

Critical Pitfall: Varices in Cancer Patients mimicking Lymphadenopathy; Differentiation of varicose veins and enlarged lymph nodes in routine staging

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ABSTRACT

Two patients, each with a history of multiple cancers, were referred to our institution for routine cancer staging. Contrast enhanced multislice-CT showed round and oval shaped inguinal and retroperitoneal masses in one patient and inguinal mass lesions in the other patient. The mass lesions were suspicious of lymphadenopathy related to cancer recurrence. Additional MR-Imaging, however, showed tortuous varicose veins as well as suspicious lymph nodes in one patient and solely venous convolutes in the other patient. Regarding the routine contrast enhanced CT-scan in the portovenous phase, varices showed no significant difference in radiodensity compared to enlarged lymph nodes.

CASE REPORT

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Case 1:

A 73 year old male with a one year history of a prostatic carcinoma and a renal lesion suspect of a renal carcinoma was referred to our institution. A native multislice CT (Siemens Somatom Sensation 64, Siemens Medical Solutions, Germany) as well as a CT scan after intravenous application of 100 ml of Iodine-containing contrast media (Ultravist 370, Bayer Healthcare, Bayer-Schering, Germany) in the arterial phase (kidneys only), the portovenous phase and 12 min after injection was performed to further distinguish the renal lesion and for screening of the prostate carcinoma. Besides a malignoma-suspect mass lesion of the right kidney, multiple retroperitoneal and iliacal masses of round and oval shape were detected (Fig. 1). A CT guided renal biopsy confirmed the diagnosis of a renal cell carcinoma.

In this context, the retroperitoneal and inguinal masses on the axial CT slices as well as the coronal reconstructions were regarded highly suspicious of lymph node metastases of either the known prostatic cancer or the newly diagnosed renal cell carcinoma. However, doubt was raised about the etiology of

the masses in light of a varicose left testicular vein not showing a definite difference in radiodensity to the suspect masses (Fig. 2).

For further clarification, magnetic resonance imaging (MRI) of the abdomen with intravenous application of 17 ml Gadolinium-containing contrast medium (Dotarem, Guerbet, Villepinte, France) was performed (Siemens Magnetom Avanto 1.5T, Siemens Medical Solutions, Erlangen, Germany). With the use of axial and coronal magnetic resonance (MR) images, most of the mass lesions could easily be identified as strongly twisted dilated veins with pronounced luminal variations (Fig. 6). However, MRI also revealed six enlarged inguinal and retroperitoneal lymph nodes, clearly differing in signal intensity from the varicose veins (Fig. 3, Fig. 4, Fig. 5).

Case 2:

A 73 year old female with a 12 year history of breast cancer was referred to our institution for an MR-examination (Siemens Magnetom Avanto 1.5T, Siemens Medical Solutions, Erlangen, Germany) of the abdomen with intravenous application of 14 ml Gadolinium-containing contrast medium

(Dotarem, Guerbet, Villepinte, France) for staging of a newly diagnosed rectal carcinoma. A lobulated inguinal mass was detected on the left side that was identified as varicose veins due to its signal intensity after application of intravenous contrast media (Fig. 7). A pelvic congestion syndrome due to a giant uterine myoma caused the varicoses. A multislice CT for tumor staging one year later (Siemens Somatom Sensation 64, Siemens Medical Solutions, Germany) after intravenous application of 80 ml of Iodine-containing contrast media (Ultravist 370, Bayer Healthcare, Bayer-Schering, Germany) in the portovenous phase showed the varicose veins as masses of unspecific radiodensity between 40 and 50 Hounsfield units (HU). There were no enlarged lymph nodes depictable in this patient.

A retrospective comparison of the radiodensity of 6 suspect retroperitoneal and iliacal lymph nodes and 6 retroperitoneal and iliacal varices in the first patient showed a mean density for lymph nodes of 77.6 HU (standard deviation.: 9.75) respectively 73 HU for varices (standard deviation.: 5.76) in an abdominal CT scan after intravenous contrast application in the portovenous phase. An unpaired Students t-test showed no statistical significant difference ($p=0.34$). The varicose veins in the second patient showed radiodensity values between 44 and 91 HU, no lymphadenopathy was detectable.

