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# Massive unilateral fetal axillary lymphangioma: A case report

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ABSTRACT

We report a substantial axillary lymphangioma in a fetus delivered at 38 weeks of gestation. Detailed fetal survey at 20 weeks revealed a 5.45 × 3.72 cm nonvascular cystic axillary structure without other malformations; amniocentesis was negative. Serial surveillance was performed throughout the pregnancy. A male infant weighing 3000 g with a 16 × 12 × 9 cm septated cystic mass arising from the left axilla was delivered via cesarean section. The newborn period was complicated by cellulitis overlying the mass and interval cystic hemorrhage requiring sclerotherapy and subsequent excision. Nonnuchal lymphangiomas may be etiologically distinct entities. The prognostic factors include anatomic location, presence of septa, and association with other congenital abnormalities. A thorough evaluation, multidisciplinary approach, and close surveillance should be undertaken to optimize neonatal outcomes.



## 1. Introduction

Lymphangiomas, alternatively termed cystic hygromas, are rare congenital anomalies of the fetal lymphatic system [1]. Lymphangiomas are thought to occur secondary to inadequate or otherwise aberrant lymphaticovenous connections near the fifth week of gestation, occurring in 1 per 6000 live births [2] during lymphatic system development. Additionally, obstructions between the lymphatic tree and venous vessels have also been described in the pathophysiology [3]. The majority of these benign tumors occur in the posterior triangle of the neck, with a predilection for the left side, with only 10–20% occurring in the axillary region [4].

While cervical lymphangiomas have been extensively reported, there is a paucity of literature describing axillary lymphangioma, and even fewer describing lesions greater than 10 cm. We present a case of a prenatally diagnosed 16 cm axillary lymphangioma with a discussion of prenatal and postnatal management.

## 2. Case Presentation

A 21-year-old woman (gravida 2, para 1) was referred at 15 weeks of gestation for a maternal-fetal consultation for post-surgical hypothyroidism. Her medical history was significant for papillary thyroid cancer during her first, otherwise uneventful, pregnancy and subsequent total thyroidectomy with adjuvant radioactive iodine postpartum. The patient denied prior neck radiation and her family history was unremarkable.

The current pregnancy was complicated by possible recurrence of thyroid cancer as evidenced by radioiodine imaging. A medically suppressed thyroid stimulating hormone (TSH) was maintained with levothyroxine and remaining maternal prenatal labs were unremarkable. The patient underwent sequential screening with normal fetal karyotype following amniocentesis at 24 weeks.

Initial fetal anatomical survey at 20 weeks 0 days of gestation first revealed a 5.45 × 3.72 cm nonvascular cystic structure (Fig. 1A,B). On subsequent imaging at 24 weeks, the mass had more than doubled in size, with appreciable vascular supply on color Doppler. It appeared to be septated and arising from the left axilla, anterior chest wall, and inferior left arm up to the level of the antecubital fossa (Fig. 1C,D). Repeat ultrasound at 32 weeks showed further enlargement of the mass to 15.02 × 11.44 × 16.21 cm (Fig. 2). Serial sonographic examinations by the same sonographer provided good visualization of the mass without concern for airway involvement and revealed appropriate interval fetal growth without evidence of hydrops fetalis or any singular abnormal fluid collections. Additional antepartum monitoring was performed with twice-weekly non-stress tests (NST) and weekly assessment of the amniotic fluid (AFI), which were consistently reactive with normal fluid.

Given the size of the mass, the patient was counseled regarding a recommended cesarean delivery. She presented to the hospital in early labor at 38 weeks. Delivery of the fetus through a low-transverse hysterotomy incision was unsuccessful; a 'T-uterine incision' was ultimately necessary to deliver the fetus. A 3000 g male infant was delivered with Apgar scores of 8 and 9 at 1 and 5 min, respectively.

