PST | PEDIATRIC SURGERY IN TROPICS

GIANT LEFT THORACIC TERATOMA IN INFANCY: A SURGICAL CASE REPORT

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Keywords	**Abstract**
Teratoma Germ cell tumors Mediastinal	**Introduction:** Mature intrathoracic teratomas are rare benign germ cell tumors, particularly in infancy. Most commonly arising in the anterior mediastinum, these tumors may be asymptomatic or present with symptoms due to compression of thoracic structures. **Case Presentation:** We report a case of a five-month-old male presenting with respiratory distress and failure to thrive. Imaging revealed a large heterogeneous mass occupying the left hemithorax. Tumor markers were within age-appropriate limits. A posterolateral thoracotomy was performed, and the mass was excised piecemeal. Postoperative recovery was uneventful, and follow-up at six months confirmed no recurrence. **Conclusion:** Although rare in infants, intrathoracic teratomas should be considered in the differential diagnosis of respiratory compromise. Early diagnosis through imaging and prompt surgical intervention can lead to excellent outcomes. This case highlights the clinical, radiologic, and surgical considerations in managing mediastinal teratomas in very young children.
Abbreviations	CPAM: Congenital Pulmonary Airway Malformations AFP: Alpha-fetoprotein β-HCG: Beta-human chorionic gonadotropin MRI: Magnetic resonance imaging

INTRODUCTION

Teratomas are germ cell tumors originating from totipotent embryonic cells and are composed of tissues derived from all three germ layers, namely ectoderm, mesoderm, and endoderm. [1,2] They are classified as either gonadal or extragonadal, further subdivided into mature (benign) or immature (potentially malignant) subtypes. While mature cystic teratomas are prevalent in gonadal sites such as the ovaries, mature intrathoracic teratomas are uncommon, particularly within the pediatric population. Extragonadal germ cell tumors represent a rare neoplasm with an estimated incidence rate of 1.27 per 100,000 annually, constituting 2-3% of all germ cell tumors. [3,4] Mediastinal teratomas account for approximately 5–10% of mediastinal tumors and 3–12% of pediatric mediastinal masses. [5] Most cases are diagnosed in adolescents or young adults, rendering infantile presentations exceedingly uncommon. These tumors are frequently situated in the anterior mediastinum, where they may remain asymptomatic or produce symptoms through compression of adjacent structures. [6,7] Differential diagnoses of anterior mediastinal masses in infants include congenital pulmonary airway malformations (CPAM), bronchogenic cysts, thymic tumors, lymphangiomas, and infectious causes such as tuberculosis, particularly in regions with a high burden of tuberculosis, such as South Africa.

This report presents a rare case of a large, symptomatic mature teratoma occupying the left hemithorax in a five-month-old infant, with emphasis on its presentation, diagnostic evaluation, surgical management, and postoperative outcomes.

CASE REPORT

The mother went in for regular antenatal checkups and experienced a full-term, uncomplicated delivery with a birth weight of 2.7 kilograms. The newborn did not show any signs of respiratory distress after birth and was discharged in good condition. Subsequent assessments showed inadequate weight gain, causing the infant's weight to drop below the 3rd percentile for their age.

During the physical examination, the infant had respiratory distress and received supplemental oxygen, with saturation recorded at 95%.
The assessment showed tracheal displacement to the right, no breath sounds detected in the left hemithorax, and dullness to percussion over the area. Cardiac auscultation revealed typical heart sounds found on the right side of the chest. The abdominal and systemic assessments showed no significant findings.

A standard chest X-ray showed a rightward shift of the mediastinum with the left hemithorax appearing opacified. (Fig 1)