DISCUSSION

Diagnosis and follow-up of lymphadenopathy is essential in oncologic imaging. However, varices in atypical location can be misinterpreted as enlarged lymph nodes in cross sectional imaging. In the rare number of oncologic cases where pathologic enlarged lymph nodes and varices are present, routine staging with contrast enhanced Computed Tomography (CT) can be substantially hindered. Moreover, this finding may lead to inadequate therapy decisions or even biopsy of varicose veins. The present cases of two cancer patients with abdominal and inguinal venous convolutes mimicking pathologic enlarged lymph nodes in computed tomography should illustrate how complex distinguishing these two entities may be.

Both cases show a rare difficulty in the assessment of cross sectional imaging. Especially in oncologic patients, where lymphadenopathy is expected, misinterpretation of varicose veins with pronounced luminal variations in atypical locations can lead to diagnostic and therapeutic consequences that may harm the patient, as for instance biopsy of retroperitoneal varices.

Venous convolutes that mimic mass lesions can appear in many thoracal and abdominal regions and have been reported in several case reports or small series [1, 3, 6, 7]. In most of the reported cases, varices result from collateralisation due to venous congestion. In the literature, retroperitoneal varices have been reported almost exclusively in patients with liver disease and consecutive portal hypertension [3]. Pelviureteric varices rarely appear as collateralization after renal vein

thrombosis [1]. In the presented case with retroperitoneal varices, liver enzymes were completely normal and no renal vein thrombosis was detected. As the cause of the varicose veins, chronic venous insufficiency with recurrent lower extremity ulcers could be identified.

As cause of the inguinal varices in the second patient, a pelvic congestion syndrome due to a giant myomatous uterus was diagnosed. The varices showed no decrease in size after hysterectomy.

The major problem in identifying varices in cross sectional imaging is their predominantly tortuous pattern of appearance. Varices often show pronounced luminal variations and strong twisting, which mimicks round and oval lesions in cross sectional images and make it difficult to impossible to recognize a continuous structure. Together with the unspecific enhancement after intravenous contrast application, a clear differentiation of varicose veins and lymph nodes can therefore not be made in computed tomography in certain cases. In those cases, MRI is an alternative cross sectional imaging modality which more reliably distinguishes between varicose veins and enlarged lymph nodes. Varicose veins show characteristic signal behaviour in MR-venography as well as flow void in T2 spin echo sequences and high signal intensity in flow sensitized imaging (Fig. 3), i.e. true-FISP or flow sensitized steady-state-free-precession sequences [8]. Diffusion weighted imaging can add information regarding the probability of malignancy of suspicious lymph nodes [4].

Positron-Emission-Tomography (PET) can add information about specific metabolic activity of mass lesions, however due to its low resolution, small lesions may not be identified. Furthermore, specific tracers are needed and the sensitivity of PET is different among tumour entities, which can pose a problem for multiple or unknown malignancies [2].

A further promising technique in differentiating mass lesions from varicose veins is the most recent advantage in CT technique, the dual energy CT. DE CT allows differentiation of iodine from other materials due to its stronger photoelectric absorption, this could help identifying varices through their different iodine uptake [5].

TEACHING POINT

In routine staging of patients with suspected lymphadenopathy and varicose veins, differentiation of varices and lymph nodes can be difficult to impossible in contrast enhanced CT. In unclear cases, specific MR-imaging, such as contrast enhanced MR-venography and flow-sensitized MR-imaging, can facilitate distinction between the two entities.

