RETROPERITONEAL LYMPHATIC MALFORMATION AS A CAUSE OF ABDOMINAL PAIN IN A PEDIATRIC PATIENT. CASE REPORT

María de los Ángeles Romero-Umbariba
Universidad Nacional de Colombia - Bogotá Campus
- Faculty of Medicine - Department of Surgery -
Bogotá D.C. - Colombia

Sara Cárdenas-Guio
Empresa Social del Estado Hospital Universitario
San Rafael de Tunja - Research Division -
Tunja - Colombia

José Ricardo Torres-Pulido
Fernando Augusto Escobar-Rivera
Empresa Social del Estado Hospital Universitario
San Rafael de Tunja - Pediatric Surgery Service
- Tunja - Colombia

Corresponding author
Sara Cárdenas-Guio. División de Investigación,
Empresa Social del Estado Hospital San Rafael de Tunja.
Tunja. Boyacá. Colombia.
E-mail: sara.cardenasguio@gmail.com

RESUMEN

Introducción. Las malformaciones linfáticas abdominales (MLA) son anomalías vasculares congénitas poco frecuentes en pediatría que se producen por alteraciones del desarrollo de los vasos linfáticos. Debido a que la literatura sobre su presentación retroperitoneal en pediatría es escasa, es importante dar a conocer alternativas de manejo como la escleroterapia, ya que su resección completa es complicada debido a su ubicación anatómica y su alta tasa de recidiva.

Presentación del caso. Niño de 6 años, quien fue llevado al servicio de urgencias de una institución de tercer nivel de atención en Tunja (Colombia) por dolor abdominal y fiebre. Tres días previos a la consulta, el paciente sufrió trauma toracoabdominal cerrado por caída desde su propia altura. Al ingreso se tomó ecografía abdominal que mostró una colección líquida abdominal de 800mL. Debido al antecedente de trauma, taquicardia y dolor abdominal, se realizó laparotomía exploratoria en la que se halló una masa retroperitoneal derecha. Se realizó una tomografía computarizada (TC) abdominal con contraste en la cual se observó malformación linfática (macroquística) retroperitoneal de 152x87x119mm aislada. Por sus características, se indicó manejo médico con drenajes percutáneos guiados por TC e infiltraciones intralesionales con bleomicina (0.5UI/kg), con posterior resolución de los síntomas y regresión del 98% del volumen de la lesión.

Conclusiones. El tratamiento de las MLA depende de su estructura interna, su localización y las lesiones asociadas. Aunque el abordaje quirúrgico fue considerado la terapia de elección, actualmente la escleroterapia se ha convertido en una opción segura y eficaz que previene complicaciones y trata los síntomas, aun en ubicaciones inusuales como en el caso reportado.

ABSTRACT

Introduction: Abdominal lymphatic malformations (ALM) are rare congenital vascular anomalies in pediatrics that result from alterations in the development of the lymphatic vessels. Since literature on retroperitoneal presentation in pediatrics is scarce, it is essential to provide information on treatment alternatives such as sclerotherapy, since complete resection is challenging because of its anatomical location and high recurrence rate.

Case presentation: A 6-year-old boy was taken to the emergency department of a tertiary care center in Tunja (Colombia) due to abdominal pain and fever. Three days prior to his visit, the patient suffered a blunt thoracoabdominal trauma due to a fall from his own height. On admission, abdominal ultrasound was performed, showing an 800mL abdominal fluid collection. Given the history of trauma, tachycardia, and abdominal pain, an exploratory laparotomy was performed, during which a retroperitoneal mass was found on the right side. A contrast-enhanced abdominal computed tomography (CT) scan was performed, finding an isolated retroperitoneal lymphatic malformation (macrocystic) measuring 152x87x119mm. Due to its

characteristics, medical treatment was ordered with CT-guided percutaneous drainage and intralesional infiltrations with bleomycin (0.5UI/kg). Subsequently, symptoms subsided and 98% of the lesion volume disappeared.

Conclusion: The treatment of the ALMs depends on their architecture, location, and associated lesions. Even though surgical treatment was previously considered the therapy of choice, sclerotherapy has now emerged as a safe and effective option that prevents complications and resolves symptoms, even in unusual locations, as in the presented case.