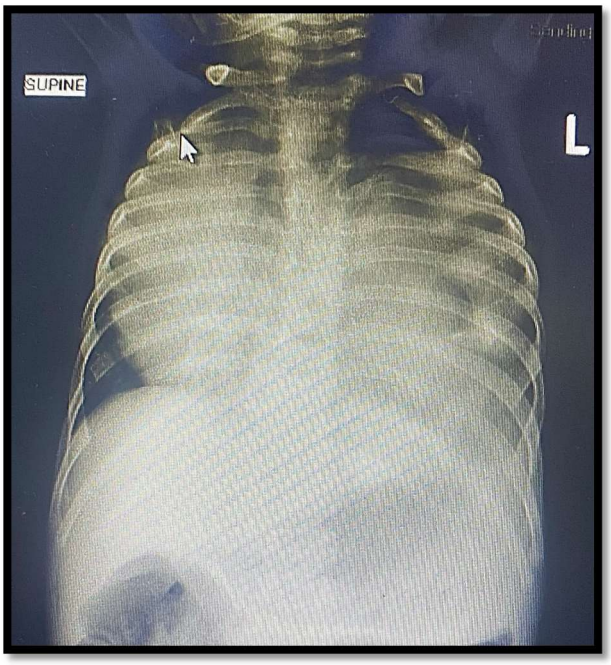
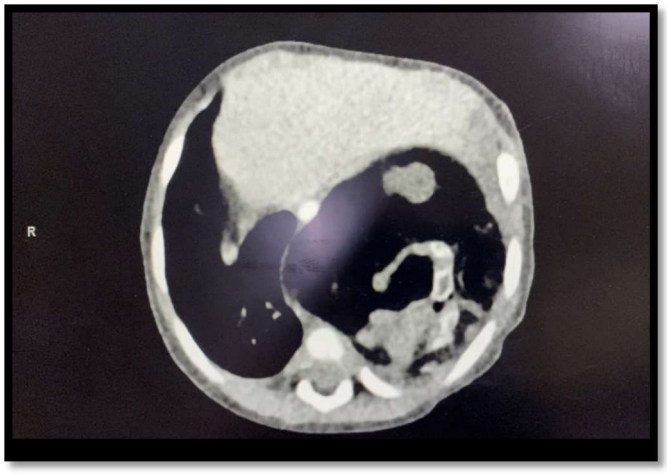


Fig 1. Preoperative plain chest X-ray

An echocardiogram was done, and a structurally normal heart with normal function was seen, but it was displaced to the right hemithorax. A contrasted CT scan of the chest reviewed in multiple windows revealed a mass located in the left hemithorax. (Fig. 2 and 3) The lesion demonstrated mixed attenuation characteristics, comprising both cystic and solid components, suggestive of a complex mass. Tumor marker evaluation revealed an alpha-fetoprotein (AFP) level of 71 ng/mL, which is within the expected physiological range for a five-month-old infant. Beta-human chorionic gonadotropin (β-HCG) levels were also within normal limits.



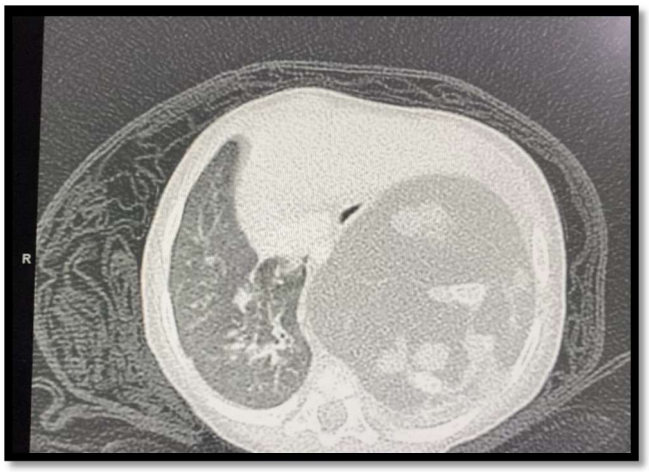


Fig 2 & 3. Preoperative CT Chest

A posterolateral thoracotomy was performed to facilitate the excision of the mediastinal mass. (Fig 4) The tumor was removed piecemeal to minimize the size of the incision. (Fig. 5) Notably, ventilation improved significantly during the procedure, corresponding with the gradual re-expansion of the left lung. An intercostal drain was inserted postoperatively to support respiratory stabilization.