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FIGURES

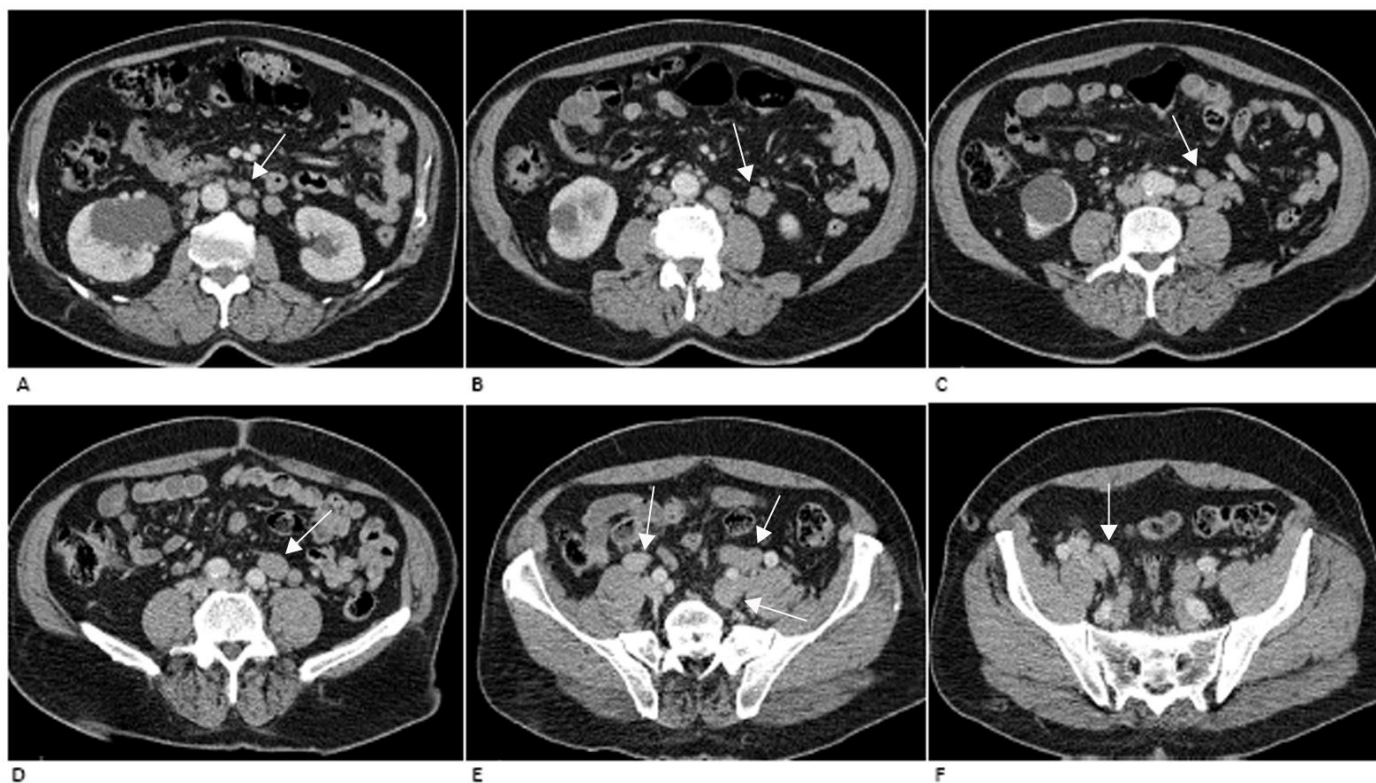


Figure 1: A-E: CT of a 73 year old male with retroperitoneal varices and enlarged retroperitoneal lymph nodes. Continuous 3 mm CT-slices from cranial (A) to caudal (C) show iliac mass lesions on both sides (arrows). Multislice CT in the portovenous phase after i.v. administration of 100 ml contrast agent (Ultravist 370, Bayer-Schering; tube voltage: 120 kvp)