INTRODUCTION

Lymphatic malformations (LM) are benign congenital vascular malformations that appear as thin-walled cystic lesions with a smooth external surface, with fluid contents that may be serous, hemorrhagic, or chylous (1). These malformations can occur throughout the body, but they usually occur in lymphatic rich areas such as the face and neck (up to 75%), axillae, groin, and extremities (2), where they tend to be diagnosed and treated early; thoracic and abdominal locations are rare (10%) (1,3,4). Their pathogenesis has been associated with genetic variants that alter the lymphangiogenesis and with communication failures between the lymphatic system and the venous system; however, their origin has not been elucidated and continues to be studied (2,3).

The incidence of LMs varies between 1 in 2 000 and 1 in 16 000 in the general population (2), being more frequent in males (4). Abdominal location is rare (4,5), with an incidence of 1 in 160 000 individuals and 1 in 100 000 inpatients, while in the pediatric population they account for between 3% and 9.2% of all LMs (6).

LMs are categorized as complex and common depending on the associated malformations, genetic causes, and their response to treatment. The common or cystic LMs are classified into three types of lesions: 1) macrocystic, or type 1, characterized by large, fluid-filled cysts ≥1cm; 2) mixed, or type 2, which are subdivided into 2a: 70% of cysts ≥1cm; 2b: 40-70% of cysts ≥1cm, and 2c: 1-39% of cysts ≥1cm; and 3) microcystic, or type 3, which include all cysts that are <1cm in size or are invisible in a solid or ill-defined matrix background (7). Solitary macrocysts are rare and usually intraperitoneal when located in the abdomen; in turn, retroperitoneal lesions usually extend to adjacent structures such as extremities or pelvis, even involving visceral or osseous structures (7).

Half of these lesions are present at birth and are often detected prenatally; however, 90% are diagnosed before the age of 2 years and some cases cannot be detected due to their deep localization or the absence of symptoms (3). LMs may present as soft, firm or spongy, non-pulsatile, painless masses, or with infiltration of adjacent tissues (2,3).

As mentioned above, abdominal lymphatic malformations (ALM) are very rare and account for less than 5% of all LMs, being incidental findings in 6% to 12% of cases (1,7). Ultrasonography, computed tomography (CT) and magnetic

4

resonance imaging (MRI) are useful diagnostic tools to study the structure and extension of this type of lesions and to plan an adequate medical or surgical treatment for each patient (2,4,7).

The following is a case report of a 6-year-old boy presenting with abdominal pain secondary to a giant retroperitoneal LM.

CASE PRESENTATION

A 6-year-old boy with no personal or family history was taken by his mother to the emergency room of a tertiary care center in Tunja (Colombia) due to diffuse, oppressive, and persistent abdominal pain of moderate intensity (which increased when urinating), radiating to the right iliac fossa, together with fever and upper respiratory symptoms for the last 24 hours; the child did not have diarrhea or vomiting. Three days prior to consultation, the patient suffered a blunt thoracoabdominal trauma due to a fall from his own height while playing. On physical examination, he was feverish (38.7ºC), tachycardic (137bpm), and had generalized abdominal pain and distension.

On admission, a complete blood count was performed, reporting leukocytosis (21.510u/L) and neutrophilia (16.920u/L), but no cytopenias. In addition, an abdominal ultrasound was requested, which showed an abdominal fluid collection (800mL) with thin internal septa extending from the right hypochondrium to the right iliac fossa and displacing the intestinal loops to the left (Figure 1). Given the history of trauma, a hematoma with incipient signs of septation was suspected, so an exploratory laparotomy was performed 9 hours after admission. A right retroperitoneal mass was found, extending from the subhepatic region and the paracolic gutter space to the right iliac fossa, without signs of trauma to other abdominal organs or free fluid in the cavity. Therefore, watchful waiting was decided in order to characterize the lesion because it involved adjacent structures.
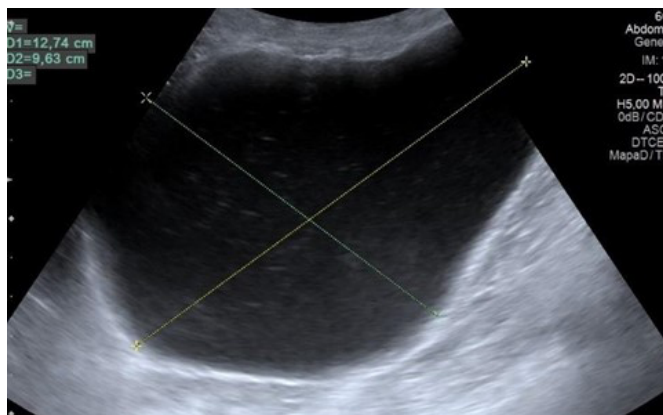

