Transabdominal Preperitoneal Repair for Acquired Abdominal Intercostal Hernia

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Abstract

Among abdominal wall hernias, herniation into the intercostal space is unique and rare. Such hernias are divided into abdominal intercostal hernias and transdiaphragmatic intercostal hernias according to the presence of a diaphragmatic defect. Such hernias are usually caused by incision or blunt trauma. The duration of development varies; in some cases, the hernia gradually develops for months or years. We herein report an acquired abdominal intercostal hernia (AAIH) that developed sub-acutely after blunt trauma.

A 47-year-old man developed a soft abdominal swelling in the right lower chest region 1 year after a traffic accident. He had undergone laparoscopic cholecystectomy 5 years before. In the accident, he had sustained a fracture of the right radius head. He had no thoracic or abdominal symptoms at the time of the accident. A nonpainful right lower chest swelling developed 11 months after the accident, and he consulted with our hospital. The swelling was located apart from the laparoscopic cholecystectomy scar. His height, weight, and body mass index were 185 cm, 107 kg and 31.3 kg/m², respectively. A computed tomography scan of the thorax and abdomen revealed an abdominal intercostal hernia at the 10th intercostal space, mimicking a right upper lumbar hernia. The hernia was covered by the latissimus dorsi and was difficult to define by physical examination.

Under diagnosis of an AAIH with no diaphragmatic defect or rib fractures, the patient was treated by laparoscopic hernioplasty using three ports. He was placed in the semi-left lateral position, and open laparoscopy was performed with subumbilical entry. No adhesion was found around the hernia in the abdominal cavity, and the hernia orifice measured 5 × 4 cm. Transabdominal preperitoneal (TAPP) repair was performed using omega-3 fatty acid-coated mesh. The prosthesis was trimmed to 12 × 10 cm and fixed to the orifice. The edge of the orifice was sutured by two 2-0 Prolene threads. Finally, the prosthesis was covered over the 10th and 11th ribs and fixed with absorbable tackers. The patient was discharged 2 days postoperatively. He had developed no recurrence 6 years later.

AAIHs tend to recur because of continuous stress by respiratory movements. In this study, an AAIH that developed after blunt trauma was treated by TAPP repair. This procedure allows for confirmation of the hernia orifice, coverage by the prosthesis, and firm suture fixation.

Keywords: Acquired Abdominal Intercostal Hernia; Transabdominal Preperitoneal Repair; Laparoscopic Surgery
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Abbreviation

AAIH: Acquired Abdominal Intercostal Hernia

Introduction

Among abdominal wall hernias, herniation into the intercostal space is unique and rare [1]. Such hernias were recently divided into two types according to the presence of a diaphragmatic defect: abdominal intercostal hernias and transdiaphragmatic intercostal hernias [2,3]. Both hernias are almost identical except for the existence of a diaphragmatic defect; they have a similar etiology and identical symptoms [4]. Excluding congenital hernias, these hernias are caused by incision or blunt trauma. Abdominal intercostal hernias are caused by surgical wounds or stabbing, and transdiaphragmatic intercostal hernias are mainly caused by traffic accidents [5-7], falls [8] or coughing [9]. The duration of development varies, and some hernias gradually develop for months or years [4]. Hernias that gradually develop without apparent trauma have been termed “spontaneous” hernias [10].

Computed tomography is a useful modality to diagnose these hernias and to define the presence of diaphragmatic defects and any rib fractures [4]. Various procedures for repair of these intercostal hernias have been described because the types of defects differ and most reports describe sporadic cases.

In this study, we report an acquired abdominal intercostal hernia (AAIH) that developed sub-acutely after blunt trauma.

Case Report

A 47-year-old man developed a soft abdominal swelling in the right lower chest region 1 year after a traffic accident. He had diabetes, hyperlipidemia, and hypertension, and he had undergone laparoscopic cholecystectomy 5 years before. In the accident, he had sustained a fracture of the right radius head. He had no thoracic or abdominal symptoms at the time of the accident. A nonpainful right lower chest swelling developed 11 months after the accident, and he consulted with our hospital. The swelling was located apart from the laparoscopic cholecystectomy scar. His height, weight, and body mass index were 185 cm, 107 kg, and 31.3 kg/m², respectively. The right flank swelling was located at the 10th intercostal space and was soft with neither tenderness nor pain. It worsened on exertion and was reducible. The skin over the swelling was normal and had no ecchymosis. A computed tomography scan of the thorax and abdomen revealed an abdominal intercostal hernia at the 10th intercostal space (Figure 1a and 1b). It mimicked a right upper lumbar hernia. The hernia was covered by the latissimus dorsi and was difficult to define by physical examination.

