CASE REPORT

A Rare Massive Congenital Cervical Lymphangioma: Case Report with Systematic Review of the Literature

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Abstract

Aim and background: Lymphangiomas are congenital anomalies of the lymphatic system consisting of benign cystic masses of enlarged lymphatic vessels sequestered from the lymphatic circulation and may appear at any site and age. Diagnosis predominantly occurs at birth with 95% located in the cervical, axillary, and head regions. Occasionally, lymphangiomas produce symptoms in neonates by exerting pressure on surrounding tissues, as seen in large masses in the mediastinum and neck regions, as well as infective or hemorrhagic complications. The purpose of this article is to evaluate the clinical presentation and advances in the management of lymphangiomas and to present a case of massive cervical lymphangioma discovered antenatally on the 30th gestational week.

Case description: We present a case of a 27-year-old pregnant woman gravida 2, para 1, taking folic acid up to the 9th gestational week. Her brother was born with Down syndrome and died 9 months after birth. On prenatal sonographic examination on the 22nd gestational week, no fetal abnormalities were found. On prenatal ultrasonography at the 30th gestational week, a tumor formation originating from the fetal neck and polyhydramnios were discovered. Following various investigations including prenatal MRI, the diagnosis of massive cervical lymphangioma (cystic hygroma) was made. A male neonate was delivered by cesarean section by the 41st gestational week and is continuously surgically managed by pediatric surgeons and other specialists.

Conclusion: Massive lymphangiomas are complicated tumors, which pose management difficulties. They can be effectively managed by staged surgical intervention and multi-professional healthcare teams including surgeons, pediatricians, primary healthcare clinicians, dermatologists.

Clinical significance: The case is rare and interesting due to the tumor's massive size and resulting compressive symptoms. Continuous surgical treatment and multidisciplinary management approach were applied, improving the prognosis for the child. This will serve as an education/encouragement for healthcare teams.

Keywords: Cystic hygromas, Lymphangioma, Massive, MRI, Prenatal ultrasonography, Surgery.

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Introduction

Congenital anomalies of the lymphatic system resulting from sequestration of primitive lymphatic sacs from the normal lymphatic circulation and consisting of benign cystic masses of enlarged lymphatic vessels are referred to as lymphangiomas. They are believed to manifest from the 6th week of pregnancy when the forming lymphatic sacs unsuccessfully fail to connect to the rest of the lymphatic system or to the internal jugular vein.[1] Thus, lymphatic malformations are swellings that are made up of multiple lymphatic cysts,[1–4] which comprise many lymphatic vessels that do not connect to normal lymphatic circulation.[3,4] Their presentation ranges from small masses affecting localized areas of the skin and subcutaneous tissues to extensive swellings that can affect a whole limb or region. The sizes of the cysts vary from very small or very large—up to several centimeters across, depending on the amount of fluid they contain. The term cystic hygroma is applied to lymphangiomas developing within loose areolar connective tissue and denotes the mass effect and the cystic nature of these lesions. The term "hygroma" can be directly translated into "moist tumor"[3,4] or "water-containing tumor."[1,4] Lymphangiomas are commonly found in the neck but they can occur almost anywhere in the body.[1,3,4]

Moreover, lymphatic malformations often appear to affect multiple separate parts of the body, but when investigated with MRI, it is revealed that the different swellings are linked

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as one continuous lesion.[1,4] It is rare to find completely separate lymphatic malformations in various parts of the body.[1,2,4] The provision of differential diagnosis of congenital cystic cervical tumors presents a diagnostic challenge. Equally, surgical difficulties and challenges are frequently presented by lymphangiomas as a result of their tendency to expand to neighboring tissues.

In spite of the fact that lymphangiomas typically present as neck masses with no symptoms, the natural progression ranges from complete regression to hostile invasion toward neighboring structures.[5] Consequently, occurrence of considerable disfigurement and issues are seen when they grow aggressively.[6] There is, therefore, a need for more awareness and education of these rare conditions for healthcare professionals and caregivers. Hence, the purpose of this article is to evaluate the presentation and management of lymphangiomas, to present a case of massive lymphangioma of the neck discovered antenatally on the 30th GW of the second pregnancy of a 27-year-old female, and to discuss the clinical presentations and advances in diagnosis and management of lymphangiomas.