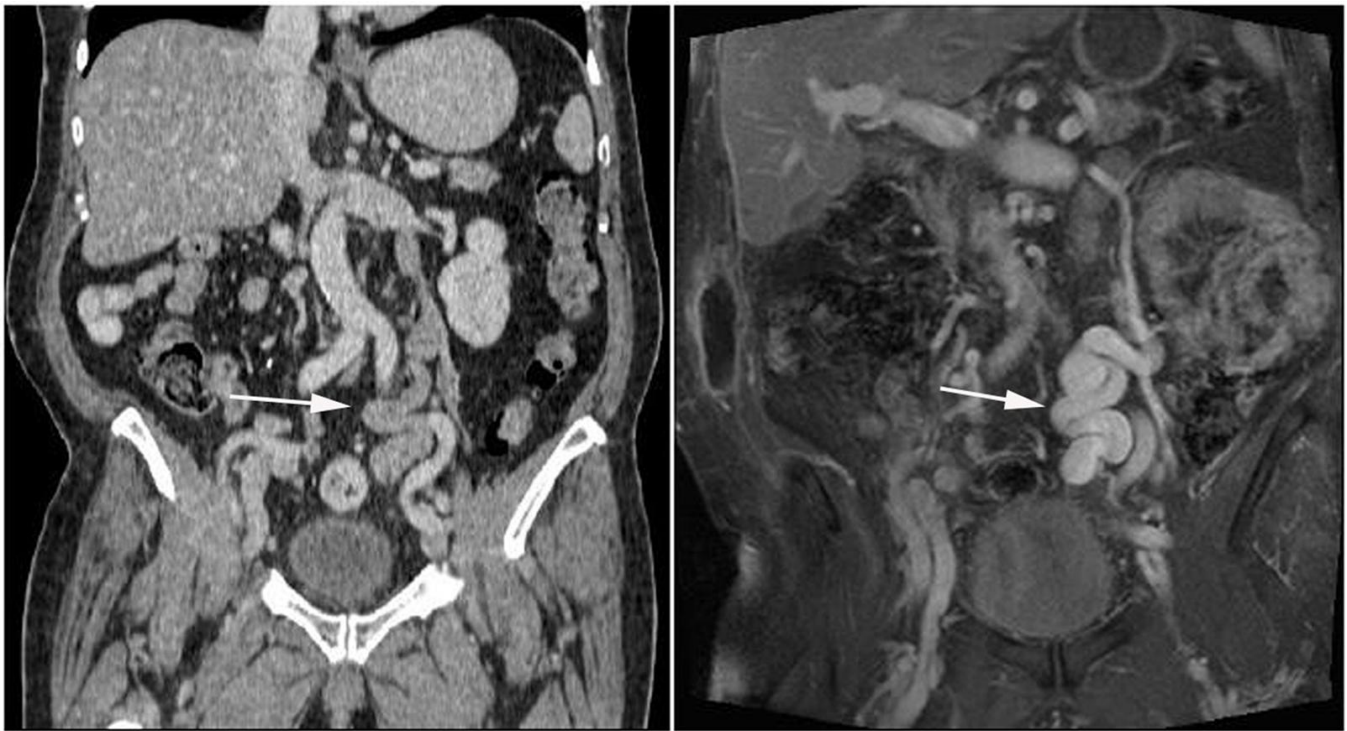


Figure 2: CT (left) and MR (right) of a 73 year old male with retroperitoneal varices and enlarged retroperitoneal lymph nodes. The tortuous varicose left testicular vein (arrows) is visible on the coronal CT-reconstructions (right) and shows bright enhancement on MR-venography (left). Contrast enhanced multislice CT (left, portovenous phase after i.v. administration of 100 ml contrast agent (Ultravist 370, Bayer-Schering); tube voltage: 120 kvp) and coronal T1-weighted MRI (right; 1.5 Tesla, T1 FLASH, TR: 100, TE: 4,76 ms, 17 ml Dotarem i.v.)

