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Surgery

VATS Lobectomy for Infectious Lung Disease

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Abstract **Original Research Article**

Background. The potential benefits of thoracoscopic lobectomy for early stage non–small cell lung cancer have been well documented in the literature. However, little is known about the use of these techniques in patients requiring resection for infectious or inflammatory lung disease. The purpose of this study was to present our experience of VATS resection for infectious lung disease. ***Method:*** This is a retrospective review of prospectively collected data for 19 consecutive VATS lobectomy patients treated for infectious lung disease between January 2016 and December 2016. ***Results:*** 19 resections were performed; there were 12 female patients and 7 male patients. The average age was 52 years (range, 26 to 78 years).Indications for surgery included focal bronchiectasis (47.3%), pulmonary aspergillosis (26.3 %), cavitary disease (5.2%) and tuberculous destroyed lobe (21.05 %). The VATS lobectomy was converted to open thoracotomy in 1 patient. Blood transfusion for 2 patients after operative recovery. Thirty-day mortality was 7.14% (1 of14).video-assisted thoracoscopic lobectomy was associated with a shorter length of stay (5.0 days) and chest tube duration (4.0 days). ***Conclusions:*** Thoracoscopic lobectomy for individuals with infectious lung disease is a feasible procedure and can be accomplished safely with minimal morbidity and mortality. For experienced thoracoscopic surgeons, VATS lobectomy appears to be a sound option for lung-sparing, anatomic pulmonary resections.

Keywords: infectious disease, lobectomy, VATS.

INTRODUCTION

Video-assisted thoracic surgery (VATS) lobectomy is still not widely adopted, even after many years of increasing popularity and experience centred on minimally invasive surgery. The American college of chest physicians (ACCP) guidelines state a minimally invasive approach is preferred over a thoracotomy for anatomic pulmonary resection [1].

Numerous reports have documented the safety and efficacy of a thoracoscopic approach, with equivalent oncologic outcomes compared with open thoracotomy [2-4].

Less morbidity [5, 6], better functional status, and the improved ability to deliver subsequent medical therapy [7, 8] have all been reported with minimally invasive procedures. In addition, shorter hospital stays [5, 9] and possible cost savings [10] have also been associated with thoracoscopic techniques.

Despite these advantages, much less is known about the use of these techniques in the setting of benign lung disease, specifically infectious lung disease and appears to be underutilized [11].

In theory, patients with focal infectious lung disease that meet indications for surgical resection would be excellent candidates for a minimally invasive approach. In this report, we describe our experience with thoracoscopic lobectomy for patients with chronic focal infectious lung disease.

PATIENTS AND METHODS

Using a prospectively collected database, we performed a retrospective review of consecutive operations from January 2016 to December 2016.at the Department of Thoracic Surgery, Ibno Rochd University Hospital, Casablanca, Morocco, identified 19 patients who underwent an anatomic lobar pulmonary resection defined by the individual ligation and division of the lobar pulmonary arteries, vein, and bronchus supplying an area of lung parenchyma.

Preoperative Evaluation

Patients initially underwent an extensive assessment, including sputum analysis and radiologic and physiologic testing. High-resolution computed tomography of the chest was performed to assess the extent of the parenchymal lung disease. Adequate pulmonary reserve was assured through the use of

pulmonary function testing with occasional use exercise testing when appropriate. Bronchoscopy was performed, primarily for diagnostic purposes and to rule out concomitant endobronchial disease. In the setting of active hemoptysis, bronchoscopy was used to localize the source within the bronchial tree level. Collection of sputum and bronchoalveolar lavage specimens allowed identification of the likely microbial pathogens. Confirmation of the presence of nontuberculous mycobacterial disease was made. Patients appropriate for surgical therapy were discussed at a weekly multidisciplinary conference attended by surgeons and pulmonologists.

All patients in this study had focal, persistent lung damage amenable to complete anatomic resection. Indications for surgery included the presence of focal parenchymal disease associated with recurrent pulmonary infections or hemoptysis, usually in the setting of failure or intolerance of medical therapy. Careful attention was paid to other known or potential comorbidities in this patient population and addressed as needed.

Surgical Technique

Theatre and instruments

Two monitors placed on each side of the table in front of the surgeons and the scrub nurse. All VATS lobectomies are performed using a 10-mm, 30^0- angled digital videothoracoscope. The chest wall is stiff and there is no need for CO_2-insufflation.