Figure 1. Admission abdominal ultrasound. Abdominal fluid collection of 800mL with thin internal septa extending from the right hypochondrium to the ipsilateral iliac fossa and displacing the intestinal loops to the left.
Source: Image obtained while conducting the study.

The day after admission, a contrast-enhanced CT scan of the chest and abdomen showed a well-defined retroperitoneal cystic lesion measuring 152x87x119mm, with homogeneous content that did not enhance with contrast, occupying the subhepatic region up to the right iliac fossa. The lesion had thin internal septa and lobulated borders and displaced the intestinal loops, colonic frame and pancreas anteriorly and to the left, this being a finding suggestive of retroperitoneal LM (Figure 2).
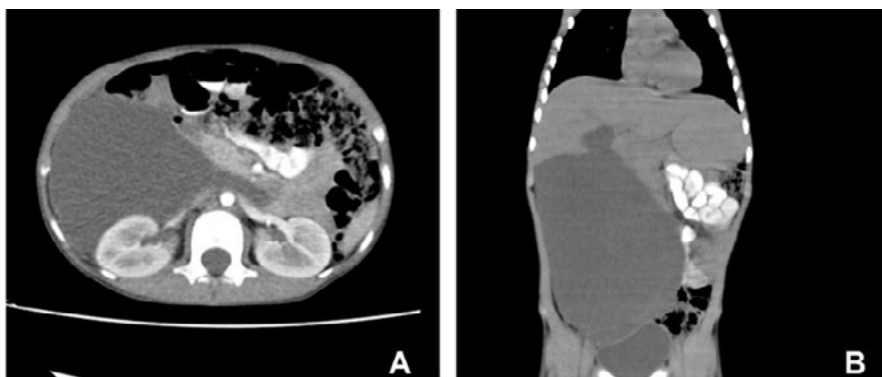

Figure 2. Contrast-enhanced abdominal computed tomography scan taken one day after admission. A) axial view; B) coronal view. Retroperitoneal cystic lesion of 152x87x119mm, well defined and with homogeneous content occupying the subhepatic region up to the right iliac fossa, a finding suggestive of retroperitoneal lymphatic malformation.
Source: Image obtained while conducting the study.

The patient continued to experience abdominal pain in the right flank and right iliac fossa, so it was decided to perform two CT-guided percutaneous drainages through the right iliac fossa 3 and 10 days after admission, obtaining 300mL of clear citrine fluid in the first procedure and 400mL in the second. Immediately after completion of the second drainage, bleomycin was administered inside the lesion at 0.5UI/kg without complications. Given his good postoperative response, medical discharge was indicated on the same day (10 days after admission).

