Ultrasound diagnostics of dilated thoracic lymphatic vessels in a newborn with PIEZO-1 defect

Jacek Kuźma[1], Wojciech Mądry[1], Magdalena Zarlenga[2], Bożena Kociszewska-Najman[2], Mariusz Kuśmierczyk[1], Maciej Aleksander Karolczak[1], Jacek Pająk[1], Michał Zawadzki[1], Michał Buczyński[1]

[1]Department of Cardiac and General Pediatric Surgery, Medical University of Warsaw, Warszawa, Poland
[2]Department of Neonatology, Medical University of Warsaw, Warszawa, Poland

Correspondence to:
Jacek Kuźma, MD,
Department of Cardiac and General Pediatric Surgery, Medical University of Warsaw, Żwirki i Wigury 63A, 02–091 Warszawa, Poland,
phone: +48 22 317 98 81,
e-mail: kuzmajacek@yahoo.com

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Lymphangiectasia represents lymphatic vessels dilation following infections, radiation therapy, mastectomy, or Fontan operation when damaged lymphatic vessels or increased central venous pressure impair lymph drainage.

Congenital lymphedema is a condition in which lymph vessels dysfunction leads to hydrops fetalis. Generalized lymphatic dysplasia (GLD) is a rare form of primary lymphoedema. There are several disorders with lymphangiectasias including cystic hygroma, nonimmune hydrops, tumors (e.g. teratoma), genetic syndromes (e.g. Turner, Noonan, Prader-Willi, Angelman), Milroy disease, congenital pulmonary lymphangiectasia, or neurofibromatosis [1, 2]. The abnormal development of lymphatic structures may be due to PIEZO-1 mechanosensory transduction protein mutation [3], which was found in patients with GLD and hereditary hemolytic anemia — xerocytosis [4]. The autosomal recessive mutation is responsible for GLD with hydrops fetalis, childhood-onset lymphedema, and less pronounced hemolytic anemia. The signs of lymph congestion are peripheral edema, pleural or pericardial effusion, ascites, or protein-losing enteropathy. Postnatal edema may resolve spontaneously within the weeks but, in severe cases, may cause neonate demise. All patients present with abnormal lymphoscintigraphy [3].

Case presentation: We present a case of a 3-week-old baby boy with chronic generalized edema and respiratory failure referred for cardiological evaluation. In medical history, the prenatal course was complicated due to hydrops fetalis requiring multiple cordocenteses with blood and albumin transfusions and pleura drainage with pleuro-amniotic shunts. The prenatal microarray assessment was normal.

A preterm newborn (35 weeks of gestation) was born by urgent Caesarean section with a bodyweight of 3000 g. Physical examination revealed prominent nuchal fold, dysmorphia, peripheral edema, and symptoms of dyspnea.

Ultrasonography showed bilateral interstitial syndrome with multiple B lines and left pleural effusion. Postnatal screening transthoracic echocardiography (TTE) revealed normal heart anatomy, myocardial contractility, patent foramen ovale, and persistent arterial duct. The child presented signs of pulmonary distress requiring respiratory support, oxygen supply, and left pleural drainage.

In a 3-week cardiological follow-up, the condition was moderate with dyspnea, tachycardia 160/min without any heart murmur. Blood pressure was 76/47 mm Hg with mean arterial pressure of 57 mm Hg and SaO_2 95% on oxygen delivery. Peripheral edema in the lower extremities was prominent.

TTE revealed features of arterial pulmonary hypertension with an abnormal profile of pulse wave Doppler pulmonary flow with decreased acceleration time (Act) and the ratio of Act to pulmonary ejection time <0.3. On two-dimensional echocardiography, as well as color Doppler flow (Figure 1A–C) in suprasternal view, dilated lymphatic vessels were visual-

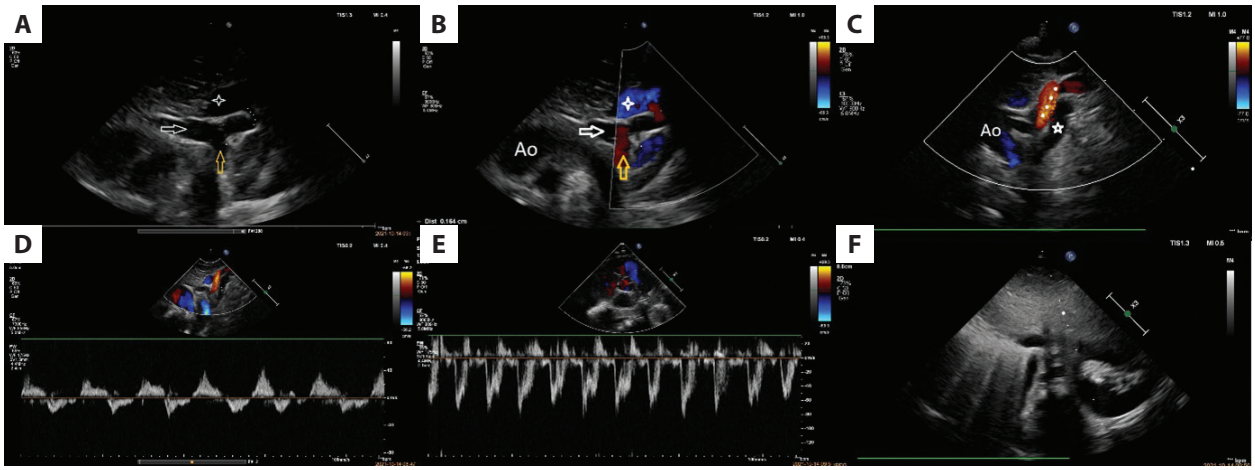

Figure 1. A, B. Suprasternal notch view, 2DE and color Doppler flow: dilated lymphatic vessels draining from lower (the yellow arrow) and right (the white arrow) side of the body *via* the thoracic duct into the innominate vein (the star). **C.** Dilated lymphatic vessel (the white star) below the left subclavian artery (the white dots) draining from the left side of the body. **D.** Pulse wave Doppler flow in a lymphatic vessel. **E.** Pulse wave Doppler pulmonary flow with features of pulmonary hypertension. **F.** Subcostal view, left pleural effusion

ized (Supplementary material, *Video S1–S4*). The presented figure suggested the diagnosis of persistent arterial duct or systemic — pulmonary — anastomoses. However, the color and wave Doppler flow indicated dilated lymphatic vessels with drainage via the thoracic duct into the innominate vein. The medical history of hydrops fetalis and lymphorrhea was crucial in the final diagnosis. Postnatal genetic consultation indicated PIEZO-1 lymphatic dysplasia with autosomal recessive inheritance. Progressive pulmonary and multiorgan failure caused the neonate's demise before heart catheterization and lymphoscintigraphy. The autopsy was not acceptable to the parents, and the diagnosis of generalized lymphatic vessels dysplasia was not confirmed.

Ultrasonography is a highly valuable tool in the differential diagnosis of congenital lymphedema with the possibility of abnormal lymphatic vessels visualization.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/kardiologia_polska.

Article information

Conflict of interest: None declared.

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