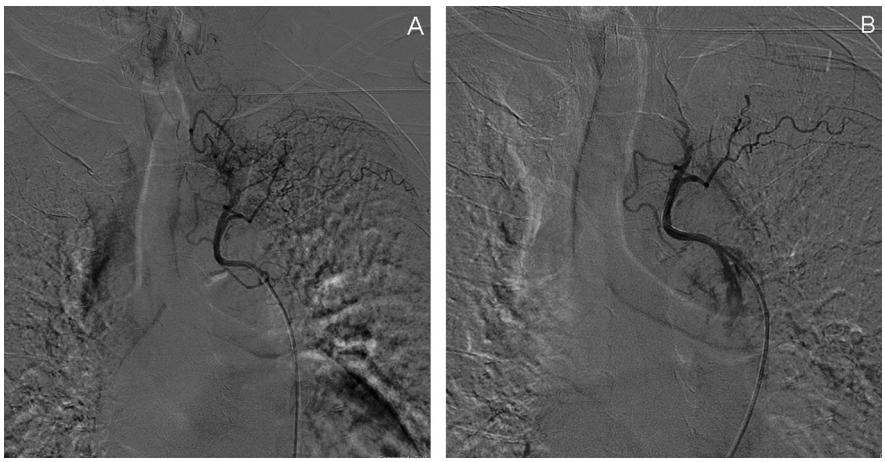

Fig 4. (A) Thoracic aortogram demonstrates a hypertrophic and tortuous left superior bronchial artery, which supplied the mediastinal mass. (B) Postembolization aortogram shows devascularization of the mass.

posterior mediastinum and its extension into the intervertebral foramen. Although the intervertebral foramen was not expanded in our patient, the imaging characteristics of the mass were consistent with a nerve sheath tumor.

Even though schwannomas and neurofibromas are far more frequent causes of tumors with both a paravertebral component and an intraforaminal (or intraspinal) component, our case suggests that angiolipomas need to be considered in the differential diagnosis of a dumbbell lesion in the posterior mediastinum because of the perioperative bleeding risk associated with these vascular tumors. In fact, tumor embolization is sometimes performed as a precaution in angiolipomas before surgical resection, but not for nerve sheath tumors. An accurate presurgical diagnosis of an angiolipoma could minimize unexpected hemorrhagic complications from resection of the lesion. Therefore, given the unexpected pathologic diagnosis of specimen from the CT-guided biopsy and the hypervascular nature of the mediastinal mass of our patient, we decided to preoperatively embolize the tumor. This is the first report that describes the use of preoperative embolization of a mediastinal angiolipoma with microspheres before surgical resection to minimize blood loss intraoperatively. The feeding vessel in our patient was embolized using microspheres, resulting in devascularization of the mass.

In conclusion, we present a case of a posterior mediastinal lipid-poor angiolipoma extending into the intervertebral foramen. Interestingly, initial imaging studies did not demonstrate focal areas of fat tissue, and a presumptive diagnosis of a nerve sheath tumor was made. However, a specimen obtained from a CT-guided biopsy confirmed the diagnosis of an angiolipoma, and a preoperative embolization with microspheres was performed to minimize intraoperative bleeding and to facilitate the excision of the tumor. The hypervascular nature of these rare masses makes these patients potential candidates for presurgical embolization to reduce unexpected intraoperative hemorrhage associated with excision of these vascular tumors.

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FEATURE ARTICLES

Feasibility and Complications in Concomitant Lung Resection With Minimally Invasive Repair of Pectus Excavatum

Zeynep Bilgi, MD, Nezih Onur Ermerak, MD, Korkut Bostancı, MD, Bülent Saçak, MD, Hasan Fevzi Batırel, MD, PhD, and Mustafa Yüksel, MD

Departments of Thoracic Surgery and Plastic and Reconstructive Surgery, Marmara University Faculty of Medicine, Istanbul, Turkey

Minimally invasive repair of pectus excavatum (MIRPE) is the procedure of choice in experienced centers and can be offered in combination with other thoracic procedures. Between 2001 and 2013, 3 cases involving MIRPE and lung surgery were done in our clinic. While postoperative course of 2 procedures (MIRPE and video-assisted thoracoscopic surgery [VATS] segmentectomy and MIRPE and VATS bullectomy) were uncomplicated, the MIRPE and VATS lung biopsy patient developed major complications arising from prolonged air leak and was

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ultimately managed with an Eloesser flap. In carefully selected cases, simultaneous lung surgery and MIRPE can be done safely but problems of lung reexpansion, long-term drainage, and infection should be kept in mind.