One month after discharge, the patient was readmitted to the emergency room of the same hospital due to a new episode of abdominal pain accompanied by nausea, vomiting, diarrhea, and fever (38ºC). An abdominal ultrasound was requested on admission, which showed an abdominal fluid collection of 697mL. To rule out complications, an abdominal CT scan was also requested, revealing a recurrent right lateral cystic lesion measuring 91x110x128mm (approximately 650mL) (Figure 3). Based on the findings, a new percutaneous drainage was performed, obtaining 500mL of clear fluid, as well as a second infiltration with bleomycin at 0.5UI/kg. These procedures were performed 3 days after readmission by the pediatric surgery and interventional radiology services, and since there were no complications, the patient was discharged the same day.
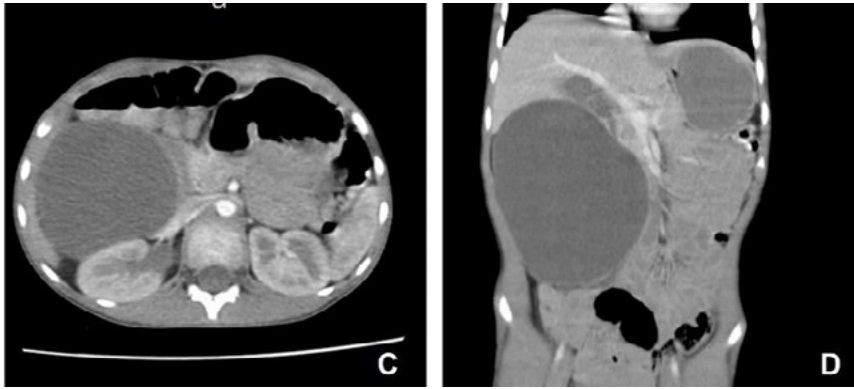
Figure 3. Follow-up contrast-enhanced abdominal computed tomography scan taken one month after discharge. A) axial view; B) coronal view. A lesion of 91x110x128mm is observed in the right flank, causing displacement of the liver, gallbladder, and pancreas.
Source: Image obtained while conducting the study.

One month later, during an outpatient follow-up with the pediatric surgery service, the patient was asymptomatic, and the follow-up abdominal ultrasound showed a significant decrease in the collection, with a volume of 68mL.

Subsequently, 4 and 5 months after the last administration of bleomycin, the patient presented again with abdominal pain with nausea and multiple episodes of vomiting, so he was readmitted to the emergency room of the same institution. On none of these occasions did he present signs of peritoneal irritation, nor was there evidence of elevated levels of acute phase reactants. Abdominal ultrasounds showed residual collections adjacent to the lower pole of the right kidney with volumes of 20mL on readmission at 4 months (Figure 4A) and 12mL at 5 months (Figure 4B). Both episodes were associated with acute self-limited infections, so, due to the reduction of the lesion, the fact that there were no signs of postoperative complications (superinfection or thrombosis) or signs of systemic inflammatory response or acute abdomen, and the resolution of symptoms with medical treatment, reoperation was not considered necessary. Therefore, the patient was discharged the same day with the indication to attend outpatient follow-ups. However, the patient was lost since then.
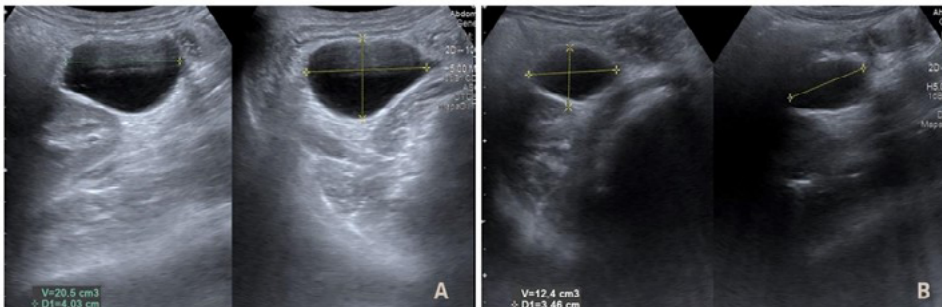

Figure 4. Follow-up abdominal ultrasound at 4 (A) and 5 months (B) since the last administration of bleomycin. Residual collections of 20mL and 12 mL, respectively, are observed adjacent to the lower pole of the right kidney, with no evidence of other collections or free fluid in the cavity.
Source: Image obtained while conducting the study.

DISCUSSION

ALMs are rare lymphatic lesions diagnosed mainly during childhood (8), with an incidence of 1:250 000. These malformations are found in the mesentery of the small or large intestine in 70% of cases (7), and less than 1% are retroperitoneal (1).

LMs are usually asymptomatic, but they may exhibit clinical manifestations associated with their location and enlargement induced by the child's growth or infections (3,9). In contrast, ALMs are symptomatic in up to 88% of cases (1) and present with acute abdominal pain, with or without palpable mass, and gastrointestinal symptoms such as nausea, vomiting, constipation, diarrhea, and bleeding (1,3,4,7,10,11), with more than 50% of cases requiring urgent initial surgery due to their unclear clinical presentation (12). In the reported case, the patient developed rapidly progressive and predominantly gastrointestinal symptoms, without palpable mass, but with abdominal distension, which is typical of this type of lesions in the pediatric population.