Figure 1a: Enhanced computed tomography scan showed a defect of the intercostal space.
Under diagnosis of an AAIH with no diaphragmatic defect or rib fractures, laparoscopic hernioplasty was performed using three ports (Figure 2). The patient was placed in the semi-left lateral position, and open laparoscopy was performed with subumbilical entry. No adhesion was found around the hernia in the abdominal cavity, and the size of the hernia orifice was 5 × 4 cm (Figure 3a). The hernia was treated by transabdominal preperitoneal (TAPP) repair using omega-3 fatty acid-coated mesh (C-QUR; Atrium Medical Corporation, Hudson, NH, USA). The prosthesis was trimmed to 12 × 10 cm and fixed to the orifice. The edge of the orifice was sutured by two 2-0 Prolene threads (Ethicon, Somerville, NJ, USA). Finally, the prosthesis was covered over the 10th and 11th ribs and fixed by absorbable tackers (AbsorbaTack; Medtronic, Minneapolis, MN, USA) (Figure 3b and 3c, 4). The postoperative course was uneventful, and the patient was discharged 2 days after surgery. He had no complaints or evidence of recurrence 24 months later (Figure 5a and 5b). Six years postoperatively, he had developed no recurrence of the hernia.

**Figure 1b:** Longitudinal section of the hernia.

**Figure 2:** Schema of the surgical scar. Open laparoscopy was performed with sub-umbilical entry. Two 5-mm ports were placed symmetrically with the hernia.

Figure 3: Laparoscopic view of the procedure. (a) Peritoneal view of the hernia. (b) Suturing of the prosthesis to the hernia rim. (c) Planning of prosthesis placement. (d) Repaired peritoneum.

Figure 4: Schema of prosthesis fixation. The hernia orifice was covered over the 10th and 11th ribs by the prosthesis. The front and back rims of the hernia orifice were sutured with 2-0 Prolene. Finally, tacking material was placed around the edge of the prosthesis.
Discussion

In this report, subacute onset of an AAIH was successfully treated by TAPP repair; and the outcome remained good at 6 years postoperatively. To the best of our knowledge, this is the first report of TAPP repair for an AAIH.

Various approaches have been described for AAIH repair. The direct approach has historically been the standard procedure [7]. Especially in emergency cases, bleeding or incarceration should be treated using this approach. The direct approach allows the injury to be reached, and hemostasis or rib approximation is then directly available. This approach requires a large incision, and observation of the abdominal cavity is sometimes difficult through the narrow intercostal space. Another technique is the indirect approach, in which the incision is located apart from the hernia. The indirect approach prevents destruction of the hernia orifice and allows for observation of the abdominal contents [11]. Similar to the indirect approach, use of the laparoscopic approach is increasing. This approach is minimally invasive and promotes early recovery. Robotic hernioplasty has also been reported [12].

Especially after blunt trauma, the indirect approach for repair of an AAIH by laparoscopy is useful. In patients with an AAIH, the injury is usually located within the intercostal space; the outer muscle layers may be intact. Use of the direct approach on the hernia may increase the risk of later development of an incisional hernia. Direct repair of the intercostal space with a minimal incision can allow for earlier recovery.

Recurrence is the most important complication of AAIH hernioplasty. In an early report, the recurrence rate was 28% [7]. Direct suturing of an AAIH increases the risk of recurrence within 12 months after surgery. Continuous stress induced by respiratory movements is the cause of recurrence in such cases, and the hernia recurs particularly easily at the lower part of the ninth rib [12]. Reinforcement of the defect by a prosthesis is then needed. If widening of the intercostal space is detected, reapproximation of the space is necessary [13].

In this case, we selected TAPP repair for AAIH hernioplasty, although most reports have described the use of intraperitoneal onlay mesh [12,14,15]. Even when using a prosthesis, recurrence of an AAIH after placement of intraperitoneal onlay mesh has been reported.

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This occurred by dislocation of the tacking material. Successful repair requires the surgeon to confirm the hernia orifice, cover it with a prosthesis, and ensure firm suturing. For this purpose, we performed TAPP repair with ligation of the hernia rim and placement of a prosthesis. Additionally, TAPP repair avoids injury to the intercostal vessels and nerves during multiple tacking procedures.

Conclusion

This report describes the diagnosis and treatment of an AAIH. This hernia sometimes develops late after injury; thus, it is important to fix the ribs and cover the prosthesis sufficiently to ensure successful repair.

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Conflict of Interest

MK, HK, KD, KK, TY, YI, HK and TW have no conflict of interest.

Bibliography


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