Vascular clamps are always ready in the table in case of emergency bleeding and, furthermore a set of instruments for open surgery is present in the theatre.

Vessels, fissures and the bronchus are divided one by one using endostaplers. For the vessels a 30-45-mm vascular stapler is used, whilst the bronchus is usually transacted with a 60-mm stapler. For the parenchyma, 45-mm or 60-mm staplers are used.

All specimens are removed in plastic bag to make sure that nothing is left within the chest cavity and there is no contact between the specimen and the wall of the incision.

Anaesthesia

Epidural catheters were available to all patients undergoing a thoracoscopic procedure, but were typically not used. Surgical resection was performed with the patient under general anesthesia using a double-lumen endotracheal tube.

Patient positioning and port placement

The patient is placed in the lateral decubitus position on the table next to its anterior edge. The table is arched to open the intercostal space maximally and the patient is tilted backwards slightly to get the lung to drop backwards. The surgeon and the assistant stand in the abdominal side of the patient with the surgeon more cranially. The scrub nurse is opposite to them. The authors recommend an anterior three-port technique, with the ports arranged in the same manner regardless of the lobe to be respected.

A 4-5-cm anterior utility incision is made between the breast and the lower angle of the scapula in the fourth intercostals space just anteriorly to the border of the latissimus dorsi muscle. The pleural cavity is inspected with the camera through the incision, looking for unexpected pathology adhesions and the level of diaphragm. The utility incision is also used for the retrieval of the specimen. A low anterior 1-1.5-cm camera port is positioned at the level of the top of the diaphragm and anterior to the level of the helium and phrenic nerve. The second 1.5-cm port is positioned at the same level, but more posteriorly, in a straight line down from the scapula. This results in a triangle with two 10 cm sides and the camera positioned in the middle, with a working incision on each side,wich makes the procedure more easy and natural to the surgeon. The camera is positioned in the lower anterior port and there is generally no need to change its position during the procedure [1].

Pleural adhesions are almost always present, and in some cases can be extensive and vascular in nature or can also be scattered throughout the hemithorax. In almost all cases, the adhesions can be divided using some new energy devices available or an electrothermal bipolar tissue sealing system.

The bronchial circulation is almost always hypertrophied, and in most cases should be directly ligated with clips to minimize bleeding. Similarly, considerable lymphadenopathy is present within the hilum and can make dissection of the hilar vessels difficult.

Postoperative Care

Patients were admitted directly to the standard thoracic ward for convalescence. Routine postoperative care was used, with pain control, and early patient mobilization, the antibiotic regimen prescribed for the pulmonary infection was continued throughout the postoperative course.

The indication for tube removal is no air leak and < 500 ml of fluid in 24 hours. Patients are usually discharged 1 day after tube removal and seen 1 week later in the outpatient clinic.

RESULTS

During a one year period from January 2016 to December 2016, 19 patients underwent thoracoscopic lobectomies for infectious lung disease at our institution. The mean age was 52 years (range, 26 to 78 years). Male to female ratio was 12/7 where 63.15% of patients were female.

The most common presenting symptoms were indicative of chronic pulmonary infection, including cough, dyspnea, excess sputum production, and recurrent pneumonias. Almost of the patient cohort described a history of recurrent hemoptysis.

The most common pattern of focal parenchymal lung disease was bronchiectasis (Fig 1), seen in (74.3%) of patients. Pulmonary aspergillosis (26.3%), Cavitary lung disease (Fig 2) was noted in (5.2%), and tuberculous destroyed lobe (21.05 %).

The mean forced expiratory volume in 1 second in the patient cohort was 84% of predicted (range, 62% to 120%). Operations performed are listed in Table 1. All patients underwent anatomic lung resection for their infectious lung disease. Conversion to open thoracotomy was required in 2 cases (10.5%).

The observed postoperative complications are detailed in Table 2. There was one 30-day mortality. Complications occurred in 4 cases (21.05%). The most common complication was prolonged air leak, defined as an air leak beyond the fifth postoperative day, which was presented in 1 patient. Blood transfusion for 2 patients after operative recovery, and one hemothorax necessitated a thoracoscopic reoperation for blood clot removal. The average length of hospital stay was 5.7 days (range, 4 to 15 days;median, 6 days).