Medical history and physical examination are the basis for diagnosing a LM (2). However, imaging is extremely important to evaluate the extent of the lesion and to plan an adequate treatment for each patient. In general, ultrasound is used as the first line, revealing hypoechoic or anechoic lesions that are separated by thin septa. On color Doppler interrogation, absence of flow is observed, except for the septa, where high resistive arterial or venous flow can be detected (13).

CT is typically used in contexts of acute abdominal pain, trauma, or when MRI is not available. It allows characterizing the malformation by showing homogeneous lesions with low attenuation and enhancement of the walls and septa, making it possible to assess their extension and anatomical relationship with adjacent structures (5,6,14,15). On the other hand, MRI is considered the best study to characterize ALMs (5) since it facilitates the differentiation of ALMs from other cystic masses (especially mesenteric or omental) and other complications (1,16,17).

In MRI, ALMs are viewed as well-defined lesions, hypointense in T1, and hyperintense in T2 (1,3); however, this test is expensive and not always available. In the present case, the diagnosis was based on the subacute clinical presentation, which is typical of ALM in pediatric patients, the imaging findings, and the characteristics of the drained intralesional fluid.

The clinical presentation, initial characteristics of the lesion, accurate assessment of its location, the extent of ALM, and the treating team's experience are indispensable in predicting the response to treatment and guiding the therapeutic approach. Thus, treatment varies from observation in asymptomatic patients, passing through pharmacotherapy (PI3KmTOR inhibitors), laser coagulation, radiofrequency ablation and sclerotherapy in cases of mixed, microcystic or complex malformations, to partial or complete surgical excision by endoscopy, laparoscopy or laparotomy in patients with isolated lesions (4,7,8,9,18-20), as described below.

Since ALMs are rare, selecting the most appropriate approach to treatment is often a challenge for clinicians (7). Surgical excision is considered the therapy of choice for ALMs, but its popularity has been declining due to its high rate of complications, lesion recurrence (10-53%), and mortality (2-6%) (21). The surgical approach is indicated whenever there are complications (infection, obstruction, intussusceptions, stenosis, rupture, ischemia, intracystic and gastrointestinal hemorrhage, etc.) (1) or when treatment with sclerotherapy is unsuccessful (1,4). Due to the history of trauma and moderate abdominal pain, in the present case it was initially decided to perform a surgery to rule out abdominal hemorrhage; however, intraoperative findings were consistent with those of an ALM (round, smooth, translucent mass with a wide base) (1,4), ruing out the initial diagnostic suspicion.

On the other hand, sclerotherapy consists of the injection of substances inside the lesions that cause thrombosis, fibrosis and obliteration of the lumen, and is generally performed after drainage (2,13). This technique is the treatment of choice in symptomatic stable patients, with unresectable and complex microcystic or macrocystic lesions (22,23), as in the case described. Complications of this therapy include lymphatic fistula formation, abdominal obstruction, subcapsular hematoma formation, surgical intervention requirement (10), fever, ulceration, localized pain, vomiting, and infection (24).

A number of drugs are available for sclerotherapy, such as pure ethanol, OK-432, sodium tetradecyl sulfate, doxycycline, bleomycin, 50% dextrose, and tetracycline (23). Bleomycin is a cytotoxic antineoplastic antibiotic that has a double effect, degrading DNA and generating a sclerosing effect on the vascular endothelium; in addition, it is widely available, inexpensive, and has minimal adverse effects (22). In this regard, Horbach *et al.* (24), in a systematic review that included 36 articles (1 552 patients) reporting the results (effectiveness and complications) of sclerotherapy in at least 10 patients with cervical and craniofacial venous malformations or ALMs, reported that the range of complete response to bleomycin treatment was 20-57% (39%) and the range of overall response was 68-100% (82%).

Sclerotherapy for ALM has proven to be safe and effective in previous studies, with demonstrated success rates of 96.7% and a low complication rate (5). This treatment may require more than 1 administration depending on the clinical response of each patient; however, there are still no randomized controlled studies based on variations in techniques (2,7,9).