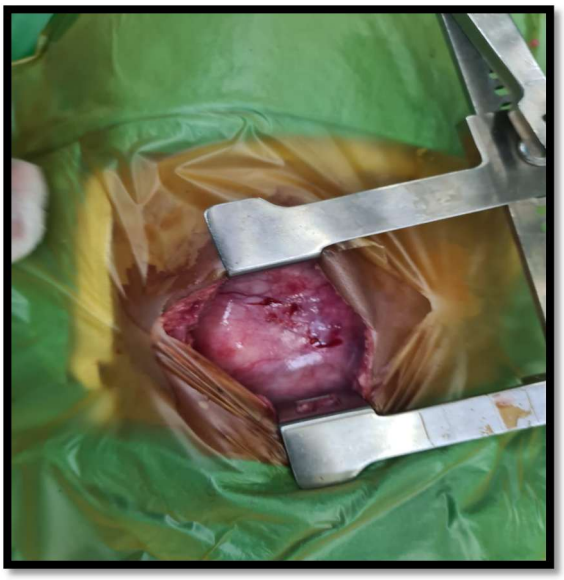


Fig 4. Left posterolateral approach with visualization of intrathoracic mass

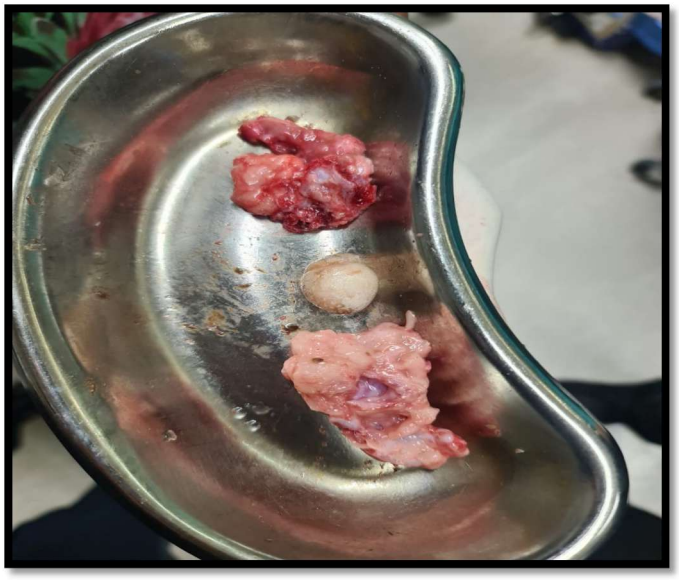


Fig 5. Some of the tissue removed from the chest

The patient was admitted to the pediatric intensive care unit, where he was electively ventilated for 24 hours. He was subsequently extubated and transferred to the general ward, showing good clinical progress. A postoperative chest X-ray confirmed satisfactory re-expansion of the left lung. (Fig 6) He was discharged home on postoperative day 4 in a stable condition with no complications. During his six-month follow-up with the pediatric oncology team, he remained well with no evidence of recurrence or delayed morbidity.

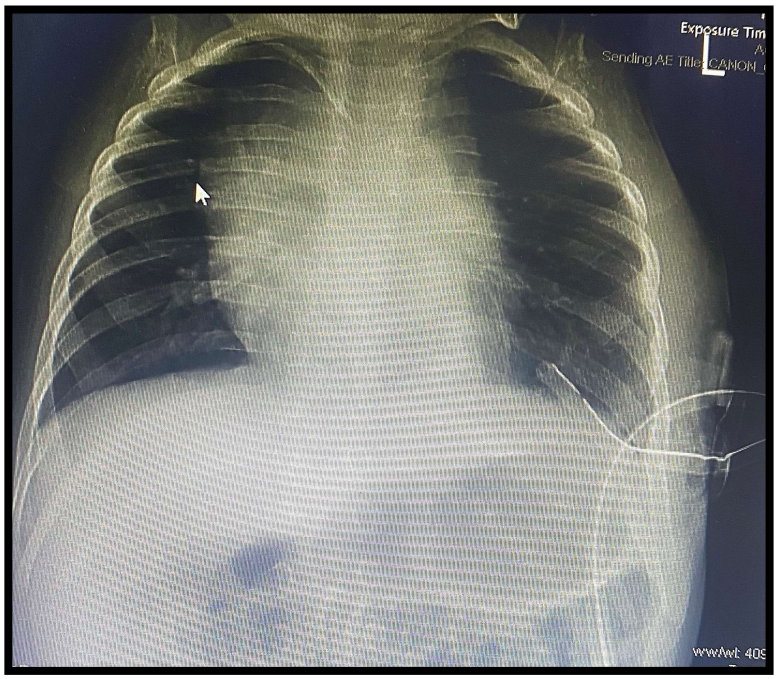


Fig. 6. Post-operative plain chest X-ray demonstrating re-expansion of the lung with the intercostal drain still in situ

Histology revealed a mature teratoma composed of a mixture of benign tissues. Ectodermal tissue was present, including squamous epithelium, sebaceous glands, and brain tissue, including choroid plexus. Mesodermal tissue present included bone, cartilage, smooth muscle, and fibroadipose tissue. Endodermal tissue was represented by intestinal glands No features of somatic malignancy were found.

DISCUSSION

Mature mediastinal teratomas are rare, benign germ cell tumors most frequently seen in adolescents and young adults, with an average age of around 20 years. [8] They represent the most common type of mediastinal germ cell tumor. [9] Presentation in infants is exceptionally uncommon. Our case, involving a five-month-old male, is among the youngest described in the literature, with only a few reports of patients under one year of age, the youngest being four months old. [10] This underscores the need for clinicians to consider neoplastic etiologies even in very young patients presenting with nonspecific respiratory symptoms.

