Cite as: Łyczek W, Migda B, Michał Kutyłowski M: Enlarged cisterna chyli diagnosed with ultrasonography – case report. J Ultrason 2022; 22: e196–e199. doi: 10.15557/JoU.2022.0032.

**Submitted:** 04.01.2022
**Accepted:** 09.03.2022
**Published:** 11.07.2022

# Enlarged cisterna chyli diagnosed with ultrasonography – case report

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DOI: 10.15557/JoU.2022.0032

**Keywords**
ultrasonography; lymphatic system; thoracic duct

**Abstract**

**Aim of the study:** We present a case report of enlarged cisterna chyli in a 25-year-old woman. The diagnosis was made during a routine abdominal ultrasound examination and afterwards verified with contrast-enhanced MRI. **Case description:** Ultrasound revealed a large, lobulated, anechoic cystic structure with thin, smooth walls, lacking any solid components. The lesion was located in the retroperitoneal space, beneath the head of the pancreas, between the partially compressed inferior vena cava and the aorta, extending almost to the aortic bifurcation. We performed a contrast-enhanced MRI examination which confirmed the sonographic suspicion of enlarged cisterna chyli, showing a non-enhancing cystic lesion in continuity with the thoracic duct. **Conclusions:** Anatomy, sonographic and magnetic resonance appearance of cisterna chyli as well as differential diagnosis are discussed.

## Introduction

Cisterna chyli is a dilated inferior part of the thoracic duct which arises from the confluence of lumbar and intestinal lymphatic trunks. It is located on the anterior surface of the bodies of the first and second lumbar vertebrae (L1 and L2) [(1)]. Running in the superior direction, between the abdominal aorta and the azygos vein, behind the right diaphragmatic crus, it enters the thoracic cavity through the aortic hiatus, continuing as the thoracic duct. The radiographic features of both normal and enlarged cisterna chyli have been described in reference to CT[(2)] and MRI[(3)], but to our knowledge there has been only one case report concerning the ultrasound appearance of this structure[(4)].

## Case report

A 25-year-old woman underwent a routine abdominal ultrasound exam. She did not complain of any symptoms, and her past medical history was unremarkable. Ultrasound (US) (Samsung RS80A, CA1-7S probe) revealed a large, lobulated, anechoic cystic structure in the retroperitoneal space, beneath the head of the pancreas, between the inferior vena cava and the aorta, extending almost to the aortic bifurcation. The lesion was approximately 82 mm in length (Fig. 1) and on transverse section its largest diameters were 29 and 17 mm (Fig. 2). It showed no signal on color or power Doppler (Fig. 3), microflow imaging (Fig. 4), and shear wave elastography (Fig. 5). The cyst partially compressed the inferior vena cava. Its walls were thin, smooth, with no visible solid components or calcifications. Because of the ultrasound appearance and location of the lesion, a suspicion of large cisterna chyli was considered. For the final diagnosis, we performed contrast-enhanced MRI using 3.0 T system (Siemens), which confirmed the presence of a lobulated, well-marginated, cystic lesion in continuity with the thoracic duct, in the same location as in the US examination, measuring 34 × 21 mm on transverse plane and 76 mm in coronal plane. The lesion featured increased signal intensity on HASTE sequences (Fig. 6, Fig. 7), low signal intensity on T1-weighted images (Fig. 8), and restriction of diffusion on diffusion-weighted images (DWI) (Fig. 9) and apparent diffusion coefficient (ADC). After intravenous administration of gadolinium-based contrast agent, no enhancement of the lesion