Bleomycin is considered a safe drug as it has a lower risk of severe complications compared to other drugs (24). In the present case, bleomycin was selected since, in a study including 26 children with non-visceral macrocystic LM to whom aqueous bleomycin was administered intralesionally under ultrasound guidance at 0.5 IU/kg/ dose in monthly intervals and without exceeding 5 doses, Gazula *et al.* (25) reported

that the response was excellent (complete resolution) in 88.4% of the cases, of which 34.6% showed complete response with a single dose.

In contrast, Elbaaly *et al.* (7), in a retrospective cross-sectional study in which they compared 28 cases of patients with isolated ALM, reported that of the 26 participants who received treatment with complete surgical resection, 25 did not present recurrence, that one patient was treated with sclerotherapy without complications, and that the other had spontaneous regression of the lesion, so they concluded that it is advisable to perform surgical resection to prevent recurrences (7). Nevertheless, in the case reported, the indicated treatment was sclerotherapy, since the surgical approach is not recommended in high-risk complex lesions with retroperitoneal involvement (7).

In the present case, 98% of lesion volume regression at 5 months, complete resolution of symptoms, and absence of local, pulmonary or systemic adverse effects were observed with bleomycin, demonstrating the efficacy of this drug for the treatment of ALMs, as reported in the current literature.

CONCLUSIONS

ALMs are rare malformations and thus pose a diagnostic challenge in the context of abdominal pain in pediatric patients. Sclerotherapy with bleomycin is an effective and safe option for the treatment of macrocystic ALM with retroperitoneal involvement, which, due to their size and localization, are difficult to access surgically, as it reduces the risk of complications, which was evidenced in the case presented.

ETHICAL CONSIDERATIONS

Informed consent was obtained from the patient's legal guardian for the preparation of this case report.

CONFLICTS OF INTEREST

FUNDING

ACKNOWLEDGMENTS

REFERENCES

1. **Lal A, Gupta P, Singhal M, Sinha SK, Lal S, Rana S, et al.** Abdominal lymphatic malformation: Spectrum of imaging findings. *Indian J Radiol Imaging.* 2016;26(4):423-8. https://doi.org/n9j6.

2. **Kulungowski AM, Patel M.** Lymphatic malformations. *Semin Pediatr Surg.* 2020;29(5):150971. https://doi.org/gq3q8p.

3. **Amodeo I, Cavallaro G, Raffaeli G, Colombo L, Fumagalli M, Cavalli R, et al.** Abdominal cystic lymphangioma in a term newborn: A case report and update of new treatments. *Medicine (Baltimore).* 2017;96(8):e5984. https://doi.org/f9rsfh.

4. **De Bast Y, Hossey D, Boon L, Duttmann R, Theunis A, Chambers S, et al.** Intra-abdominal lymphatic malformation. *Acta Gastroenterol Belg.* 2006;69(2):209-12.

5. **Brungardt JG, Cooke-Barber J, Tiao G, Hammill AM, Ricci K, Patel MN, et al.** Intra-abdominal Lymphatic Malformations: A Case Series. *Authorea.* 2022. https://doi.org/n9kc.

6. **Torrealba I, de Barbieri F.** Linfangioma abdominal. Caso clínico. *Rev. Chil. Pediatr.* 2012;83(1):68-72. https://doi.org/n9kd.

7. **Elbaaly H, Piché N, Rypens F, Kleiber N, Lapierre C, Dubois J.** Intra-abdominal lymphatic malformation management in light of the updated International Society for the Study of Vascular Anomalies classification. *Pediatr Radiol.* 2021;51(5):760-72. https://doi.org/n9kg.

8. **Gimero-Aranguez M, Colomar-Palmer P, González-Mediero I, Ollero-Caprani JM.** Aspectos clínicos y morfológicos de los linfangiomas infantiles: revisión de 145 casos. *An Esp Pediatr.* 1996;45(1):25-8.

9. **Elluru RG, Balakrishnan K, Padua HM.** Lymphatic malformations: diagnosis and management. *Semin Pediatr Surg.* 2014;23(4):178-85. https://doi.org/f6j3km.