These tumors are often asymptomatic, and up to 60% are discovered incidentally during routine chest imaging or evaluation for unrelated conditions. [11] When symptoms do occur, they are typically attributable to mass effect on adjacent thoracic structures, including the lung, bronchi, esophagus, and great vessels. Clinical manifestations can include chronic cough, chest or shoulder pain, dyspnea, orthopnea, fever, wheezing, or pleural effusion. [12] In some cases, external chest wall bulging may be observed due to the size of the mass. A striking but rare symptom is trichoptysis, the coughing up of hair, indicating direct communication between the teratoma and the bronchial tree. [13] This occurs when the tumor erodes into the airways, a feature seen only in a small fraction of cases but considered pathognomonic. Other pediatric cases have been diagnosed incidentally during investigations for unrelated issues, such as suspected foreign body ingestion, without any overt respiratory or compressive symptoms. [9]

In regions with a high burden of tuberculosis and HIV, such as sub-Saharan Africa, recurrent respiratory infections and failure to thrive often raise suspicion for pulmonary tuberculosis or HIV-related lung disease. In our patient, however, there was no known TB exposure, and the child was HIV-unexposed. This case reinforces the importance of maintaining a broad differential diagnosis and pursuing advanced imaging when initial treatment fails or clinical signs are discordant with common infections.

Cross-sectional imaging, particularly contrast-enhanced computed tomography (CT), plays a pivotal role in diagnosis and surgical planning. Mature teratomas typically appear as well-circumscribed masses with heterogeneous internal composition, often containing soft tissue, fluid, fat, and occasionally calcifications, seen in approximately 20–40% of cases. [14,15] The identification of fat and calcified components within the tumor on CT imaging is highly suggestive of a teratomatous lesion. Some tumors may exhibit hemorrhagic or necrotic regions, appearing as high-density areas on non-contrast studies. [9] Magnetic resonance imaging (MRI) may offer superior soft tissue contrast and is particularly useful for evaluating the tumor's relationship to critical mediastinal structures. [16]

Definitive treatment involves complete surgical excision, which is both curative and diagnostic. The surgical approach is determined by tumor size, location, laterality, and involvement of vital structures. Reported techniques include median sternotomy, anterolateral thoracotomy, posterolateral thoracotomy, and clamshell incision. [17] Median sternotomy is generally indicated for centrally located tumors with involvement of or adherence to the superior vena cava, innominate vein, or bilateral mediastinal compartments. Tumors with superior extension through the thoracic inlet may require a T-shaped approach, incorporating a transverse cervical (collar) incision to ensure adequate exposure. [17]

Posterolateral thoracotomy is often preferred for large, unilateral masses, especially when the tumor involves the pericardium or adjacent lung parenchyma. [15,17] In our case, this approach was selected due to the size and confinement of the tumor to the left hemithorax. While en bloc resection was not feasible, the tumor was excised piecemeal with complete

macroscopic clearance, allowing for lung re-expansion and symptom resolution. Intraoperatively, improvement in ventilation was noted as the mass was progressively removed, highlighting the degree of respiratory compromise caused by the mass effect. Minimally invasive thoracoscopic techniques have been described for mediastinal teratomas less than 10 cm in size and not adherent to major vessels. These approaches are associated with shorter operative times, reduced blood loss, decreased postoperative pain, and faster recovery.[17] However, in neonates and infants with large or symptomatic masses, open surgical approaches remain the most appropriate and safest strategy. Postoperative recovery is typically uneventful following complete resection of mature teratomas. Our patient was extubated within 24 hours and discharged home by postoperative day four, with no complications. Regular follow-up is essential to monitor for recurrence or late complications, although recurrence is rare after complete resection of a benign lesion. This case not only highlights a rare diagnosis in an unusually young patient but also underscores the importance of early imaging, multidisciplinary evaluation, and timely surgical intervention. With appropriate management, even large mediastinal teratomas in infancy can be treated successfully, with excellent long-term outcomes.

CONCLUSION

Intrathoracic teratomas, although rare, represent a critical differential diagnosis in infants presenting with failure to thrive and respiratory compromise. In settings with a high burden of HIV and tuberculosis, where chronic respiratory symptoms and poor growth are frequently attributed to infectious etiologies, these tumors may be overlooked. Early clinical suspicion, supported by appropriate imaging modalities, is essential for accurate diagnosis. Timely surgical management can result in excellent prognostic outcomes, underscoring the importance of considering neoplastic causes even in high-prevalence infectious disease environments.