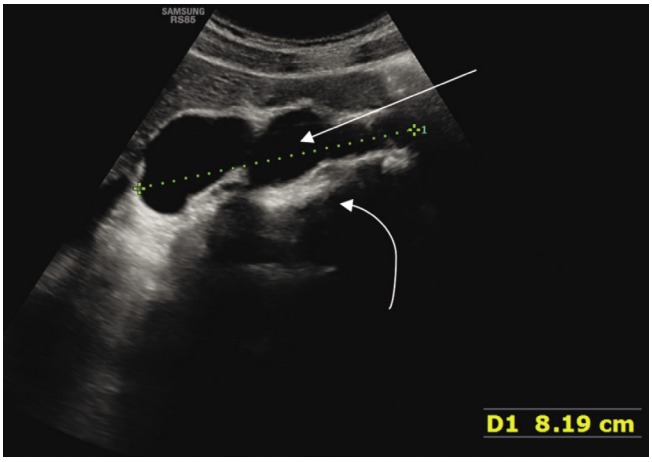


**Fig. 1.** *B-mode sagittal section of enlarged cisterna chyli (straight arrow), situated on the anterior surface of vertebral bodies (curved arrow)*

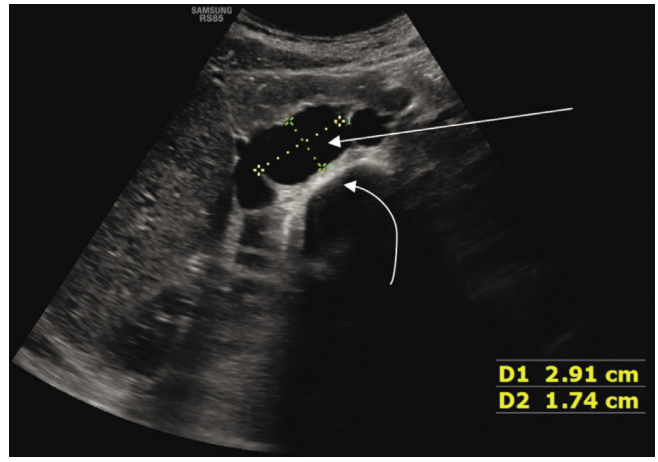


**Fig. 2.** *B-mode transverse section of enlarged cisterna chyli (straight arrow), situated on the anterior surface of vertebral bodies (curved arrow)*

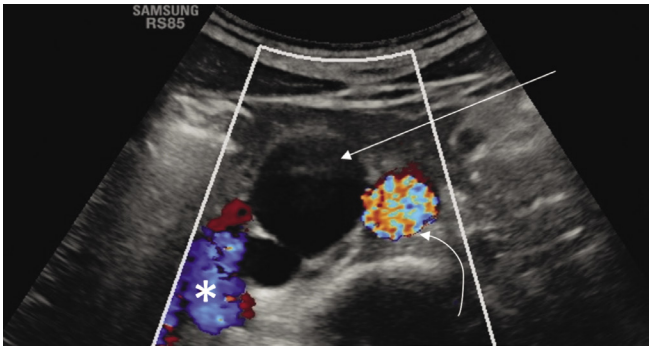


**Fig. 3.** *Color Doppler image shows no signal in cisterna chyli (straight arrow), located between the abdominal aorta (curved arrow) and inferior vena cava (asterisk)*

was observed (Fig. 8). The cyst showed an indentation into the inferior vena cava, with partial compression and preserved patency of the vein. All of the findings validated the diagnosis of enlarged cisterna chyli.

## Discussion

Ultrasonography is an excellent imaging modality frequently used as a first-line diagnostic tool for the examination of the abdomen with retroperitoneal space.

Lesions in the retroperitoneal space are difficult to evaluate with sonography, depending on the amount of bowel gas and adipose tissue. Moreover, normal lymphatic vessels and cisterna chyli are not visible during routine abdominal ultrasound examinations. Therefore, sonography is an initial modality, used before an appropriate assessment of the retroperitoneal space by CT or MRI. However, a medical doctor or technician performing the examination should be aware of the anatomy, including the lymphatic system. The knowledge of anatomy and pathophysiology allows to give differential diagnosis during ultrasound scanning and describe the location and relation of the lesion to other structures, which facilitates the analysis of CT and MRI images.

