PRENATAL DIAGNOSIS OF LYMPHATIC MALFORMATIONS

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Recent advances in prenatal diagnosis have enabled in utero diagnosis of lymphatic malformations. Depending on their size and location, lymphatic malformations can cause complications, and therefore, timely referral to specialised multidisciplinary centres allows for better planning of subsequent diagnostic and therapeutic steps.

Lymph is as important as blood in the body. Its role is to collect nutrients, remove unwanted substances from tissues and drain lymph cells to the lymph nodes, allowing the immune system to function properly. It flows in a dedicated circulatory system, which is structured like a tree. The branches of the system are present in every part of the body, collecting in the lymph nodes and eventually converging in a stem called the thoracic duct. This stem drains into the venous system in the upper left thorax. This complex but precise architectural structure begins to develop in the fifth embryonic week, originating from the embryonic venous system and branching progressively until it reaches its final form around the 13th week of gestation. During this development, four pouches progressively appear: two in the neck, one in the thorax, and one in the abdomen.

Alterations during this process can lead to defects in the formation of the lymphatic system, known as lymphatic malformations (LMs). LMs are divided into microcystic and macrocystic LMs based on the size of the cyst; they may be mixed if both types are present.

Most countries in Europe propose three prenatal ultrasound examinations of the foetus to detect anatomical alterations in a timely manner. LMs are typically identified by routine ultrasound after 18 weeks of gestation as hypoechogenic, clear, fluid-filled cysts. The most common location is the neck, followed by the thorax, limbs, and abdomen. Once LM is suspected, the family is usually referred for prenatal MRI, which is not harmful to the foetus and provides a more precise characterisation of the malformation. It is important to note that although some authors describe occasional spontaneous involution of LMs during pregnancy, such a course is unlikely. If a lymphatic malformation is diagnosed in the prenatal phase, it is important to seek informationfrom a centre with experience in vascular anomalies and a multidisciplinary structure (*Editor's note: this also applies if an LM is diagnosed at any stage of life*).

The location of the LM is a crucial factor in planning the delivery, i.e. its mode and place. If the LM is in the neck, prenatal care focuses primarily on ruling out airway obstruction and providing multidisciplinary counselling on the best options for a safe delivery, including prompt intubation of the newborn if needed (Figure 1).

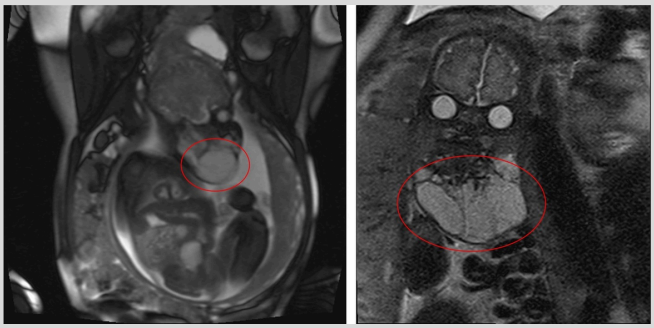

Figure 1: An MRI of a foetus at 35 weeks' gestation is shown. The lymphatic malformation (indicated by the red circle) in the neck is compressing the airways, making monitoring during pregnancy mandatory. Referral to a specialist centre allows proper planning of the delivery to secure the airways in a timely manner after birth.

Source: Courtesy of the Division of Pediatric Radiology, Medical University of Graz.

Lymphatic malformations in the shoulder and thoracic wall can become large during pregnancy. Prenatal investigation of these usually cystic masses may indicate the need for a caesarean section to avoid shoulder dystocia and complications such as nerve injury, clavicle fracture, or bleeding into the cysts and anaemia. In these cases, it is also important to determine whether the malformation extends into the intrathoracic space.

In the case of cystic lesions in the abdomen, it is important to first rule out other conditions such as ovarian cyst, choledochal cyst or intestinal cyst. Once the diagnosis is clear, it is important to monitor the evolution of the lesion during pregnancy to determine the size of the malformation and the degree of involvement or compression of neighbouring structures, as this will guide postnatal treatment. Figure 2 shows a large intra-abdominal LM that caused prenatal compromise of the bowel loops. Postnatal intracystic bleeding led to massive enlargement of the abdomen.