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Pectus excavatum (PE) is a relatively common congenital deformity occurring in 1 per 300/400 births. Minimally invasive repair of pectus excavatum (MIRPE) has gained acceptance as the procedure of choice over the last decade [1–3].

Pectus excavatum can accompany various other congenital defects. Most of the combined procedures involving MIRPE involve correction of congenital cardiac defects and show that this kind of approach is both feasible and safe in well selected cases and in appropriate centers where multidisciplinary care can be coordinated [4].

While combined heart surgery and MIRPE result in mostly good outcomes, there are less data on procedures involving the lung parenchyma, which poses its own unique problems and possible sources for complication. In this report we present 3 cases of combined lung surgery and MIRPE that we have performed in our clinic.

FEATURE ARTICLES

Case Reports

Patient 1

A 19-year-old male with PE was admitted to our clinic for recurrent right spontaneous pneumothorax that was initially treated with a chest tube. His lung failed to re-expand fully and he went on to having prolonged air leak. After a discussion with the patient, simultaneous video-assisted thoracoscopic surgery (VATS) bullectomy and MIRPE were performed.

First, a right-sided VATS apical wedge resection with staple line going through grossly healthy parenchyma was performed, followed by MIRPE. The patient was discharged on the sixth postoperative day with a fully expanded lung and good cosmetic result. He underwent an uneventful bar 3 years later; no recurrence was seen for either pneumothorax or PE.

Patient 2

A 24-year-old female was referred to our department for both correction of PE and lung biopsy for diagnosis of presumed interstitial lung disease. The operation was conducted in a similar fashion as with patient 1; pathology results showed nonspecific interstitial fibrosis. The patient was discharged uneventfully. However, she was referred again to our clinic on the fourth week, with a chest tube in place due to pneumothorax and prolonged air leak. Despite intensive physiotherapy her lung did not expand fully and she eventually progressed to empty space empyema (Fig 1A). She was first treated with prolonged drainage, washout, VATS debridement, and systemic antibiotics guided by culture results. We also removed the bar at the tenth postoperative week, avoiding possible prosthesis infection. Her clinical picture failed to improve due to infection and interstitial lung disease flare up. As she was dependent on steroids for interstitial lung disease and had a resistant strain in culture results due to prolonged systemic antibiotherapy, at the third postoperative month a decision was made to perform a Eloesser flap thoracostomy anteriorly. Afterward the thoracostomy was maintained with a vacuum-assisted closure device (Figs 1B and 1C) for 10 weeks, during which her antibiotic coverage could get scaled down and steroids tapered, and she was better clinically. Ultimately, her Eloesser flap thoracostomy was closed with a transposition of ipsilateral latissimus dorsi muscle and split thickness skin grafting (Fig 1D). The patient was able to return to normal life without any permanent morbidity and was able to discontinue oral steroids at 6 months follow-up.

Patient 3

A 17-year-old male was referred to our clinic for left lower lobe adenoid cystic malformation, bronchiectasis, and PE. He had recurrent lower respiratory tract infections requiring systemic antibiotics for several times a year, but his functional status was good with forced expiratory volume in the first second of expiration at 126%. First a VATS left lower lobectomy was performed, with the patient on a decubitus position, taking care to place the anterior utility incision appropriately for MIRPE as

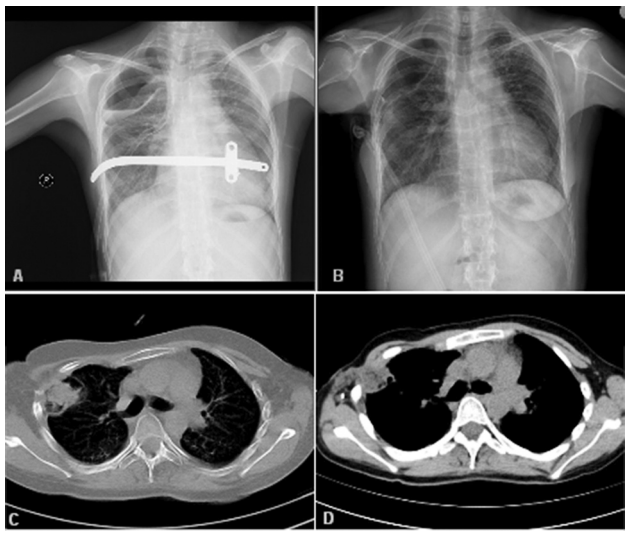

Fig 1. (A) Empty space with non-expanded lung. (B) Post Eloesser flap with vacuum-assisted closure device. (C) and (D) Computed tomographic scans showing vacuum-assisted closure dressing and latissimus dorsi, respectively, in the cavity.