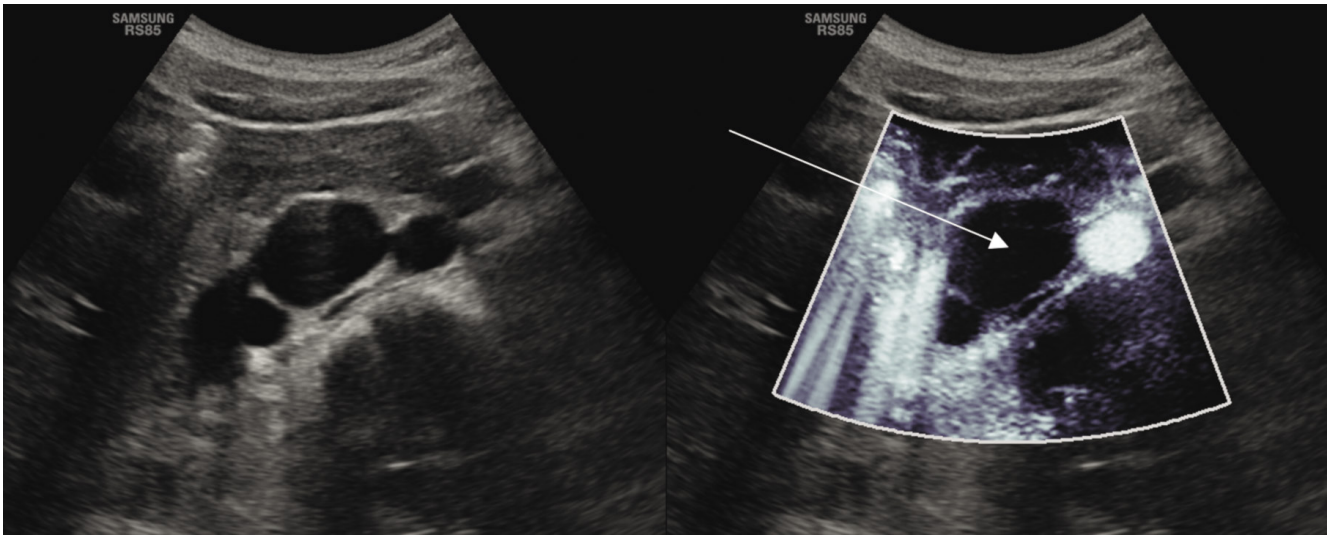


**Fig. 4.** *Microflow Imaging shows no vascularity in cisterna chyli (straight arrow)*

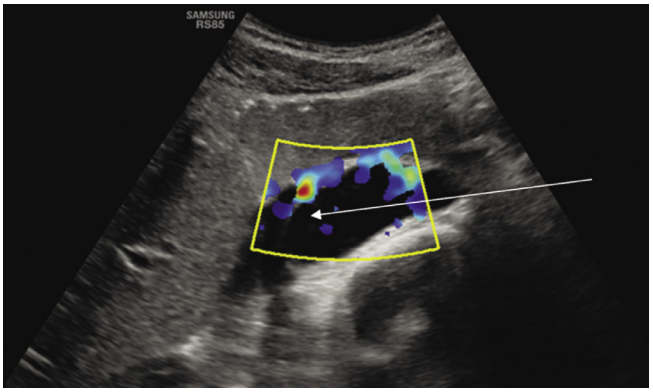


**Fig. 5.** *Cisterna chyli (straight arrow) exhibits no signal in shear-wave elastography*

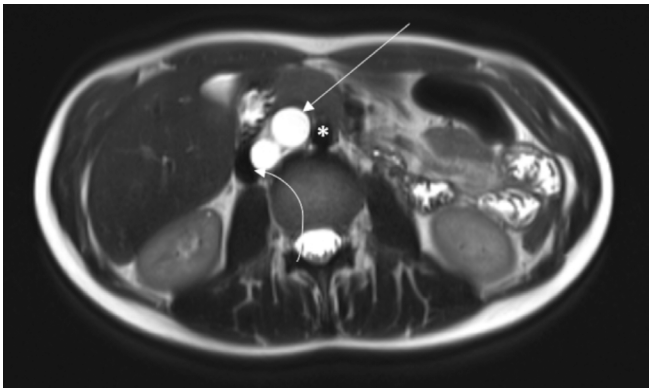

**Fig. 6.** *Axial HASTE sequence shows a lobulated cystic lesion (arrow) between the aorta (asterisk) and inferior vena cava (curved