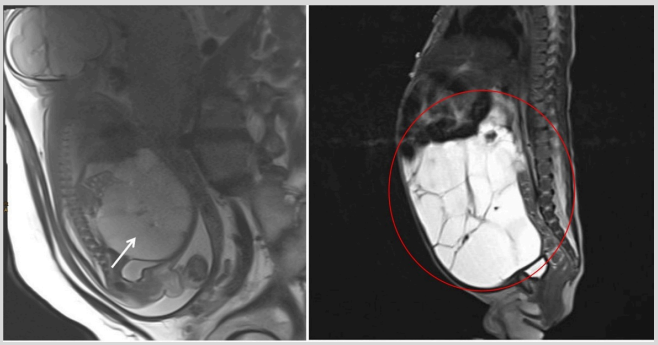

Figure 2: An MRI of a foetus at 32 weeks' gestation is shown, showing an intra-abdominal lymphatic malformation (indicated by the white arrow). An MRI of the newborn is shown. The red circle indicates the lymphatic malformation occupying the entire abdomen. This malformation may be connected to the bowel loops and filled with chylous (milky fluid) after birth, or it may be separated from the bowel and contain a clear fluid in utero.

Source: Courtesy of the Division of Pediatric Radiology, Medical University of Graz.

LMs can also be diagnosed in the lower extremities or in multiple locations, possibly indicating a syndromic form, as shown in Figure 3. In this prenatal MRI, multiple LMs were detected and the child was postnatally diagnosed with CLOVES syndrome.

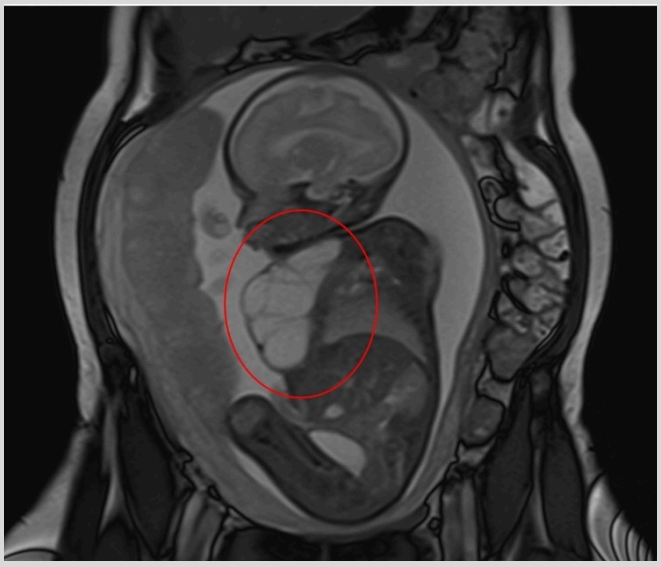

Figure 3: An MRI of a foetus at 31 weeks' gestation. The red circle indicates a macrocystic lymphatic malformation in the thoracic wall. This patient also had microcystic lymphatic malformations and was later diagnosed with CLOVES syndrome after birth.

Source: Courtesy of the Division of Pediatric Radiology, Medical University of Graz.

Following a diagnosis of LM, referral to a specialised centre is recommended as these conditions are complex and require the expertise of a multidisciplinary, dedicated team. In these centres, parents will receive comprehensive advice on the future development of the disease, based on the experience of specialists with both paediatric and adult patients. The interdisciplinary approach of these teams ensures a comprehensive, multidisciplinary diagnostic and therapeutic strategy, avoiding a solitary treatment method. Medical therapy, interventional radiology, and surgery should be provided when necessary and promptly to optimise these infants' survival rate and future quality of life.

Receiving a prenatal diagnosis of LM can be an unexpected and overwhelming event for families, particularly because of the uncertainty regarding postnatal functional complications and future quality of life. A prompt diagnostic evaluation at a vascular anomalies centre by a multidisciplinary team allowsfor appropriate counselling of the families to provide a clear understanding of future steps. Contacting a patient organisation and connecting to other affected families might give emotional support.

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FURTHER RESOURCES ON LYMPHATIC MALFORMATIONS

The VASCA Working Group has produced a suite of resources to support clinicians and families navigating lymphatic malformation diagnosis and management. Click each title below to access:

- VASCA-WG Diagnostic and Management Patient Pathway for Lymphatic Malformations
- The VASCERN-VASCA working group diagnostic and management pathways for lymphatic malformations
- VASCERN Webinar Replay: Diagnostic and Management Pathway for Lymphatic Malformations