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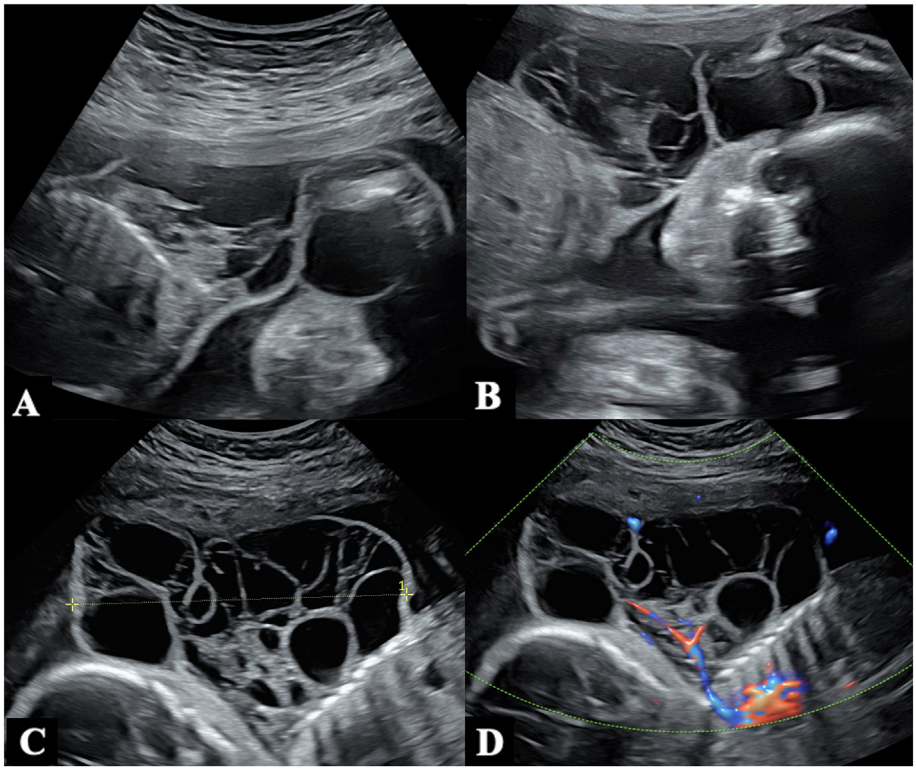


**Fig. 1.** (A,B) US at 20 weeks showing a 5.45 × 3.72 cm nonvascular cystic structure in cross-sectional views in relation to fetus. (C,D) US at 24 weeks showing a 10.6 × 6.1 × 10.2 cm mass with evidence of a vascular supply with color-flow Doppler and septa arising from the left axilla, anterior chest wall, and inferior left arm up to the elbow.

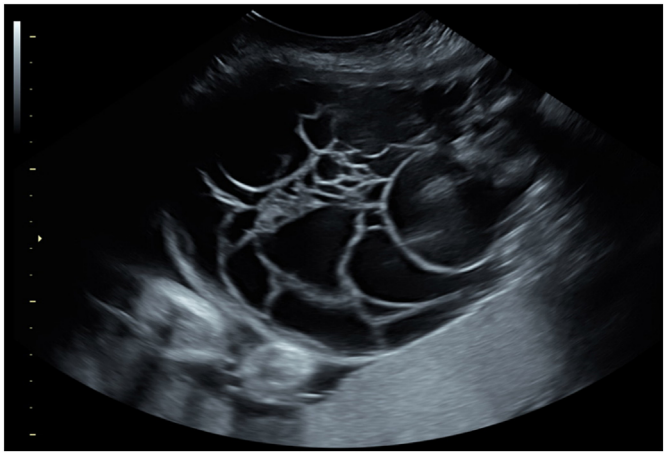

**Fig. 2.** US at 32 weeks demonstrating interval growth of the mass now at 15.02 × 11.44 × 16.21 cm.

The newborn physical exam was notable for a 16 × 12 × 9 cm heterogeneous cystic mass extending from the left thorax and involving the left shoulder complex, dorsal thorax, and humerus (Fig. 3). No other anatomical abnormalities were apparent. Chest ultrasound revealed a predominately cystic mass with multiple septations, numerous irregular cystic compartments ranging from 5 to 60 mm with appreciable vascular supply on color Doppler. MRI of the chest (Fig. 4) redemonstrated the large, extrathoracic, well-defined cystic mass extending from the axilla and proximal arm down to the level of the kidneys. The mass insinuated into the chest wall and adjacent muscles, encasing the neurovascular bundle. No substantial solid components, large vessels, or further intra-thoracic and intra-abdominal involvement were noted. Newborn hemoglobin and hematocrit at delivery were 13.8 g/dL and 40.2% respectively. The mass continued to enlarge to 20 × 13 × 9 cm with increased bruising on postnatal day 2.