Case Description

We present a case of a 27-year-old woman bearing a second, normal pregnancy (G2P1) of a male fetus referred to the Department of Obstetrics and Gynecology on the 30th GW with cervical malformation visualized on ultrasound (USD). The mother, with family history of diabetes, denied smoking or alcohol intake and was taking folic acid up to the 9th GW. Her brother, who was born with Down syndrome, died 9 months after birth. Prenatal sonographic examination in 22nd GW found no fetal abnormalities, however, in the following echographic examination in the 30th GW, a tumor formation originating from the fetal neck and polyhydramnios was discovered, resulting in the referral.

Based on USD data and the location of the formation, there were suspicions of compression of the esophagus and trachea. Blood tests were performed, which were normal. For the purpose of diagnostic clarification, a prenatal MRI scan was carried out in the Translational Center of our Medical University, after the written consent of both parents was obtained, which confirmed the presence of a tumor formation and specified the involved structures.

After a discussion with the patient and explanation/counseling given to her about her child's condition, on the basis of the analyzed data from the imaging studies, a date for a cesarean section was scheduled on 41st GW. The live birth was delivered, weighing 3550 gm, height of 50 cm with presence of a massive tumor formation, involving the anterior half of the left side of the neck, extending to the floor of the oral cavity and the left ear. On palpation, the mass was found to be mobile, nontender, nonpulsatile with a soft and smooth consistency and no overlying skin changes. Due to increase in size of the lesion and pressure on the surrounding structures, the neonate developed respiratory distress with progressive dyspnea and stridor, and the infant was intubated. Following continuing respiratory distress, a tracheostomy was placed. After consultations with a pediatric surgeon, it was assumed that the mass on the neck was cystic hygroma/lymphangioma.

The infant was then admitted to the Pediatric Surgery Department for further observation, investigation, and treatment. Operation for removal of the mass was undertaken due to reduced quality of life of the infant. The invasion by partial excision of the accessible lymph formation was performed *via* left lateral cervicotomy.

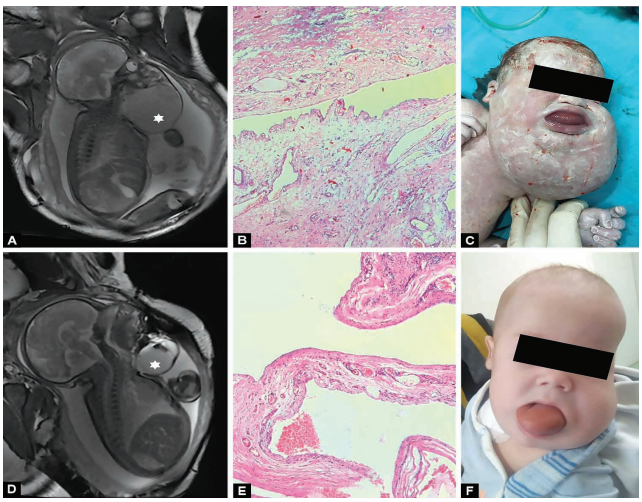
Operative specimen was sent for pathological confirmation which supported the diagnosis of lymphangioma. Injection of the sclerosing agent, bleomycin in the tongue according to the scheme was given to the infant. Images of the various features of the lymphatic malformation of the infant, including the prenatal MRI imaging (A, D) of the mass and histological confirmation (B, E) of the infant before and after the surgical operation (C, F) can be seen in Figures 1A to F.

As a result of the severity of the case and its complications, the infant is still admitted in the Pediatric Surgery Clinic where his continuous management and surgical treatment by interdisciplinary surgeons from ENT, Pediatric Surgery, and Obstetrics and Gynecology/Neonatology departments are being undertaken.

Discussion

In this article, we have presented a case of a neonate born to a 27-year-old woman who has a baby with rare massive lymphangioma of the neck diagnosed prenatally by the 30th GW. In addition, review of the literature was undertaken, including discussion of the clinical manifestations and management of lymphangiomas.

