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Prevalence of Non-thrombotic Iliac Vein Lesions in Patients with Unilateral Primary Varicose Veins

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WHAT THIS PAPER ADDS

This the first study that addresses the question of a possible association between non-thrombotic iliac vein lesions (NIVLs) and the presence of ipsilateral primary varicose veins using intravascular ultrasound (IVUS). In view of the results, it can be assumed that non-thrombotic iliac vein lesions do not play a role in the development of primary varicose veins and that a finding of a NIVL in an asymptomatic patient does not warrant intervention.

Objectives: A role of non-thrombotic iliac vein lesions (NIVLs) in the development of primary varicose veins (PVVs) has not been studied. It seems that intravascular ultrasound (IVUS) is the most accurate method to diagnose these lesions. The aim of the study was to investigate the association between the presence of NIVLs and PVVs and the frequency of NIVLs in asymptomatic and PVV limbs.

Design: This was an observational study.

Materials: Thirty-three patients with unilateral PVV and great saphenous vein incompetence who were qualified for surgical treatment were analyzed. Nineteen patients (57%) presented with varicose veins on the right side.

Methods: During varicose vein surgery, IVUS of the iliac veins and the inferior vena cava was performed. In all patients the iliocaval outflow was interrogated by IVUS in both the limb with and without PVVs. The PVV side was accessed through the surgically exposed sapheno-femoral junction and the non-PVV side was accessed by an ultrasound guided percutaneous puncture of the common femoral vein. In both the common iliac (CIVs) and the external iliac veins (EIVs) the minimal and reference lumen area were measured and the percentage stenosis calculated.

Results: There were no intra- or post-procedural complications. The minimal lumen area (MLA) was smaller and the stenosis of the CIV was greater on the left side than the right: median 57 and 108 mm^2 ($p = 0.001$) and 69 and 34% ($p < 0.001$), respectively. However when the PVV and non-PVV sides were compared, no statistically significant differences of MLA or stenosis of the CIV were found: 88 and 67 mm^2 ($p = 0.38$) and 44% and 51% ($p = 0.40$), respectively. With regard to EIVs, no statistically significant differences in either MLA or stenosis between the left and right and PVV and non-PVV sides were found. The frequency of $\geq$50% stenosis of CIV and EIV in the PVV limbs and the non-PVV limbs was 42% and 48% and 51% and 39%, respectively.

Conclusions: NIVLs are common in patients with PVV but do not seem to be associated with the presence of ipsilateral PVV.

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INTRODUCTION

Primary varicose veins (PVVs) are a common condition.[1–4] To date their etiology is not fully understood. A role of both genetic and behavioral factors has been suggested but not proven. Moreover, certain aspects of PVVs, such as asymmetry of the clinical severity or unilateral occurrence, cannot be explained by these factors. The clinical presentation of PVVs varies from asymptomatic varicosities causing an esthetic defect to severe chronic venous insufficiency with leg ulcers.[3–5] Owing to the anatomical relationship between the iliac arteries and veins, the venous system may be exposed to compression and chronic, focal pulsatile trauma, resulting in the development of intraluminal morphological lesions. The most common site, as described by May and Thurner and also by Cockett and Thomas, is the left common iliac vein (CIV) as it is crossed by the right common iliac artery, but other sites of

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compression have also been described.[6,7] Non-thrombotic iliac vein lesions (NIVLs) have been shown to contribute to the pathophysiology of severe forms of chronic venous insufficiency and to be common in the development of acute iliofemoral deep vein thrombosis (DVT).[6–10] However, the role of these lesions in the development of PVV has not been studied. Both the sensitivity and specificity of the commonly used diagnostic methods such as duplex Doppler are not sufficient for accurate visualization of the lesions in this segment. Venography was considered the gold standard but it usually requires several projections at different angles, requiring exposure to radiation and iodinated contrast media. It seems that intravascular ultrasound (IVUS) is a much more accurate diagnostic method for these lesions.[11,12] Additionally, it does not expose the patients to radiation or contrast media toxicity. Taking the aforementioned factors into account, the aim of this study was to assess whether or not an association exists between the presence of NIVLs and PVVs and to analyze the frequency of NIVLs in asymptomatic limbs and limbs with PVVs.