Despite increasing size of the mass, the infant was stable, without signs of infection or hemorrhage, and was discharged on postnatal day 3 with a referral to an outpatient vascular anomalies clinic. The infant was readmitted postnatal day 9 for apparent cellulitis overlying the

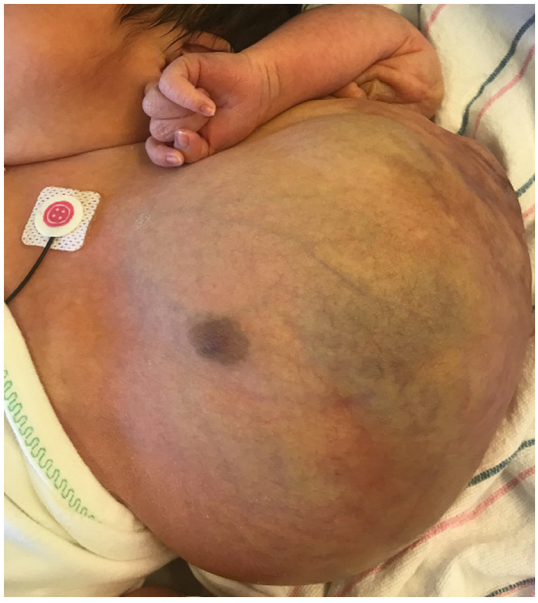

**Fig. 3.** Photograph after delivery demonstrating the left axillary mass.

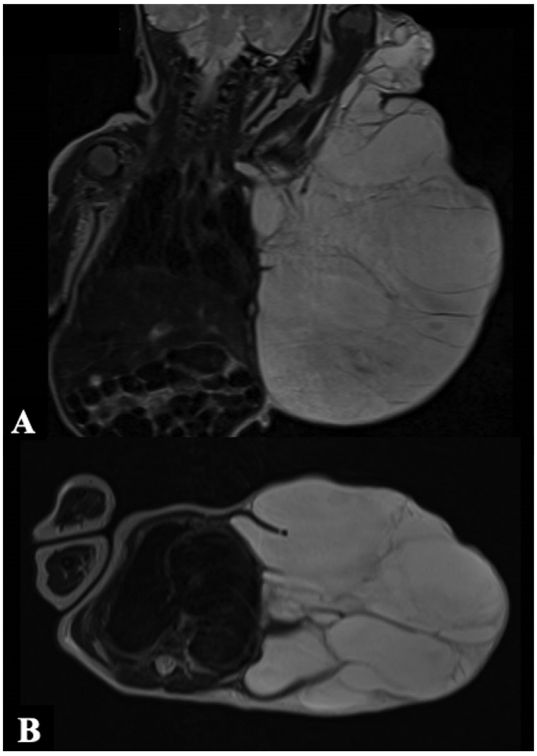


**Fig. 4.** Postnatal MRI. (A) T2 Coronal image, (B) T2 Axial image.

lymphangioma with additional concern for intracavitary bleeding given the increasing size of the mass with progressive anemia on postnatal day 14 (hemoglobin 7.9 g/dL, hematocrit of 23.1%); however, blood transfusion was deferred for religious beliefs. Following initial stabilization with conservative management and broad-spectrum antibiotics, the newborn was transferred to a children's hospital on postnatal day 17 for higher level of care.

The lesion was refractory to several rounds of image-guided sclerotherapy with doxycycline and drain placement, with a subsequent MRI demonstrating findings concerning for new foci of hemorrhage within the mass. Newborn transfusion was rediscussed and agreed upon. Additionally, the newborn was treated for an *Enterobacter* infection discovered upon culture of drain fluid. Debulking surgery and cyst aspiration were ultimately performed at 5 weeks of age. Histopathology was consistent with lymphatic malformation (Fig. 5).

Following genetic consultation with normal microarray, the newborn was discharged home in stable condition with a normal neurological exam.

