FIGURE 2. Diagram demonstrating mesh configuration in axial view with intracorporeal and extracorporeal knot orientation.

therapeutic advantages with shorter operative times, less postoperative pain, and an earlier return to full activity compared with traditional thoracotomy and laparotomy.³ Intraoperative evaluation of the presented patient revealed an absence of the anterior diaphragmatic rim, which inspired our use of the laparoscopic suture passer for retrieval of pre-placed anterior mesh sutures. To our knowledge, this is the first report of laparoscopic suture passer use in the prosthetic repair of a Morgagni hernia.

Significant discussion persists regarding the appropriate technique for laparoscopic repair of the hernia of Morgagni. In meta-analysis, 64% have reported the use of a mesh prosthesis to achieve a tension-free repair, and 69% remove the hernia sac before closure of the defect.² Successful repair has been achieved using laparoscopic-assisted extracorporeal and intracorporeal mesh prosthesis and primary

repairs.^{4,5} No currently established guideline is available for the application of a mesh prosthesis, with reports of primary repairs of up to 50 cm².⁵ Proponents of mesh repair have advocated universal application in defects >20 to 30 cm² to achieve a tension-free repair, with 1.5 to 2.5 cm of overlap to the native diaphragm.³ Prolene mesh was chosen for our patient to accomplish dependable strength in repair of a defect with no directly adjacent bowel; however, a composite mesh might also be appropriate for this technique. Our experience with the successful repair of a large hernia of Morgagni supports the efficacy of hernia sac excision followed by laparoscopic-assisted prosthetic mesh reconstruction and extracorporeal knot fixation.

The laparoscopic suture passer provides a novel and adaptable method for prosthetic repair of the foramen of Morgagni. This technique allows direct visualization and controlled placement of the mesh prosthesis to the anterior abdominal wall. As we seek to better understand the mechanisms for Morgagni hernia development, laparoscopy promises to optimize our approach as a well-tolerated diagnostic and therapeutic instrument for individualized care.

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Single-incision video-assisted thoracoscopic lobectomy: Initial results

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Video clip is available online.

Video-assisted thoracoscopic surgery (VATS) was introduced nearly 2 decades ago and has experienced an exponential increase for lung cancer treatment. The standard approach is performed through three incisions, including a utility incision of about 3 to 5 cm. However, anatomic

FIGURE 1. A, Diagram and surgical image of procedure showing stapling of right superior pulmonary vein, and (B) right subcarinal lymph node dissection after right lower lobectomy.

lung resections are also performed using a two-port technique. We believe it is feasible to perform the same procedures through a single utility incision. This report describes our initial experience performing lobectomies using a uniportal approach with no rib spreading.

SURGICAL TECHNIQUE

With the patient in the standard lateral position and double-lumen intubation, the 4- to 5-cm incision is performed at the fifth intercostal space, anterior axillary line. This incision is the same as that used in the 2- or 3-port VATS technique. We use conventional instruments combined with specifically designed thoracoscopic equipment. The camera (30° angled) is placed for the dissection at the anterior end of the incision. For lymphadenectomy, the camera is moved to the most posterior part of the incision (Figure 1, B).

In our experience, especially in the upper lobes, we have moved toward dividing the artery first, when possible, to facilitate the insertion of the staplers along the upper lobe vein later in the procedure (Figure 1, A). We have favored the use of articulated staplers for division of structures. In the case of small branches or anatomic

difficulties, we have used clips for vascular control (Hem-o-lok, Teleflex).

The lobe is introduced into a protective bag for its retrieval off the thoracic cavity, and a lobe-specific mediastinal lymph node dissection is performed. Analgesia is provided by intercostal bupivacain, and we insert a single chest tube in the posterior part of the incision (Figure 2, A).

RESULTS

From June 29, 2010 to May 12, 2011, of the 23 patients in whom uniportal anatomic lung resection was attempted, 20 cases were successfully completed with this technique alone (87%). Three of these patients underwent elective uniportal pneumonectomy for tumors crossing the fissures and were not included in the present report, although their postoperative course was uneventful.

Three cases were not finished using the single approach. One patient required an additional port insertion, and 2 patients required conversion because of nontorrential bleeding. In retrospect, these cases were more complex anatomically than the findings from the computed tomography scans suggested. The institutional review board at Minimally Invasive Thoracic Surgery Unit approved this initial audit.

FIGURE 2. A, Postoperative result of single chest tube placed in posterior part of incision. B, Postoperative result of right upper lobectomy incision.

The management of the learning curve was based in our experience in VATS, including 2-port technique anatomic pulmonary resections and the uniportal technique for wedge resections. Initially, we started performing lower lobectomies that were deemed less complex (Video 1), but these were rapidly followed by upper lobe resections (Video 2; Figure 2, B).

The 17 patients of our analysis (10 men and 7 women; mean age, 67.6 years; range, 43-81) underwent left lower lobectomy in 9 (52.9%), right upper lobectomy in 2, and right lower lobectomy and left upper lobectomy in 3 each. The mean surgical time was 134 minutes (range, 80-180). We aimed to perform a fissureless technique as the last step of the procedure, especially in upper resections.

Complete mediastinal lymphadenectomy was performed according to the oncologic criteria (Video 2). The mean number of nodal stations explored was 4.5 (range, 3-6), with a mean of 11.6 ± 4.7 lymph node resections (range, 5-18). The mean tumor size was 2.8 ± 1.1 cm (range, 1.2-4.8). The most common histologic type was squamous cell carcinoma (6 cases).

No postoperative mortality or readmission to the intensive care unit occurred. One patient developed a prolonged air leak (7 days) and another had atrial fibrillation. The mean duration of chest drainage was 2.4 ± 1.3 days (range, 1-7), and the mean length of hospital stay was 2.8 ± 1.2 days (range, 2-7).

DISCUSSION

Most of the investigators have described the VATS approach to lobectomy using 3 to 4 incisions. However, the surgery can be performed using 2 ports¹ or even by a single incision, as we have recently reported.^{2,3}

Since June 2010 and after performing 95 cases using the 2-port approach, we have begun to perform uniportal VATS lobectomy, initially for lower lobes.⁴

Since 2004, Rocco and colleagues⁵ have published different studies leading the development of uniportal VATS techniques; however, anatomic lung resections were not performed. It is necessary, as described by Rocco and colleagues,⁵ to bring the instruments to address the target lesion from a vertical perspective rather than the traditional horizontal one.

One of the potential advantages is that only one intercostal space is involved, representing the most minimally invasive approach possible. We expect additional development of robotic technologies, which will probably allow the single-incision approach to become our standard surgical procedure for lobectomy.

In conclusion, we believe that single-incision VATS lobectomy is a feasible and promising procedure, especially when performed in centers with previous experience in the double-port VATS approach.

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Takedown of cavopulmonary (Glenn) shunt: A technique using a right atrial flap

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Traditionally, the bidirectional Glenn shunt has been used as a palliative operation in patients with functional single ventricles. More recently, it has also been used to augment pulmonary blood flow in patients with Ebstein's anomaly and marginal right ventricular function,¹ and patients with hypoplastic left heart syndrome as an adjunct in operations attempting biventricular repairs. Patients who successfully achieve ventricular rehabilitation resulting in a functional biventricular heart no longer require the cavopulmonary anastomosis. Historically, several authors have reported