arrow) with partial compression of the vein*

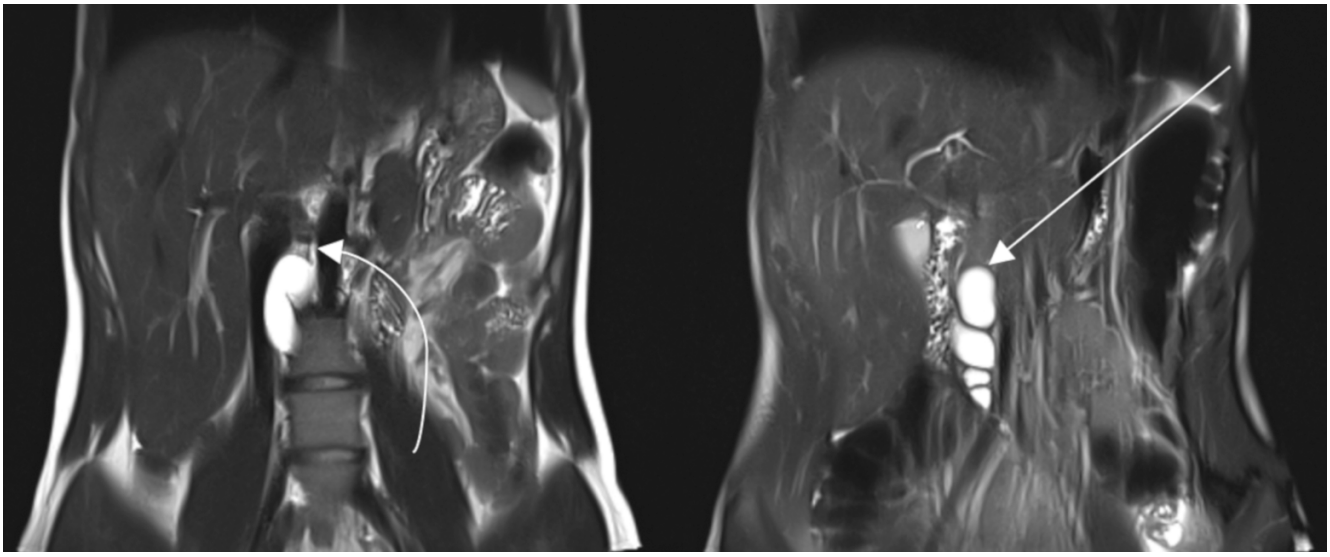

**Fig. 7.** *Coronal HASTE sequence images at two different levels show a cystic lobulated lesion (arrow) in continuity with thoracic duct (curved arrow)*

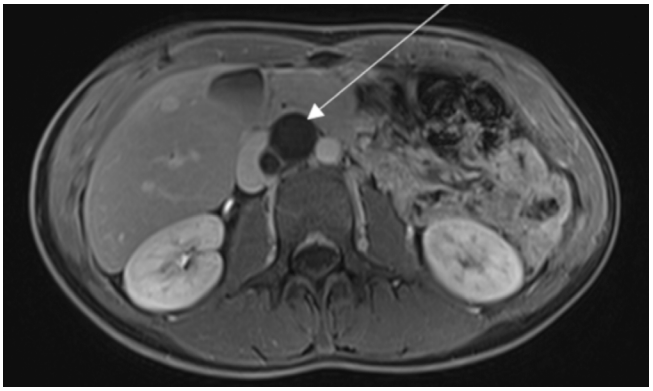

**Fig. 8.** *Axial T1-weighted sequence after intravenous administration of gadolinium-based contrast agent shows no enhancement of the cystic lesion (arrow)*