10. **Zamora AK, Barry WE, Nowicki D, Ourshalimian S, Navid F, Miller JM, et al.** A multidisciplinary approach to management of abdominal lymphatic malformations. *J Pediatr Surg.* 2021;56(8):1425-9. https://doi.org/g54dzn.

11. **Gunadi, Kashogi G, Prasetya D, Fauzi AR, Daryanto E, Dwihantoro A.** Pediatric patients with mesenteric cystic lymphangioma: A case series. *Int J Surg Case Rep.* 2019;64:89-93. https://doi.org/n9km.

12. **de Lagausie P, Bonnard A, Berrebi D, Lepretre O, Statopoulos L, Delarue A, et al.** Abdominal lymphangiomas in children: interest of the laparoscopic approach. *Surg Endosc.* 2007;21(7):1153-7. https://doi.org/dvk48x.

13. **Dubois J, Thomas-Chaussé F, Soulez G.** Common (Cystic) Lymphatic Malformations: Current Knowledge and Management. *Tech Vasc Interv Radiol.* 2019;22(4):100631. https://doi.org/gq3q82.

14. **Restrepo R.** Multimodality imaging of vascular anomalies. *Pediatr Radiol.* 2013;43(Suppl 1):S141-54. https://doi.org/n9kn.

15. **Martínez-Montalvo CM, Muñoz-Delgado DY, Jiménez-Sánchez HC, Siado-Guerrero SA, Esguerra DC, Ordóñez DA.** Quiste mesentérico gigante: reporte de caso. *Rev Colomb Gastroenterol.* 2021;36(2):257-62. https://doi.org/n9kp.

16. **Yan J, Xie C, Chen Y.** Surgical Treatment of Mesenteric Lymphatic Malformations in Children: An Observational Cohort study. *J Pediatr Surg.* 2023;58(9):1762-9. https://doi.org/n9kq.

17. **Tripathy PK, Jena PK, Pattnaik K.** Management outcomes of mesenteric cysts in paediatric age group. *Afr J Paediatr Surg.* 2022;19(1):32-5. https://doi.org/n9kr.

18. **Yilmaz H, Yilmaz Ö, Çamlidağ I, Belet Ü, Akan H.** Single center experience with intralesional bleomycin sclerotherapy for lymphatic malformations. *Jpn J Radiol.* 2017;35(10):590-6. https://doi.org/n9kx.

19. **Thorburn C, Price D.** Expectant management of pediatric lymphatic malformations: A 30-year chart review. *J Pediatr Surg.* 2022;57(5):883-7. https://doi.org/n9kz.

20. **Van Damme A, Seront E, Dekeuleneer V, Boon LM, Vikkula M.** New and Emerging Targeted Therapies for Vascular Malformations. *Am J Clin Dermatol.* 2020;21(5):657-68. https://doi.org/n9k2.

21. **Cuervo JL, Galli E, Eisele G, Johannes E, Fainboim A, Tonini S, et al.** Malformaciones linfáticas: Tratamiento percutáneo con bleomicina. *Arch. Argent. Pediatr.* 2011;109(5):417-22. https://doi.org/fxvgw6.

22. **Rosales-Parra ND, Acero-Murillo CF, García-Aristizabal MP, Romero-Espitia WD.** Malformaciones linfáticas abdominales en una población pediátrica: experiencia en un centro de referencia de Medellín, Colombia. *Rev Colomb Cir.* 2022;37:245-50. https://doi.org/n9k5.

23. **Echeagaray-Sánchez HL, Del Bosque-Méndez JE, Soto-Becerril OA, Hernández-Abarca E, Gómez-De la Cruz CA.** Escleroterapia con bleomicina en el tratamiento de malformación linfática microquística. *An Orl Mex.* 2019;64(4):229-33.

24. **Horbach SE, Lokhorst MM, Saeed P, de Goüyon Matignon de Pontouraude CM, Rothová A, van der Horst CM.** Sclerotherapy for low-flow vascular malformations of the head and neck: A systematic review of sclerosing agents. *J Plast Reconstr Aesthet Surg.* 2016;69(3):295-304. https://doi.org/f8czkb.