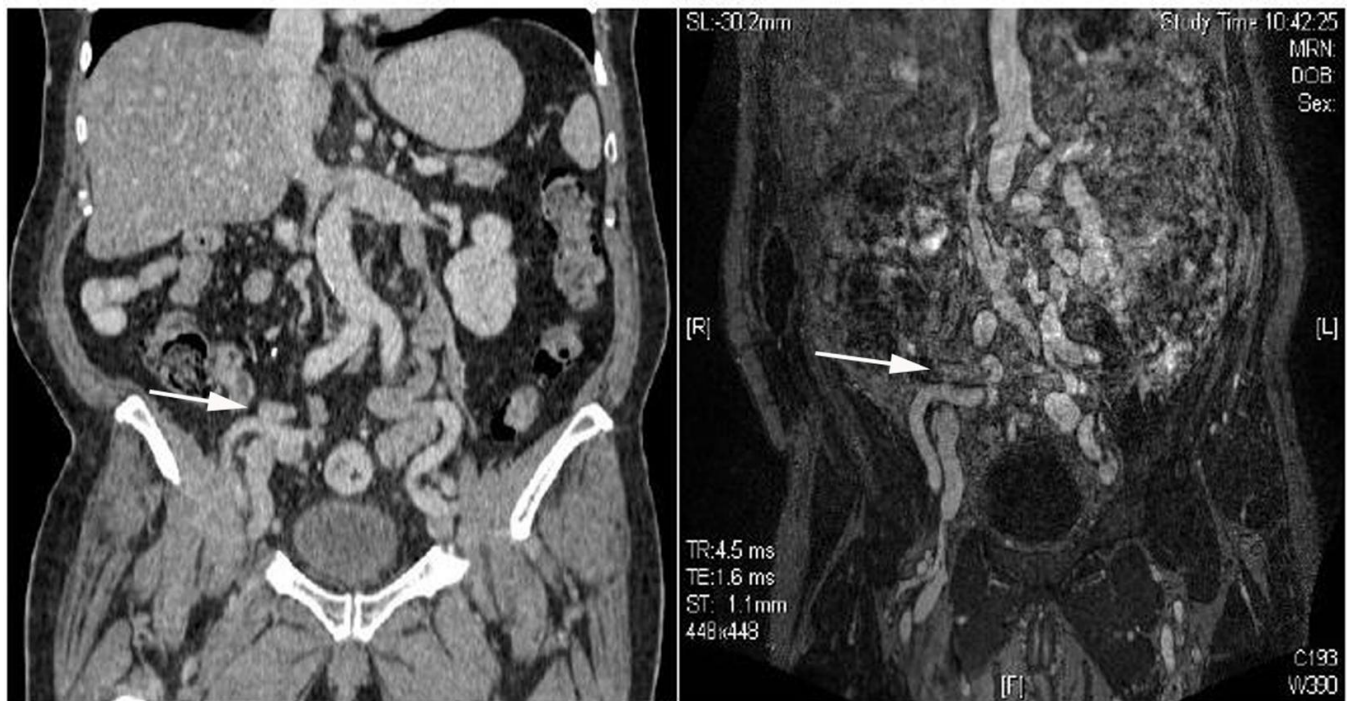


Figure 3: Coronal reconstructions of a contrast enhanced CT (left) and coronal flow sensitized MRI (right) of a 73 year old male with retroperitoneal varices and enlarged retroperitoneal lymph nodes. The arrows depict a suspicious lymph node cranial to the right internal iliac artery. Note the comparable radiodensity to the left testicular vein in contrast enhanced CT and the low signal intensity in flow sensitized MRI. Contrast enhanced multislice CT (left , portovenous phase after i.v. administration of 100 ml contrast agent (Ultravist 370, Bayer-Schering); tube voltage: 120 kvp) and flow sensitized MRI (right, 1.5 Tesla, trueFISP, TR: 4.46, TE: 1.55 ms)