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Address correspondence to Dr Bilgi, Marmara University Faculty of Medicine, Department of Thoracic Surgery, The Ministry of Health of Turkey, Marmara University Hospital, Thoracic Surgery Clinic, 7th Flr, F wing, Fevzi Cakmak Mah., Mimar Sinan Cad., No:41, Ust Kaynarca, Pendik, Istanbul 34899, Turkey; e-mail: zeynep.bilgi@gmail.com.

well. The fissure was near complete, requiring minimal dissection. After completion of the lobectomy, MIRPE was performed from the right side with the usual technique. The patient was followed up with a single chest tube on the left, which was discontinued on postoperative day 3. He was subsequently discharged on postoperative day 4. On sixth-month follow-up the patient was doing well with satisfactory clinical and cosmetic outcomes.

Comment

Minimally invasive repair of pectus excavatum has gained widespread acceptance over the last 20 years as a procedure of choice in experienced centers [3]. As the availability of MIRPE and experience with the procedure grow, feasibility and safety of MIRPE in complicated cases became an interesting focus in the literature. As nearly all of the documented cases regarding the simultaneous MIRPE and non-cosmetic surgery involved cardiac [4], diaphragmatic, and mediastinal [5] operations, the experiences we now report have unique characteristics due to the fact that all of the operations involve direct manipulation of lung parenchyma.

It is known that MIRPE induces measurable differences in thorax anatomy and respiratory physiology even though their exact clinical effects are debatable [6]. Immediate postoperative pain management can be challenging to maintain in MIRPE patients [7]. Our observation from our clinic's experience is that it may be difficult and demanding for patients to comply fully and effectively to respiratory physiotherapy after MIRPE, especially with the added pain burden of a chest tube. In 2 cases of nonanatomic resections we experienced longer hospital stays, the latter case proved to be very challenging due to problems of non-expansion, prolonged air leak, and subsequent infectious and life threatening complications. In case of the anatomic resection with remaining intact parenchyma, we did not encounter either of the problems.

A stepwise approach for PE and other thoracic comorbidities has been reported [5] and we can see that in experienced clinics former lung surgery does not preclude MIRPE, and MIRPE can be modified for use during thoracotomy and minimally invasive mediastinal tumor resections as well. There are also various reports demonstrating the safety of MIRPE after open repair of PE, which is affirmed by our clinic's experience as well [8].

In conclusion, we report 3 cases of concomitant MIRPE and lung resection. In carefully selected cases, and in experienced centers where multidisciplinary care is available, this might be a feasible option. Caution should be exercised in patients where nonanatomic resection on fragile lung parenchyma is being planned, as MIRPE may contribute adversely to the postoperative course through pain issues and changes in thorax anatomy and physiology. In those patients, a stepwise approach giving precedence to medical condition may be the safer option. Because the need for such operations is rare, multi-institutional pooling of cases and data analysis is needed for an ultimate estimation on the feasibility and safety of combined lung surgery and MIRPE.

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Interatrial Bronchogenic Cyst Resection

Meghan Olsen, BS, Thomas A. Mitchell, MD, Thomas J. Percival, MD, and Bryan S. Helsel, MD

Uniformed Services University School of Medicine, Bethesda, Maryland; and the Departments of General Surgery and Cardiothoracic Surgery, San Antonio Military Medical Center, San Antonio, Texas

Interatrial bronchogenic cysts are rare entities, and the long-term clinical sequelae are unknown. This case report details the removal of a large (>4 cm) interatrial bronchogenic cyst that had been present for more than 10 years. Surgical resection remains the current standard of therapy when encountering an interatrial mass.

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Interatrial bronchogenic cysts are rare congenital primary cardiac tumors. Surgical resection remains the standard of care to prevent long-term sequelae from this embryonically derived neoplasm.

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Address correspondence to Dr Mitchell, San Antonio Military Medical Center, Department of General Surgery, 3551 Roger Brooke Dr, Fort Sam Houston, TX 78234; e-mail: thomas.a.mitchell.mil@mail.mil.

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