DISCUSSION

In this study we describe our experience with the use of thoracoscopic lobectomy for infectious lung disease such a localized bronchiectasis or cavitary or pulmonary aspergillosis. Patients underwent targeted anatomic resection to remove diseased, damaged lung parenchyma.

This study suggests that VATS lobectomy should be performed in appropriately selected patients with infectious lung disease.

Surgery has usually been reserved for patients with focal lung aspergilosis (aspergiloma) disease, damaged lung parenchyma after tuberculosis or for focal bronchiectasis that have failed or become intolerant to medical therapy, has recurrent episodes of hemoptysis, or both.

When surgery is advised, it is usually performed through an open thoracotomy approach, described by some authors as a necessity to ensure complete resection [12].

Several large series of patients undergoing resection for bronchiectasis have been published within the last decade [13 –14]. All report low mortality rates of 0% to 1.7% and acceptable morbidity rates of 9% to 23%, and emphasize the need for complete resection of disease.

More recently, Zhang and coworkers [15] reported 52 patients who underwent thoracoscopic lobectomy using a technique similar to ours with two 12-mm trocar ports and a 4- to 5-cm incision. They noted no operative mortality, a morbidity rate of 15.4%, and a conversion to thoracotomy rate of 13.5%.

John D. Mitchell, and all [16] have similar outcomes after 126 VATS lobectomy for infectious lung disease with zero mortality rate and 9% of morbidity. The mean hospital length of stay was 3.7 days.

We have previously emphasized the importance of a multidisciplinary approach to the surgical treatment of patients with infectious lung disease [17]. Careful consultation with pulmonologists and infectious disease specialists. The goal of adding surgery to the treatment regimen is to remove these areas of permanently damaged lung parenchyma that can serve as a reservoir or nidus for recurrent infection.

Thoracoscopic lobectomy for focal infectious lung disease poses several technical challenges when compared with a similar procedure for thoracic malignancy. Pleural adhesions are almost always present to some degree, and in some cases can be extensive and vascular in nature. They typically involve the affected part(s) of lung, but can also be scattered throughout the hemithorax. In the upper lobe disease, the adhesions to the overlying parietal pleura can be significant. The preoperative high-resolution computed tomography will usually predict the presence of dense adhesions, but frequently underestimates the amount of pleural symphysis. In almost all cases, the adhesions can be divided through a minimally invasive approach, often with improved visibility compared with thoracotomy. Indications to convert to an open approach would include the perceived need for an extrapleural dissection or because of concern regarding underlying vital structures.

The bronchial circulation in patients with infectious lung disease is almost always hypertrophied, and in most cases should be directly ligated with clips to minimize bleeding. Similarly, considerable lymphadenopathy may be present within the hilum. Although a nodal dissection is clearly not required, the lymphadenopathy in the setting of chronic pulmonary granulomatous disease can make dissection of the hilar vessels difficult. When developing a fissure with a stapling device, we tend to err toward the uninvolved lobe to aid in complete resection. Beyond this, the diseased tissue is thickened and tends to compress poorly, thus making it a poor substrate for staple closure.

Lobes with cavitary disease often have concomitant, adjacent pleural symphysis, and care must be taken during lung mobilization to avoid spillage of

infected debris within the pleural space. We do not routinely buttress the bronchial stump closure of patients, and did not note any bronchopleural fistula postoperatively.

It is our bias to perform anatomic lung resection in the setting of focal bronchiectasis or cavitary lung disease associated with recurrent lung infection, believing this approach removes all of the damaged lung parenchyma that might lead to later recurrence of disease.

CONCLUSION

Thoracoscopic lobectomy for focal infectious lung disease is safe and effective; it can be accomplished with acceptable morbidity and mortality. VATS lobectomy may be the preferred strategy for appropriately selected patients with a multidisciplinary approach whom are key factors to success**.**

