and the technique cannot detect occult hernias [15], such as Swiss-cheese-type defects, which were found in one case in our series. The laparoscopic procedure may contribute to reducing the incidence of recurrent hernias caused by such occult hernias.

The composite mesh was placed intraperitoneally, overlapping the defect by at least 3 cm, as recommended by many investigators [1, 6, 14, 16]. This approach eliminates the extensive soft-tissue dissection that is usually required for the open approach. In addition, the small surgical wounds are thought to result in less pain, decreased incidence of wound complications, and reduced lengths of hospitalization, resulting in early recovery of normal activity [4, 17–19]. It is necessary to use a few transabdominal nonabsorbable sutures for mesh fixation to secure the patch while awaiting complete tissue incorporation (approximately 3 to 4 weeks) [20]. We placed four stitches, one at each cardinal point, by using 0-Surgilon; these were passed by EndoClose™ and were followed by circumferential outer and inner transfascial sutures using 2–0 nylon. To avoid damage to the mesh and to reduce postoperative pain, we used a straight needle with a thread for concentric sutures. At present, many investigators use spiral tackers to reinforce mesh fixation. The use of tackers may contribute to the formation of adhesions [21] or small bowel perforations [22], and may hamper future radiological examinations. For mesh fixation, we used 2–0 nylon with a straight needle in two concentric sutures, thus we avoided the use of tackers. Recently, Jagad [23] reported a method for fixation of the mesh with continuous sutures without using tackers. The ideal procedure for mesh fixation is currently not known.

Postoperative pain was minimal in all patients without the use of additional analgesia. According to two prospective randomized controlled trials [8, 9] there is no significant difference in postoperative pain levels between the laparoscopic procedure and the open procedure. Persistent pain has been reported to occur at sites of transfascial sutures [5, 24]. We used 2–0 nylon to reduce tension, which may be a cause of persistent pain from transfascial sutures.

Postoperative seromas occurred infrequently, with an incidence of approximately 2% [5, 10]. However, they should not be aspirated because aspiration increases the risk of infection and does not hasten resolution. Furthermore, a seroma should not be classified as a complication unless it is symptomatic or does not self-resolve within a postoperative period of 4 to 6 weeks [18]. Wound infections are exceedingly rare, and only few patients in the series required subsequent mesh removal [5–7, 10]. In our procedure, seromas subsided spontaneously without aspiration, and no wound complication developed. A number of trials [3, 5–7] have reported low recurrence rates (2.9–7.5%) for the laparoscopic approach; however, the true incidence of recurrence will not become apparent until the results of long-term follow-up studies become available.

In conclusion, we have developed a new method of LIHR that is designed to prevent intraoperative bowel injury, to reduce postoperative pain, and to anchor the mesh securely until it is incorporated into tissue. Although, a longer follow-up will be required to prove the operative adequacy of our new procedure, it represents a feasible option for LIHR.

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