## 3. Discussion

Axillary lymphangiomas of comparable size at delivery are extremely rare and are associated with critical or even lethal intralesional hemorrhage [2,5]. In general, lymphangiomas are associated with structural anomalies, aneuploidy, genetic syndromes, fetal hydrops, and intrauterine fetal demise [1]. Once identified on prenatal imaging, a detailed fetal anatomic survey is imperative to screen for additional anomalies with particular evaluation for potential upper airway obstruction. Sonographic volume assessment should also be considered

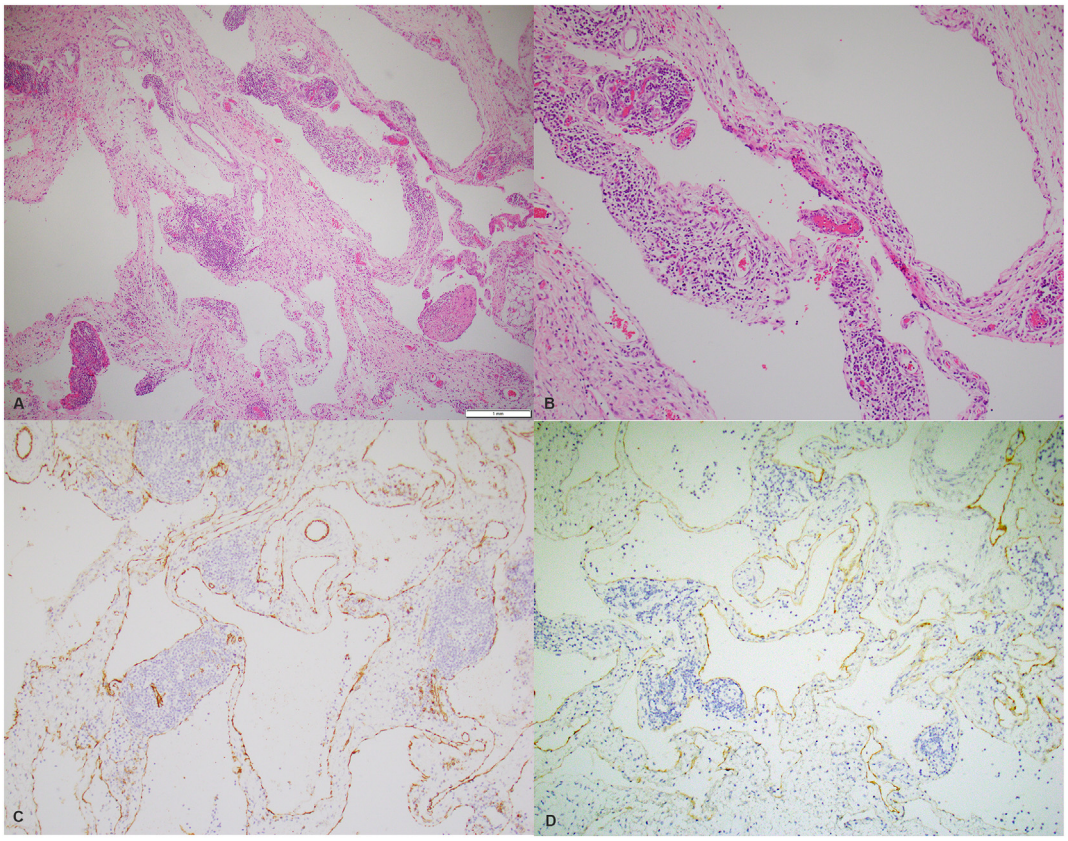


**Fig. 5.** Irregular, variably sized lymphovascular channels lined by a layer of flattened endothelial cells in loose connective tissue stroma and presence of scattered lymphoid aggregates within lymphovascular walls. (A,B) H&E sections show variably sized lymphatic channels in loose connective tissue stroma. There are lymphoid aggregates within lymphatic walls (A. X40 (magnification); B X100). (C) Immunostaining for CD31, an endothelial marker which stains both vascular and lymphatic endothelial cells, highlights lesion channels (X100). (D) Immunostaining for D2-40, a specific marker for lymphatic endothelial cells, highlights cells lining lesion channels (X100).

as a possible adjunct means of size monitoring. If extensive involvement of fetal airway is suspected, antenatal consultations with pediatric surgeons are appropriate with consideration for an ex-utero intrapartum treatment (EXIT) procedure. Fetal MRI should be strongly considered in situations of poor visibility on ultrasound, when characterization of the mass or anatomic location is difficult to assess, or if there are other concerning complexities associated with the lymphangioma. Further, fetal MRI can help delineate the anatomic relationship to airway structures and assist with delivery planning and neonatal management. Antepartum monitoring of the pregnancy should include serial fetal ultrasounds. Color-flow Doppler US is useful to asses for signs of possible intralesional hemorrhage [6]. Independent of additional maternal-fetal comorbidities, antenatal fetal testing is recommended in the third trimester [1]. Fetal karyotype testing and consultation with a geneticist are also recommended.

