

Multidisciplinary Surgical Management of a Complex Thoracic Venous Malformation

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Abstract

Objective: Venous malformations are congenital low-flow vascular anomalies that may present significant therapeutic challenges when associated with extensive anatomical spread. This study presents the multidisciplinary surgical management of a complex thoracic venous malformation extending from the scapular region to the breast with pleural and retrosternal involvement following failed sclerotherapy. **Materials and Methods:** A 30-year-old female patient presented with a congenital left thoracic wall mass that progressively enlarged over time. The patient had previously undergone three unsuccessful sessions of sclerotherapy. Magnetic resonance imaging demonstrated a multicompartiment vascular lesion involving the latissimus dorsi, serratus anterior, pectoralis major and minor muscles, with extension toward the retrosternal region. The lesion showed close association with the internal thoracic and thoracodorsal vascular structures. Surgical excision was performed through a multidisciplinary approach involving plastic and thoracic surgery teams. **Results:** Intraoperatively, the lesion was found to extend to the visceral pleura and pericardial surface. Thoracic access and pleural dissection were performed with the assistance of the thoracic surgery team to ensure safe resection. Complete excision was achieved after meticulous vascular control and dissection. No postoperative complications or recurrence were observed during follow-up. **Conclusion:** Multidisciplinary surgical management may represent a safe and effective treatment option in complex thoracic venous malformations with extensive anatomical involvement and resistance to sclerotherapy. Detailed preoperative imaging and careful surgical planning are essential for successful outcomes.

Keywords: Venous malformation, thoracic wall, multidisciplinary surgery, sclerotherapy, vascular anomaly

1. Introduction

Venous malformations are congenital slow-flow vascular anomalies that are present at birth and typically enlarge gradually over time. Because they often grow proportionately with the patient and may remain clinically silent for years, diagnosis is frequently delayed until pain, swelling, cosmetic deformity, or functional limitation develops^{1,2}.

Accurate classification is essential, as current vascular anomaly terminology distinguishes venous malformations from vascular tumors and other malformation subtypes, directly influencing both imaging strategy and treatment planning².

Sclerotherapy is widely regarded as a mainstay of treatment for venous malformations; however, outcomes are less predictable in lesions with deep extension, intramuscular involvement, complex morphology, or prior unsuccessful interventions^{1,3,4}. In such settings, surgical excision may become necessary, especially when the lesion is symptomatic, refractory to prior treatment, or anatomically suitable for complete resection^{1,3,4}. Thoracic wall and breast-region venous malformations are uncommon, and lesions extending across the scapular, chest wall, and breast compartments are particularly unusual^{5,6}. We present the surgical treatment of a congenital thoracic venous malformation extending from the left scapular region to the breast after three unsuccessful sessions of sclerotherapy.

2. Case Presentation

A 30-year-old woman presented with a congenital soft tissue mass involving the left posterior thoracic region. According to the patient, the lesion had been present since birth and had progressively become more prominent over time. Clinically, the mass extended from the left scapular region anteriorly toward the breast, resulting in a visible contour deformity. In addition to aesthetic concerns, the patient reported persistent pain and increasing fatigue associated with the progressive enlargement of the lesion. She had previously undergone three sessions of sclerotherapy at another institution without meaningful regression of the lesion; however, details regarding the sclerosant agents and treatment protocols were unavailable. Given the progressive enlargement of the lesion, persistent symptoms, extensive deep thoracic involvement, and failure of previous sclerotherapy, surgical excision was indicated. (Figure 1) (Figure 2)



Figure 1. Preoperative posterior view of the left thoracic wall lesion.



Figure 2. Preoperative lateral view showing the contour deformity and superficial vascular changes.

Contrast-enhanced magnetic resonance imaging demonstrated a multicompartmental, lobulated soft tissue lesion involving the left posterolateral thoracic wall, with extension through the latissimus dorsi and serratus anterior muscles. The lesion measured approximately 16 cm in craniocaudal length and 10 cm in maximal transverse diameter.

Additional components extended anteriorly into the pectoralis major and minor muscles and toward the presternal region, with focal extension into the upper inner quadrant of the breast.

An extrapleural component was observed at the level of the 4th–5th intercostal spaces, with further extension toward the retrosternal region in proximity to the internal thoracic vessels. The lesion demonstrated lobulated contours, tubular structures, and heterogeneous contrast enhancement, consistent with a low-flow vascular malformation.

