

The diagnostic role of IVUS in pelvic venous disease

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ABSTRACT

The two main mechanisms for pelvic venous disease (PeVD) are reflux of ovarian vein and obstruction of left common iliac or left renal vein. Some patients have a combination of the two. Adequate assessment of the location and degree of stenosis and delineation of venous anatomy are the key elements in the success of interventions to treat chronic obstructions causing PeVD. While venography is more accessible and less expensive to perform than intravascular ultrasound (IVUS), an increasing number of studies have demonstrated that IVUS is significantly more sensitive than venography in identifying stenotic lesions and real-time anatomical alterations of the affected venous segments. In this paper, we discuss the derived information and the clinical applications of IVUS during such interventions. The definitive diagnosis of PeVD can be achieved with venography combined with IVUS to evaluate for obstructive lesions in the iliac veins and compression of the left renal vein. Venography has poor sensitivity and specificity in the detection of venous stenosis. However, IVUS can detect fine intraluminal trabeculae and outside compression that can be missed with standard multiplanar venography. The IVUS can confidently confirm the persistent venous stenosis regardless of the hemodynamical alterations of venous pressure, as well. Moreover, it is possible to precisely measure the diameter of ovarian vein with IVUS. This may be helpful to decide about the diameter of the coils or the plugs needed to avoid migration. In conclusion, IVUS enables us to accurately evaluate the underlying cause of PeVD and apply a patient's tailored treatment on table.

Keywords: IVUS, pelvic venous disease, venography, venous obstruction, venous reflux.

Duplex ultrasound and magnetic resonance venography are two important pillars of preoperative work-up in patients suspected of having pelvic venous disease (PeVD).^[1] Invasive venography using contrast media at the time of intervention is the preferred diagnostic test, if information regarding the presence and severity of compression at Nutcracker or May-Thurner points is needed.^[2] Furthermore, the extend of ovarian venous congestion, parauterine venous plexus and leakage points at pelvic area can be evaluated with venography.

Although venography has been a long-standing imaging technique during interventional treatment

of PeVD, this technology has certain limitations. In contrast to the conventional venography which give information regarding the contour of vascular lumen, the intravascular ultrasound (IVUS) delivers additional data such as venous wall structure, luminal area, intraluminal trabeculation and real-time anatomical alterations of the affected venous segments.^[3]

In this paper, we discuss the technical aspects, the derived information, and the clinical applications of IVUS during such interventions. An attempt would be made to provide guidance on when and how this technique should be considered.

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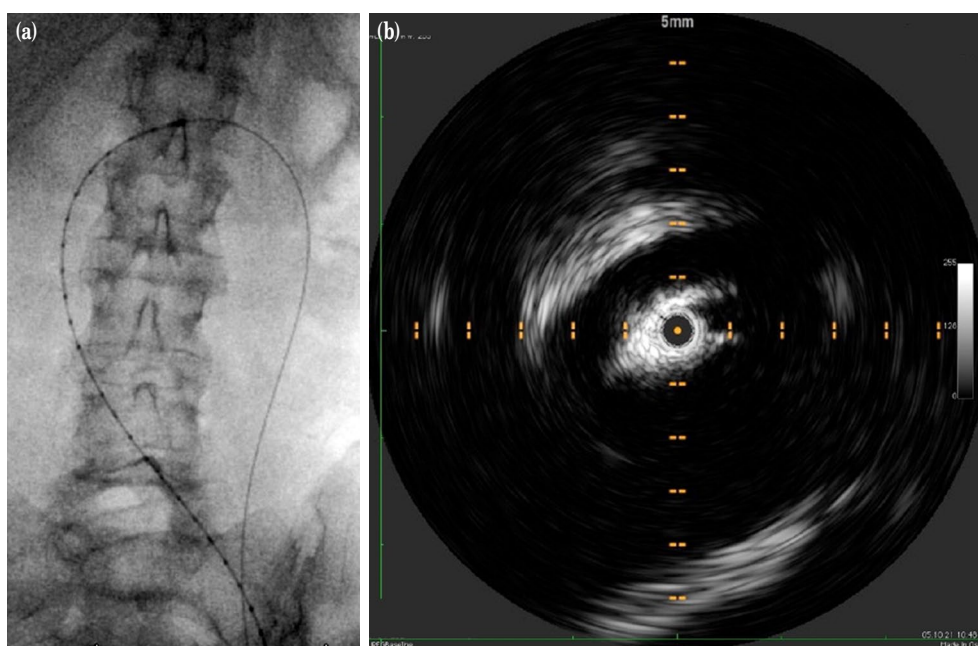


Figure 1. Location of Nutcracker on (a) fluoroscopy and (b) intravascular ultrasound (IVUS).

1: Superior mesenteric artery; 2: Left renal vein; 3: Aorta.

What IVUS might tell you

The definitive diagnosis of PeVD can be achieved after a thorough evaluation of ovarian vein reflux and obstructive lesions including May-Thurner syndrome and Nutcracker syndrome.^[4] This can be accomplished with venography combined with IVUS to evaluate for obstructive lesions in the iliac veins, such as intraluminal trabeculation or extraluminal compression, and compression of the left renal vein. The IVUS imaging enables physicians to formulate patient-specific treatment plans and confirm treatment results.

For the most part, the initial venography provides an overall gross assessment of vessel patency, collateralization, and flow. However, even a multiplanar venography cannot adequately provide detailed information needed for planning the proper treatment. On the contrary, IVUS is an essential tool in venous disease for detection and characterization of underlying pathology.^[3]

The first role of IVUS is to confirm the persistent venous stenosis regardless of the hemodynamical alterations of the venous pressure due to the increased intrathoracic pressure and pulsatile compression due to the degree of stenosis of the adjacent artery (May-Thurner syndrome or Nutcracker syndrome) (Figure 1).^[5]

Consequently, the degree of stenosis and the length of involved segments can be determined correctly using IVUS. The measured dimension can be compared with adjacent normal vein or contralateral normal venous segments for confirmation of the diagnosis. The IVUS-guided venous stenting has been shown to influence decisions on additional therapy in 50% of patients with iliac vein obstructive lesions.^[6,7] Additionally, it is possible to precisely measure the diameter of ovarian vein with IVUS. This may be helpful to decide about the diameter of the coils or the plugs needed to avoid migration.^[8]

Furthermore, using IVUS, instead of multiple venography, decreases the amount of radiation and contrast agent used during venous intervention. Although radiation exposure to patients during endovenous interventions does not reach the threshold to have a deterministic effect,^[9] the long-term stochastic effects of radiation during venous intervention for this non-life-threatening chronic disease should be taken into account.

In conclusion, IVUS enables us to accurately evaluate the underlying cause of PeVD and apply a patient's tailored treatment on table.

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