Poor prognostic factors include those with: chromosomal abnormalities, presence of other malformations, hydrops fetalis, thickness of the nonnuchal cystic hygroma, and presence of septations [6]. Unlike nuchal cystic hygromas, axillary lesions do not appear to be as strongly associated with hydrops fetalis [2].

Controversy exists in relation to the presence of septa in lymphangiomas and their respective association. Compared with septated cystic hygromas, nonseptate cystic hygromas *overall* reportedly have a decreased associated risk for aneuploidy and fetal death [1]. However, it has been reported that nonseptated (unilocular) *axillary* lymphangiomas have a higher association with aneuploidies than septated axillary lesions [2]. Interestingly, our case involved a septated axillary lymphangioma that was not associated with aneuploidy, corroborating the later report. These contradictory results may be secondary to the location of the cyst, as most reported lymphangiomas are nuchal in location. However, while it has been proposed that nuchal lymphangioma may be etiologically distinct from those occurring in other locations, they may appear to involve the chest in utero [7,8].

It has further been proposed that septate and nonseptate axillary lymphangiomas should be viewed as different entities altogether [2]. Nonseptate axillary lesions, in addition to having a higher association with chromosomal abnormalities and smaller size, tend to have a higher rate of spontaneous resolution; fetal morbidity is more associated with concurrent chromosomal abnormalities. In contrast, and as demonstrated by our case, septated axillary lesions are larger, less associated with other congenital abnormalities, with morbidity more directly linked to progressive growth and size of the mass. Septated axillary lesions are also associated with increased risk of shoulder dystocia and increased cesarean delivery rate, likely from mass effect of the lesion [2].

Large lymphangioma do not resolve spontaneously and postnatal surgical excision is the reported gold standard of treatment [9]. However, the mass may involve vital anatomic structures, thus hindering complete surgical excision. Intralesional injections of sclerosing agents, such as OK-432 (inactivated streptococcal organisms), doxycycline, or Bleomycin, have been utilized to decrease the mass size either completely or partially prior to resection [6,10]. Long-term treatment with sirolimus, a vascular endothelial growth factor (VEGF) receptor-3 inhibitor, has also reportedly resulted in successful resolution of large axillary lymphangioma deemed non-operable [10].

While controversial, several peripartum management strategies exist. Neck lymphangiomas close to the fetal airway have been treated with prenatal intrauterine intracystic injection of OK-432 or aspiration prior to delivery [11]. Caution should be exercised in highly vascularized lesions or if any indication of current intralesional hemorrhage is present. Additional labor complications include shoulder dystocia and uterine rupture.

Treatment of large axillary lymphangioma is clinically challenging and a combination of expectant management, medical, and surgical approaches are employed, depending on the severity and circumstance. Currently, no standard recommendations for antepartum management or delivery planning exist and successful outcomes often involve an individualized, multidisciplinary approach. Close postnatal monitoring of the size and characteristics of the lesion should be performed to assess for complications, including overlying cellulitis and hemorrhage.

## Contributors

Dana M. Hutchison contributed to study conception and design, data collection and analysis, and drafting and editing of the manuscript.

Brian A. Crosland contributed to study conception and design, data collection and analysis, and editing of the manuscript.

Larry Wang contributed to study conception and design, data collection and analysis, and editing of the manuscript.

Michael P. Nageotte contributed to study conception and design, data collection and analysis, and editing of the manuscript.

All authors saw and approved the final manuscript.

## Conflict of Interest

The authors declare that they have no conflict of interest regarding the publication of this case report.

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## Patient Consent

Obtained.

## Provenance and Peer Review

This case report was peer reviewed.

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