MATERIALS AND METHODS

After approval by the institutional bioethics committee (approval document nr 728/10 from 02/09/2010) an observational study was carried out. Patients scheduled for varicose vein surgery were invited to participate in the study. All participating patients gave written informed consent before inclusion in the study. The principal inclusion criterion was the presence of unilateral PVVs combined with great saphenous vein (GSV) incompetence but no deep incompetence. In all study patients, data on demographic factors, relevant medical history and co-morbidities were collected and clinical examination of the varicose veins was performed. Severity of venous disease was classified according to clinical part of the CEAP classification.[13] Before inclusion in the study, a duplex Doppler of the lower limb venous system was performed. The exclusion criteria included: history or ultrasound signs of iliofemoral DVT, patients under 18 years of age, pregnancy and breastfeeding, previous ipsilateral GSV surgery, chronic and acute lower limb ischemia, known thrombophilia or other coagulation disorders, lymphedema, any acute or chronic inflammatory disease, active cancer, or current chemo- or radiotherapy, symptomatic coronary artery disease, history of major pelvic or retroperitoneal surgery or trauma, aortic or iliac aneurysms, and patients with cirrhosis. All patients were scheduled for unilateral GSV high ligation and stripping with mini-phlebectomy if needed. All operations were performed under spinal anesthesia. During the procedure intravascular ultrasonography of the IVC and the iliac and common femoral veins on both sides was performed. The side with varicose veins was defined as the PVV side and the opposite side was defined as the non-PVV side and served as a control group for further analysis. The examinations were performed with the Volcano s5 Imaging System (Volcano Corporation, Rancho Cordova, CA, USA) and Visions PV 0.035 catheters that have a maximum imaging diameter of 60 mm (Volcano Corporation). On the PVV side, after surgical exposure of the sapheno-femoral junction through a 4 cm oblique incision in the inguinal area and ligation of the tributaries, the cranial part of the GSV, near the sapheno-femoral junction, was punctured with a 19G needle (Balton, Warsaw, Poland), and a 9F introducer sheath was inserted (Super Sheath, Medikit Co., Ltd. Tokyo, Japan). The Visions PV 0.035 catheter was advanced over a J-shaped Teflon coated guidewire (Balton, Warsaw, Poland) to the level of the right atrium. After a ringdown action to get rid of the scatter, the recording mode was turned on and the Visions PV catheter was manually withdrawn over the guidewire. The length and time of each pull-back were recorded. The pull-back record was stored and then archived on a DVD disc for a further analysis. The non-PVV side was accessed through an ultrasound guided percutaneous puncture of the distal common femoral vein. After insertion of the 9F introducer sheath the same procedure was repeated, the introducer sheath removed, and 5 minutes of manual compression was applied over the puncture site. Finally standard high ligation and stripping of the GSV was performed on the PVV side. After the procedure, compression with two layers of elastic bandages was applied, and use of class II compression stocking for 4 weeks was recommended. All patients were recommended to maintain bed rest for several hours (6–12) after the procedure due to spinal anesthesia and to prevent bleeding from the puncture site. All patients received antithrombotic prophylaxis with low molecular weight heparin for 7 days. Patients were discharged home on the first post-operative day and follow up visits were scheduled on the seventh and 30th post-operative days.

IVUS assessment

The CIV and external iliac vein (EIV) segments were visualized bilaterally with the Volcano s5 Imaging System (Volcano Corporation). The inbuilt software was utilized to calculate the vessel area (Fig. 1). In each vein segment the most stenosed segment was identified and measured (MLA, mm^2) as well as the "normal" maximal transverse area of the same vein segment (reference area, REF, mm^2). The percentage of stenosis (S%) of each analyzed vessel was calculated according to the following formula:

$$S\% = (REF - MLA)/REF \times 100$$

The MLA and the degree of stenosis of corresponding veins were compared between left and right and between PVV and non-PVV side.

Statistical analysis

Statistical analysis was carried out with Statistical Package for the Social Sciences (SPSS) for Windows, (SPSS Inc., Chicago, IL, USA). The values were described by median and range. The normal distribution was verified with Shapiro–Wilk test and the variables were compared with the *t*-test