REFERENCES

1. Henrik jessen hensen and Rene Horsleben Peterson. ESTS book 55.lung- operative techniques. 55.6 videothoracoscopic Lobectomy and Bilobectomy.
2. Leshnower BG, Miller DL, Fernandez FG, Pickens A, Force SD. Video-assisted thoracoscopic surgery segmentectomy: a safe and effective procedure. The Annals of thoracic surgery. 2010 May 1;89(5):1571-6.
3. Mitchell JD, Jessica AY, Bishop A, Weyant MJ, Pomerantz M. Thoracoscopic lobectomy and segmentectomy for infectious lung disease. The Annals of thoracic surgery. 2012 Apr 1;93(4):1033-40.
4. Onaitis MW, Petersen RP, Balderson SS, Toloza E, Burfeind WR, Harpole Jr DH, D'amico TA. Thoracoscopic lobectomy is a safe and versatile procedure: experience with 500 consecutive patients. Annals of surgery. 2006 Sep;244(3):420.
5. Paul S, Altorki NK, Sheng S, Lee PC, Harpole DH, Onaitis MW, Stiles BM, Port JL, D'amico TA. Thoracoscopic lobectomy is associated with lower morbidity than open lobectomy: a propensity-matched analysis from the STS database. The Journal of thoracic and cardiovascular surgery. 2010 Feb 1;139(2):366-78.
6. Villamizar NR, Darrabie MD, Burfeind WR, Petersen RP, Onaitis MW, Toloza E, Harpole DH, D'amico TA. Thoracoscopic lobectomy is associated with lower morbidity compared with thoracotomy. The Journal of thoracic and cardiovascular surgery. 2009 Aug 1;138(2):419-25.
7. Lee JG, Cho BC, Bae MK, Lee CY, Park IK, Kim DJ, Chung KY. Thoracoscopic lobectomy is associated with superior compliance with adjuvant chemotherapy in lung cancer. The Annals of thoracic surgery. 2011 Feb 1;91(2):344-8.
8. Petersen RP, Pham D, Burfeind WR, Hanish SI, Toloza EM, Harpole Jr DH, D'Amico TA. Thoracoscopic lobectomy facilitates the delivery of chemotherapy after resection for lung cancer. The Annals of thoracic surgery. 2007 Apr 1;83(4):1245-50.
9. Atkins BZ, Harpole Jr DH, Mangum JH, Toloza EM, D'amico TA, Burfeind Jr WR. Pulmonary segmentectomy by thoracotomy or thoracoscopy: reduced hospital length of stay with a minimally-invasive approach. The Annals of thoracic surgery. 2007 Oct 1;84(4):1107-13.
10. Burfeind Jr WR, Jaik NP, Villamizar N, Toloza EM, Harpole Jr DH, D'Amico TA. A cost-minimisation analysis of lobectomy: thoracoscopic versus posterolateral thoracotomy. European Journal of Cardio-thoracic Surgery. 2010 Apr 1;37(4):827-32.
11. Jacobs DO. Department of Surgery, Duke University Medical Center, Durham, NC. Archives of Surgery. 2004 Jul 1;139(7):706-8.
12. Watanabe M, Hasegawa N, Ishizaka A, Asakura K, Izumi Y, Eguchi K, Kawamura M, Horinouchi H, Kobayashi K. Early pulmonary resection for Mycobacterium avium complex lung disease treated with macrolides and quinolones. The Annals of thoracic surgery. 2006 Jun 1;81(6):2026-30.
13. Balkanli K, Genç O, Dakak M, Gürkök S, Gözübüyük A, Çaylak H, Yücel O. Surgical management of bronchiectasis: analysis and short-term results in 238 patients. European journal of cardio-thoracic surgery. 2003 Nov 1;24(5):699-702.
14. Zhang P, Jiang G, Ding J, Zhou X, Gao W. Surgical treatment of bronchiectasis: a retrospective analysis of 790 patients. The Annals of thoracic surgery. 2010 Jul 1;90(1):246-50.
15. Zhang P, Zhang F, Jiang S, Jiang G, Zhou X, Ding J, Gao W. Video-assisted thoracic surgery for bronchiectasis. The Annals of thoracic surgery. 2011 Jan 1;91(1):239-43.
16. John D. Mitchell, MD, Jessica A. Yu, MD, Amy Bishop, BA, Michael J. Weyant, MD, and Marvin Pomerantz. Thoracoscopic Lobectomy and Segmentectomy for Infectious Lung Disease. Ann Thorac Surg. 2012;93:1033– 40.
17. Mitchell JD, Bishop A, Cafaro A, Weyant MJ, Pomerantz M. Anatomic lung resection for nontuberculous mycobacterial disease. The Annals of thoracic surgery. 2008 Jun 1;85(6):1887-93.