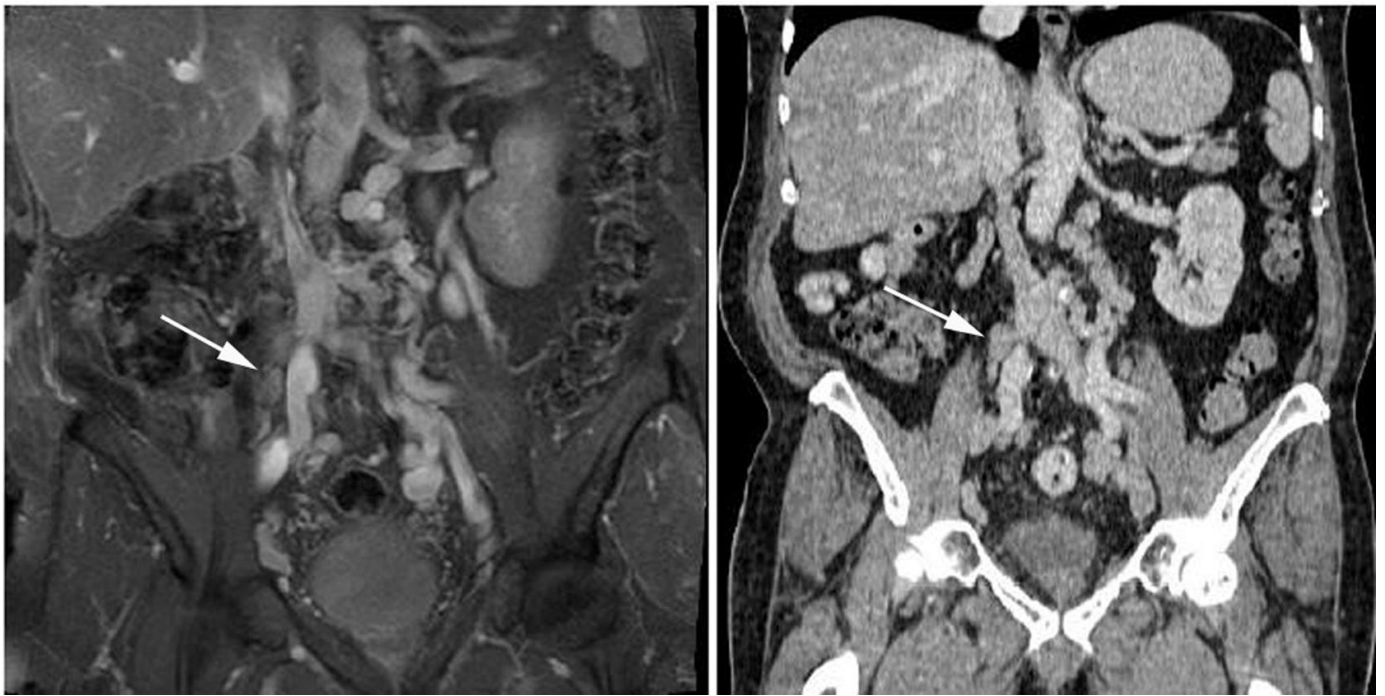


Figure 4: Coronal contrast enhanced T1-weighted MRI (left) and coronal reconstructions of a contrast enhanced CT (right) of a 73 year old male with retroperitoneal varices and enlarged retroperitoneal lymph nodes. The arrows point to a suspicious right iliac lymph node. Note the clear difference in signal intensity compared to the iliac veins in contrast enhanced T1-weighted MRI (left). In contrast enhanced CT (right), there is no clear difference in radiodensity visible. Coronal contrast enhanced T1-weighted MRI (left, 1.5 Tesla, T1 FLASH, TR: 125, TE: 4.76 ms, 17 ml Dotarem i.v.), contrast enhanced multislice CT (right, portovenous phase after i.v. administration of 100 ml contrast agent (Ultravist 370, Bayer-Schering); tube voltage: 120 kvp)

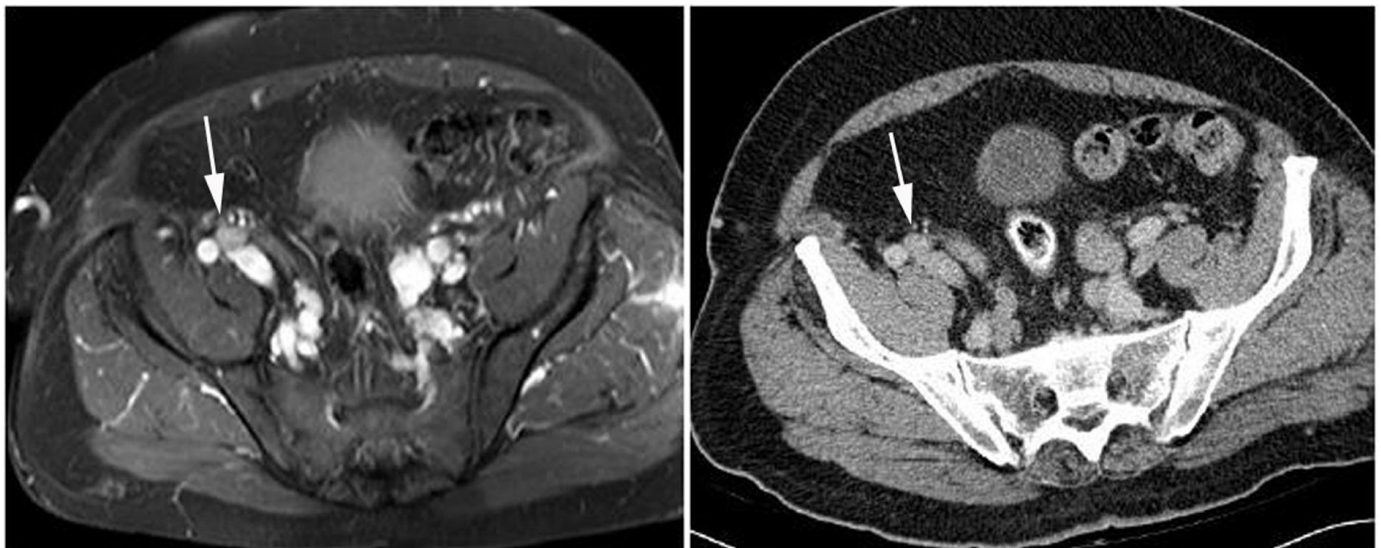


Figure 5: Axial slice of a contrast enhanced T1-weighted MRI (left) and axial contrast enhanced CT (right) of a 73 year old male with retroperitoneal varices and enlarged retroperitoneal lymph nodes. The arrows point to a suspicious lymph node immediately ventral to the right common iliac vein easily missed in the CT-image. Contrast enhanced T1-weighted MRI (left, 1.5 Tesla, T1 FLASH, TR: 125, TE: 4.76 ms, 17 ml Dotarem i.v.), contrast enhanced multislice CT (right, portovenous phase after i.v. administration of 100 ml contrast agent (Ultravist 370, Bayer-Schering); tube voltage: 120 kvp)