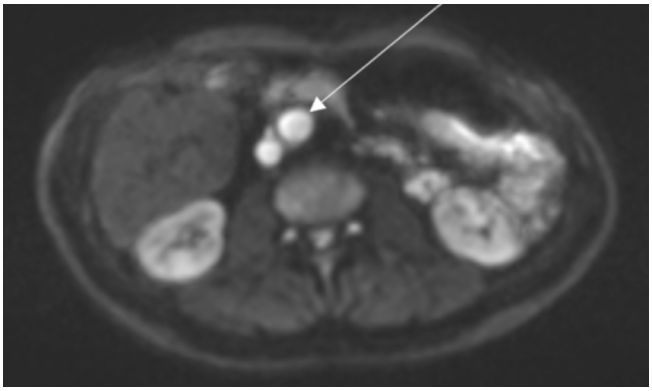

**Fig. 9.** *Axial DWI shows restricted diffusion of the lesion (arrow)*

The essential advantage of sonography is that in many cases it helps to differentiate between solid and cystic lesions. An anechoic lesion (without any additional echoes inside) with a visible posterior enhancement artifact, no signal on color or power Doppler, as described in our case, is a typical appearance of a cystic lesion. Furthermore, differentiation between solid and cystic lesions can be performed using shear-wave elastography, as in the case of adrenal

**Tab. 1.** *Differential diagnosis of cystic lesions in the retroperitoneal space*

| Neoplastic lesions | Non-neoplastic lesions |
|---|---|
| lymphangioma<br>teratoma<br>mesothelioma<br>pseudomyxoma retroperitonei | pancreatic pseudocyst<br>hematoma<br>lymphocele |

lesions[5], since the transversely oriented shear wave does not propagate through fluid. The diagnosis is less certain when the lesion is deeply located (far from the probe) or contains dense fluid, e.g. abscess or organizing hematoma, which causes the interior of the lesion to appear echogenic. However, lymph-filled lesions like enlarged cisterna chyli or post-operative lymphocele are characterized by anechoic appearance – they are similar to simple cysts frequently seen in the kidneys or liver[6].

Cisterna chyli is a fluid-filled space located paravertebrally, to the right from the midline of the body. Depending on the size, it can compress the large vessels in the retroperitoneal space, e.g. the inferior vena cava, as in the presented case. Cisterna chyli is typically anechoic, and it should be differentiated with postinflammatory pancreatic cysts in patients with a history of acute pancreatitis, other lesions such as urinoma and lymphocele in patients who underwent laparotomy or hematoma in patients after lumbar region trauma, or rupture of an abdominal aortic aneurysm[6–8]. Where the lesion contains solid components or septations, it should be differentiated with neoplastic processes such as lymphangioma, teratoma, mesothelioma, etc.[9–11] (Tab. 1). Obtaining a detailed medical history is crucial in the differential diagnosis.

MRI examination confirmed the initial diagnosis of a large cisterna chyli, which was based on the ultrasound features, location of the lesion and its anatomical relationship with adjacent structures, and the patient's medical history.

## Conclusion

Large cisterna chyli represents an anatomical variation with ultrasonographic features that doctors and ultrasound technicians should be familiar with.

### Conflict of interest

*The authors do not report any financial or personal connections with other persons or organizations which might negatively affect the contents of this publication and/or claim authorship rights to this publication.*

### Author contributions

*Original concept of study: WŁ, BM. Writing of manuscript: WŁ, BM, MK. Analysis and interpretation of data: MK. Final acceptation of manuscript: WŁ, BM. Collection, recording and/or compilation of data: WŁ, MK. Critical review of manuscript: BM.*

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