The radiologic evaluation in this case also suggested that the lesion demonstrated a complex anatomical relationship with the regional vascular structures, including the internal thoracic vessels anteriorly and the thoracodorsal vascular structures posteriorly, which increased the technical difficulty of treatment.

Surgical Technique

Surgical excision was performed under general anesthesia through an approximately 25-cm S-shaped incision extending from the left scapular region along the left hemithorax. The skin and subcutaneous tissues were carefully traversed using predominantly blunt dissection to avoid injury to the superficial components of the vascular malformation and minimize inadvertent bleeding. The lesion was identified within the subcutaneous tissue and was found to extend into the latissimus dorsi muscle. The involved portion of the latissimus dorsi muscle was included in the excision.

As the dissection proceeded deeper, the lesion was found to extend through the intercostal musculature toward the visceral pleural surface. Given the deep thoracic involvement, the thoracic surgery team joined the procedure. Controlled thoracic access was obtained by opening the space between the fourth and fifth ribs using a rib spreader, allowing direct visualization of the posterior visceral pleural surface. The component involving the pleural surface was carefully dissected and included in the excision. (Figure 3)

Dissection was then continued anteriorly along the chest wall. The vascular connections related to the thoracodorsal system were identified and controlled. The anterior component of the lesion was followed along the costal plane, where it extended superficially into the pectoral musculature and deeply toward the pericardial surface. These components were carefully dissected, and the anterior vascular attachments associated with the internal thoracic system were identified and controlled. Following meticulous dissection and vascular control, the lesion was completely excised without intraoperative complications. (Figure 4)



Figure 3. Intraoperative view during dissection of the thoracic lesion.



Figure 4. Excised surgical specimen.

The postoperative course was uneventful. The patient was monitored in the intensive care unit for one day, given cefazolin sodium, dexketoprofene trometamol, and pantoprazole. No blood infusion was needed. After the day in the ICU, the patient was followed on the ward for three additional days. (Figure 5) (Figure 6) No perioperative complication developed, and she was discharged in stable condition. Histopathological examination confirmed an arteriovenous malformation involving the scapular, axillary/trunk, and intrapleural-intercostal specimens, with focal dystrophic calcification and thrombotic foci. An additional specimen from the posterior thoracic lesion demonstrated fibrosis, dystrophic calcification, and findings compatible with an organized old thrombus, without evidence of dysplasia or malignancy. Surgical margins were free of the lesion. At the 1-year outpatient follow-up, there was no evidence of early recurrence or postoperative morbidity.



Figure 5. Postoperative posterior view.



Figure 6. Postoperative lateral view.

3. Discussion

Venous malformations are the most common type of vascular malformation and may involve skin, subcutaneous tissue, muscle, or multiple contiguous anatomic compartments^{1,2}. Their management requires an individualized approach based on flow characteristics, lesion extent, symptom burden, and prior treatment history^{1,2}. Although sclerotherapy is frequently used as first-line therapy, systematic review data show that treatment selection is not uniform across all lesion types and that multidisciplinary decision-making remains essential³.

In the present case, several features favored surgical treatment over additional percutaneous intervention: persistent growth despite three prior sclerotherapy sessions, deep intramuscular extension, thoracic wall spread, and intimate proximity to critical structures such as the pleura and pericardial surface. These factors are well aligned with published recommendations emphasizing that extensive or anatomically complex venous malformations may require operative management when less invasive methods are insufficient^{1,3,4}.

Another notable feature of this case was its unusual regional distribution, extending from the scapular region into the breast. Thoracic wall and breast-associated venous malformations are uncommon and may mimic other soft tissue or breast lesions, which can delay diagnosis and complicate management^{5,6}. Reports involving chest wall, pectoral, retropectoral, or breast-region venous malformations support the importance of careful imaging-based characterization before intervention^{5,6}.

Our case demonstrates that complete excision can be achieved safely in selected patients, even in lesions with deep thoracic extension, provided that preoperative imaging is thoroughly reviewed and vascular dissection is performed meticulously. This experience supports the role of surgery as a definitive treatment option in carefully selected complex venous malformations.

4. Conclusion

Complex thoracic venous malformations extending are rare and may be challenging to treat, particularly after failed sclerotherapy. In patients with extensive deep involvement and anatomically complex spread, complete surgical excision may provide an effective and safe treatment option. Detailed preoperative imaging and multidisciplinary planning are critical for successful management.

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Informed Consent Statement: Written informed consent was obtained from the patient for scientific use of the clinical data. All clinical data were presented without revealing the patient's identity.

Conflict of Interest: The author declares no conflict of interest.

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