First described in 1854 by Virchow, lymphangiomas are cystic, benign, hamartomatous malformations of the lymphatic system characterized by localized dilatation of lymphatic vessels.[7,8] Lymphangiomas most often manifest in the neck (75%), typically in posterior triangle/lateral aspect, behind the sternocleidomastoid muscle. Locations of lymphangiomas following the neck in frequency are the axilla, groin, mediastinum, and oral cavity regions, however, they may manifest anywhere in the body.[7–9] Over 95% of lymphangiomas appear in the extremities,



Figs 1A to F: Images of the various features of the lymphatic malformation of the infant: (A) Sagittal T2-weighted MRI: large cystic formation starting from the neck and spreading to the face (star); (B) Histological features of dilated lymphatic channels with different size in loose connective tissue. Hematoxylin-eosin: ×40; (C) Newborn with massive lymphangioma before surgery; (D) Sagittal T2-weighted MRI: Normal structures of central nervous system; formation on neck (star); (E) Histological features of large and dilated lymphatic channels among loose connective tissue. Hematoxylin-eosin: ×40; (F) Operated newborn after surgical intervention

head and neck regions of the body combined.[10,11] The term cystic hygroma refers to macrocystic lymphatic malformations that develop within loose areolar tissue and describes the cystic nature of these lesions. Lymphangiomas can also manifest in internal viscera, including in the abdomen, spleen, liver, kidney, and other areas in 5% of cases.[7,8,10,11] In the case we presented here, the massive lymphangioma is located in the region of the neck and the diagnosis of cystic hygroma was placed.

Lymphangiomas have incidence of between 1.2 and 2.8 per 1000 infants.[12] Reported prevalence has varied between studies from 1 in 4000 live births to 1 in 6500 live births.[13,14] To date, there are no data reporting the link between ethnicity and the susceptibility of developing lymphangioma. Likewise, in many analyses, the gender proportion of developing lymphangiomas is equal,[15–18] while few writers have stated that lymphangiomas are predominant in the male population.[19,20] The majority of lymphangiomas are evident after delivery, with almost all cases appearing by early childhood. Lymphangiomas are evident on prenatal ultrasonography or in newborns in 50–70% of cases, and 80–90% have manifested in the course of the first 5 years of life. Nonetheless, lymphangiomas can still occur in young adults.[15,21,22] Massive neck lymphangioma was discovered prenatally on the 30th GW, and its presence was confirmed at birth in the case we presented here. Spontaneous resolution is relatively infrequent described in about 15% of reported cases of the condition.[20–22]

Lymphangiomas are thought to start with sequestration of lymphatic cells, which did not link with the draining apparatus during the gestational period embryologically.[7,8,22] The origin of this abnormality has been further explained in three proposed theories:[23] firstly, lymphangiomas are a result of blockage of the primitive lymphatic sacs from communicating with the internal jugular vein; secondly, the obstruction of the development of the primitive lymph sacs in the embryogenesis process leading to their isolation from the rest of the lymphatic system; and thirdly, the hypothesis that lymphatic sacs arise in ectopic locations during embryogenesis.

Over 60 years ago, the "rule of 7" was proposed as a diagnostic aid in the differential diagnosis of neck masses based on the duration of symptoms.[24] This rule dictates that the typical duration of symptoms for cervical masses caused by infections averages 7 days, while for neoplasms, 7 months; and an interval of 7 years is characteristic of developmental anomalies.[22–24] In the case we presented here, the massive lymphangiomas were identified from the 30th GW on prenatal USD and MRI, making a congenital neoplastic etiology apparent.

Cystic hygromas are usually anechoic on USD, arising from the back of the neck, or bilaterally. It is rare for cystic hygroma to develop in the anterior region of the neck.[25] Eighty-five percent of lymphangiomas are unilateral in the neck. In some patients, they may extend to the facial and oral regions[26–29] and up to 15% are located centrally/bilaterally in both sides of the neck.[27–29] The area of the abnormal growths could become massive in size, as with our case.[18,26–29]

Differential diagnoses of lymphangiomas including hamartomas, malformative syndromes, and chromosomal anomalies (e.g., Noonan syndrome and Down syndrome) should be excluded.[27–29] The location of the lesion in relation to the sternocleidomastoid can aid diagnosis—masses arising in the posterior triangle are typically neoplasms. Certain genetic syndromes are known to be associated with lymphangiomas such as trisomies 18 and 21, Turner syndrome, and fetal alcohol syndrome. Lymphangiomas in association with Down syndrome typically arise from the posterior neck region.[21,29] In our case, the lymphangioma arose from the anterior region of the neck. In addition, chromosomal analysis did not reveal a chromosomal aberration with normal 46XY karyotype.