REFERENCES

1. Lewis BD, Hurt RD, Payne WS, Farrow GM, Knapp RH, Muhm JR. Benign teratomas of the mediastinum. *J Thorac Cardiovasc Surg*. 1983;86(5):727-731. doi:10.1016/S0022-5223(19)39090-7
2. Saini ML, Krishnamurthy S, Kumar RV. Intrapulmonary mature Teratoma. *Diagn Pathol*. 2006;1(1):38. doi:10.1186/1746-1596-1-38
3. Sadjo SA, Destinval C, Gomola V, Lemelle JL. Incidentally Diagnosed Mediastinal Mature Teratoma in an Infant: About A Case Report and Literature Review. *SAS J Surg*. 2024;10(08):919-923. doi:10.36347/sasjs.2024.v10i08.003
4. AlHarbi KM, Sairafi MH, Almuzaini SA. Mature cystic teratoma of mediastinum compressing the right atrium in a child: A rare case report. *J Taibah Univ Med Sci*. 2017;12(6):555-560. doi:10.1016/j.jtumed.2017.06.007
5. Takeda S, Miyoshi S, Ohta M, Minami M, Masaoka A, Matsuda H. Primary germ cell tumors in the mediastinum: A 50-year experience at a single Japanese institution. *Cancer*. 2003;97(2):367-376. doi:10.1002/cncr.11068
6. Zisis C, Rontogianni D, Stratakos G, et al. Teratoma occupying the left hemithorax. *World J Surg Oncol*. 2005;3(1):76. doi:10.1186/1477-7819-3-76
7. Moeller KH, Rosado-de-Christenson ML, Templeton PA. Mediastinal mature teratoma: imaging features. *Am J Roentgenol*. 1997;169(4):985-990. doi:10.2214/ajr.169.4.9308448
8. Duc VT, Thuy TTM, Bang HT, Vy TT. Imaging findings of three cases of large mediastinal mature cystic teratoma. *Radiol Case Rep*. 2020;15(7):1058-1065. doi:10.1016/j.radcr.2020.05.011
9. De Hoyos A, Sundaresan RS. Resection of Mediastinal Teratoma. *Oper Tech Thorac Cardiovasc Surg*. 2001;6(4):209-220. doi:10.1053/otct.2001.31302
10. Drevelegas A, Palladas P, Scordalaki A. Mediastinal germ cell tumours: a radiologic–pathologic review. *Eur Radiol*. 2001;11(10):1925-1932. doi:10.1007/s003300000725
11. Tian Z, Liu H, Li S, et al. Surgical treatment of benign mediastinal teratoma: summary of experience of 108 cases. *J Cardiothorac Surg*. 2020;15(1):36. doi:10.1186/s13019-020-1075-8

12. Takeda S, Miyoshi S, Ohta M, Minami M, Masaoka A, Matsuda H. Primary germ cell tumors in the mediastinum: A 50-year experience at a single Japanese institution. *Cancer*. 2003;97(2):367-376. doi:10.1002/cncr.11068
13. Zisis C, Rontogianni D, Stratakos G, et al. Teratoma occupying the left hemithorax. *World J Surg Oncol*. 2005;3(1):76. doi:10.1186/1477-7819-3-76
14. Moeller KH, Rosado-de-Christenson ML, Templeton PA. Mediastinal mature teratoma: imaging features. *Am J Roentgenol*. 1997;169(4):985-990. doi:10.2214/ajr.169.4.9308448
15. Duc VT, Thuy TTM, Bang HT, Vy TT. Imaging findings of three cases of large mediastinal mature cystic teratoma. *Radiol Case Rep*. 2020;15(7):1058-1065. doi:10.1016/j.radcr.2020.05.011
16. De Hoyos A, Sundaresan RS. Resection of Mediastinal Teratoma. *Oper Tech Thorac Cardiovasc Surg*. 2001;6(4):209-220. doi:10.1053/otct.2001.31302
17. Drevelegas A, Palladas P, Scordalaki A. Mediastinal germ cell tumours: a radiologic–pathologic review. *Eur Radiol*. 2001;11(10):1925-1932. doi:10.1007/s003300000725
18. Tian Z, Liu H, Li S, et al. Surgical treatment of benign mediastinal teratoma: summary of experience of 108 cases. *J Cardiothorac Surg*. 2020;15(1):36. doi:10.1186/s13019-020-1075-8