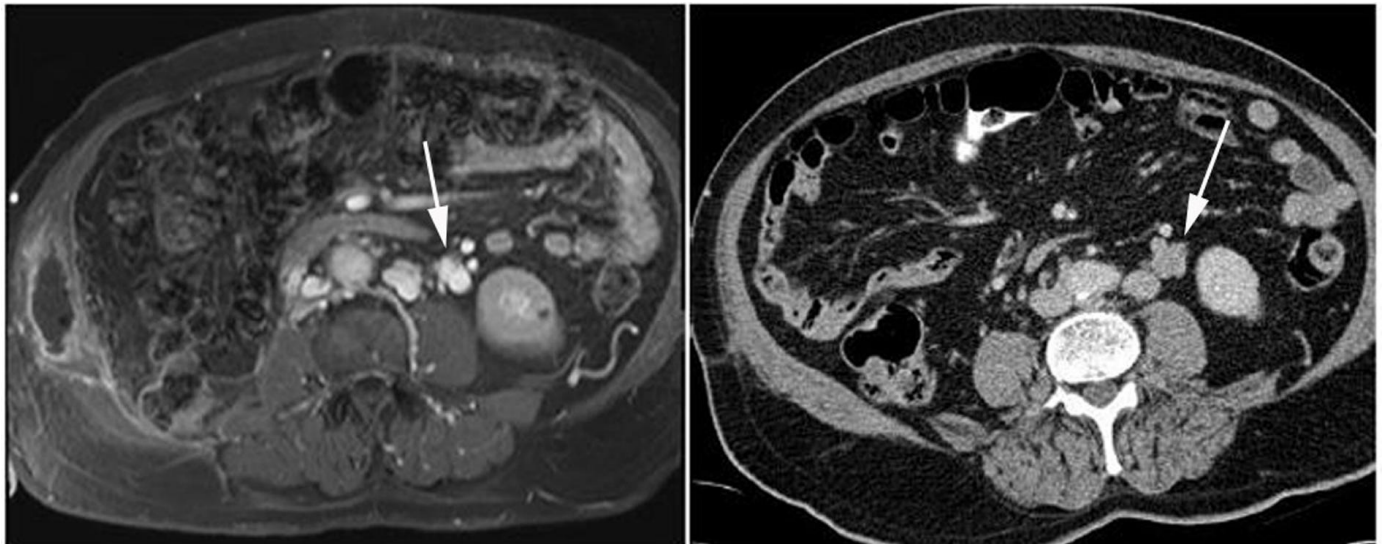


Figure 6: Axial contrast-enhanced CT (right) and contrast enhanced T1-weighted MRI (left) of a 73 year old male with retroperitoneal varices and enlarged retroperitoneal lymph nodes. The contrast enhanced CT on the right depicted a malignoma-suspicious mass lesion situated medially to the lower pole of the left kidney (arrow, right). The mass turned out to be a venous convolute in MR-venography (arrow, left). Contrast-enhanced multislice-CT (right; portovenous phase after i.v. administration of 100 ml contrast agent (Ultravist 370, Bayer-Schering); tube voltage: 120 kvp), contrast enhanced T1-weighted MRI (left, 1.5 Tesla, T1 FLASH, TR: 125, TE: 4.76 ms, 17 ml Dotarem i.v.).