Ultrasound is the routine method for imaging and widely used in the antenatal diagnosis of cystic hygroma.[7,28,29] From prenatal USD, the location, sonographic characteristics, and associated findings can be understood. The diagnosis of cystic hygroma can also be made after birth and further characterized by conducting clinical examination, and the lesion can be verified *via* ultrasonography of the lump or mass. Computed tomography (CT) examination and MRI scan can be undertaken in order to obtain a clear view and knowledge of the surrounding anatomy in order to plan surgical intervention.[7,8,10,11,27–29] MRI is preferred to CT in neonates to prevent radiation exposure. USD and MRI techniques have been used in the investigation and management of the case under study here. In addition, in our case, prenatal MRI scan was performed which confirmed the presence of a tumor formation and specified the structures involved. Moreover, the combination of all diagnostic modalities, USD, MRI, and postnatal examination presents a new model of diagnostics used for confirmation of cystic hygroma/lymphangioma diagnosis.

Furthermore, surgical treatment is indicated for very large cystic lymphangiomas affecting the neck, head, tongue, and oral cavity,[7,9,26,29] and extra care is required intraoperatively in order to preserve vital structures. Surgical excision is the gold standard therapy and lateral cervical incision is the approach of choice in masses of the neck. The aim of surgical intervention is to improve cosmesis and abate compressive complications such as dyspnea, stridor, and dysphagia, ideally with removal of the tumor in a single excision. Surgical removal of lymphangiomas can be completed in staged procedures.[7,26,29] In 5–15% of patients, recurrence occurs, and repeated surgical excisions are necessary.[7,26–29] The infant we presented here underwent an operation in order to minimize recurrence of the lesions, and a multidisciplinary and multiprofessional approach has been used in the management of the patient.

The use of injection sclerotherapy presents a viable therapeutic alternative and can avoid the short-term (hemorrhage/hematoma, seroma, postoperative infection, damage to adjacent vital organs and neurovascular structures, e.g., recurrent laryngeal nerve) and long-term morbidity (recurrence, scarring, disfigurement) associated with surgery. Sclerosing agents of choice include doxycycline, steroids, bleomycin, ethanol, and OK-432. Injection of intralesional bleomycin injection is recommended for large macrocystic malformations with extension to nearby tissues.

In addition, prenatal treatment involving the use of intralesional injection of OK-432 has led to better outcomes involving the reduction of the size of the tumor with minimal complications and/or perilesional fibrosis.[30] OK-432 injection alone for macrocystic lesions, and for microcystic and cavernous lymphangiomas as a preliminary treatment followed by operative removal, is also recommended by Okazaki et al.[31] Other reported therapeutic methods include radiotherapy, cryotherapy, CO_2 or Nd-YAG laser therapy, and aspiration. Successful management of patients with massive lymphangiomas of neck, head, and oral cavity regions is achievable by surgical interventions and gives good outcomes, although, additional care should be taken when performing complete excision of the lesions.[7,9,26,31] This is the case with the patient we presented here.

Conclusions

LLymphatic malformations or lymphangiomas are benign and complicated tumors, which pose management difficulties. Hence, they are efficiently and effectively managed by multiprofessional healthcare teams including surgeons, pediatricians, family doctors, primary healthcare clinicians, dermatologists, etc., as was done in the case presented here. It is not always possible to treat the condition surgically, which is usually the treatment of choice. For the management of small, nonexpanding lesions, observation of the patient is suggested. However, surgical resection is indicated for lesions that persist, enlarge, or produce obstructive symptoms, as was performed in the rare massive lymphangioma that we presented in this article.

Clinical Significance

The case presented here is rare and interesting due to the tumor's massive size resulting in compressive symptoms and complications. Continuous staged surgical treatment and multidisciplinary management approach were applied, improving the prognosis for the child. This will serve as an education/encouragement for other multiprofessional teams that such complicated cases of rare massive lymphangioma can be managed with great success.

Ethical Approval

The consent to undertake the case study and for its publication was obtained from the patient. Project Protocol Number № 5.29.2016.

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