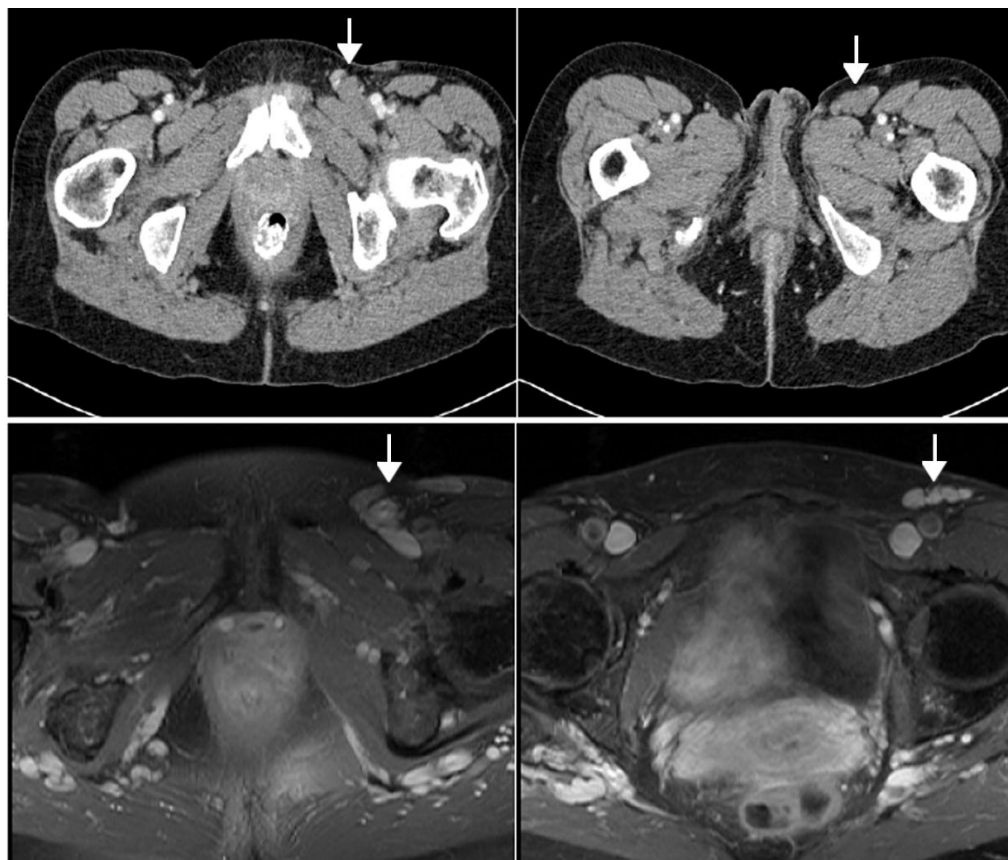


Figure 7: Contrast enhanced CT (upper row of images) and T1-weighted MRI (lower row of images) of a 73 year old female with left inguinal varices. An inhomogenously enhancing structure inguinal left in can be clearly identified as venous convolute in contrast enhanced T1-weighted MRI, on the CT slices, a medially enhancing mass with indefinite density of the lateral parts is visible (arrows). Contrast enhanced multislice CT (upper row of images, portovenous phase after i.v. administration of 80 ml contrast agent (Ultravist 370, Bayer-Schering); tube voltage: 120 kvp), T1-weighted MRI (lower row of images, FLASH, TR: 121, TE: 4.76 ms, 14 ml Dotarem i.v.)

Etiology	Usually derive from increased venous pressure, i.e. increased portovenous resistance due to liver cirrhosis. In rare cases can be due to venous insufficiency.
Incidence	About 120:100000
Gender	Male – female : 2 – 1
Age	No specific age
Risk factors	All conditions involving increased portovenous pressure, rare: Venous insufficiency
Treatment	If bleeding occurs, transjugular intrahepatic portosystemic shunting.
Prognosis	Depends upon the underlying disease
Findings on imaging	Ranges from large-caliber veins in atypic locations (retroperitoneum, abdominal wall) until varices with strong luminal variations that can mimic mass lesions in cross-sectional imaging.

Table 1: Summary table of thoracic and abdominal varicose veins.
In contrast, varices of the lower extremity are mainly due to venous insufficiency.

	Abdominal varicose veins	Suspicious lymph nodes
USG	Hypoechoic lesions with venous flow signal	Hypoechoic masses
CT	Hypoattenuating round or oval shaped masses	Hypoattenuating round or oval shaped masses
MRI T1	Isointense to muscle tissue	Isointense to muscle tissue / may be hyperintense in malignant melanoma
MRI T2	Flow void / hyperintense	Slightly hyperintense
DWI / ADC	No restricted diffusion	May show restricted diffusion when malignant
CE MRI	Show homogenous, venous enhancement	Slight contrast enhancement

Table 2: Differential diagnosis of abdominal varicose veins and suspicious lymph nodes

ABBREVIATIONS

CT: Computed Tomography
CE: Contrast enhanced
DWI: Diffusion Weighted Imaging
ADC: Apparent Diffusion Coefficient
MRI: Magnetic Resonance Imaging
PET: Positron Emission Tomography

KEYWORDS

Varices; Lymphadenopathy; Oncology; Computed Tomography; Magnetic Resonance Tomography

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