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# Ovarian Vein Diameter Cannot Be Used as an Indicator of Ovarian Venous Reflux

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**WHAT THIS PAPER ADDS**

This study aims to challenge the long-held idea that the diameter of ovarian veins is of importance in the diagnosis of venous reflux. As can be seen on duplex ultrasound, veins of both large and small diameters display reflux, thus including a criterion involving vein diameter in diagnostic protocols is unnecessary. The article will hopefully prompt physicians to think twice about using diagnostic imaging techniques that place a heavy reliance on measuring the diameter of veins under investigation.

**Objectives:** Previous research into pelvic venous reflux has suggested that the size of the ovarian veins indicates the presence or absence of reflux. It is already known that vessel diameter is not an indicator of reflux in the great saphenous vein. However, to this day, physicians still use vein size to plan treatment of refluxing ovarian veins. The authors aimed to investigate whether or not vessel diameter can be used as an indicator of reflux in the ovarian veins.

**Methods:** Nineteen female patients (mean 40.2 years, range 29–60) presenting to a specialist vein unit with leg varicose veins underwent duplex ultrasonography (DUS). All were found to have a significant pelvic contribution to their leg reflux on transvaginal duplex ultrasonography (TVS) and were referred to an interventional radiologist for treatment by transjugular coil embolization. During the procedure, the diameter of the ovarian veins was measured using digital subtraction venography.

**Results:** Thirty-four ovarian veins were measured (17 right, 17 left) and of these 18 were found to be non-refluxing while 16 displayed reflux. The mean diameter of the non-refluxing veins was 7.2 mm (range 3–13 mm) and that of the refluxing veins was 8.5 mm (range 4–13 mm). This difference was found to be insignificant at a 95% confidence level (Student $t$ test, $p = .204$).

**Conclusions:** There is no significant difference between the diameters of competent and refluxing ovarian veins and, as such, techniques that measure vein diameter may not be suitable for the diagnosis of venous reflux in the ovarian veins.



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## INTRODUCTION

Venous reflux in the ovarian veins and its association with pelvic congestion syndrome[1] (PCS), primary and recurrent lower limb varicose veins,[2–4] and labial/vulval varicose veins[2] has been extensively reported in the vascular community. It has been the focus of much research over the last decade, with previous epidemiological estimations placing its prevalence at 4%.[1] Current data suggest this is an underestimation, with a recent study showing a prevalence of 14% of all females with primary varicose veins and 20% in multiparous women who have leg varicose veins and a history of at least one prior vaginal delivery.[5]

However, pelvic venous reflux (PVR) remains a contentious topic and many doctors treating varicose veins do not look for it or treat it. This is a cause of some concern as untreated PVR in the presence of treated varicose veins has been shown to be a major cause of recurrence in over 25% of such women presenting with recurrent leg varicose veins.[3]

Currently doctors investigating and treating PVR often use the size (diameter) of the ovarian vein as a criterion for assuming reflux and hence deciding upon treatment, with a diameter of 8 mm having been suggested as a limit of normality.[6] This is surprising as doctors treating varicose veins of the lower limb accept that duplex-proven reflux is the "gold standard" investigation and not the diameter of the great saphenous or small saphenous vein. This study investigates the diameters of ovarian veins measured at

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venography and compares the diameter to duplex proven competence or reflux.

## METHODS

Patients presenting to our unit with lower limb varicose veins undergo a comprehensive duplex examination of the legs in order to assess the source of the reflux and plan any subsequent treatment. If venous reflux is seen to emerge from the pelvis and contribute to the leg vein reflux pattern, the patient is offered a transvaginal duplex scan (TVS) to confirm the suspected pelvic reflux and to identify which of the pelvic veins are incompetent. Patients who have been referred for labial or vulval varices alone proceed straight to TVS. A vascular technologist who has been trained to follow the Holdstock—Harrison protocol performs this scan and examines the ovarian and internal iliac veins, any labial or vulval varices and haemorrhoids for reflux.

The protocol for assessing patients for PVR using TVS was conceived and refined over the last 15 years at our unit. Notable criteria include:

- consideration of trunks of *all* diameters
- patient examined in a 45° "head-up" position
- reflux lasting for more than 1 second and persisting until the end of Valsalva manoeuvre
- contralateral dilatation of ovarian and internal iliac veins
- contralateral or ipsilateral syphon effects between ovarian and internal iliac veins in cases of gross reflux, leading to large increases in anterograde flow in opposing venous trunks.

After reflux has been identified in any of the above four veins, patients are referred to an interventional radiologist for treatment with transjugular coil embolization. The latter is known to be an effective treatment for the elimination of reflux in the ovarian veins.[7,8] The radiologist was not blinded to the results of the TVS but as part of their routine procedure and attempted to check each of the ovarian and internal iliac veins to assess the anatomy of the before commencing embolization. In addition, all patients had the iliac veins and interior vena cava imaged to ensure there was no gross obstructive disease of the major venous trunks. During this part of the embolization procedure, digital subtraction venography was performed on those veins that were entered and images of each of the truncal veins were captured. Images analysed showed veins full of contrast, and with the catheter in situ, for calibration of the measuring software and hence accurate measurement of diameter of the vein.

To ensure accuracy of the diameter measurement, calibration was performed using the diameter of the catheter, which was known, in order to obtain measurements accurate to 1 mm. The results of the digital subtraction venograms were then compared with the TVS reports to assess any correlation between vessel diameter and reflux.

A prospective analysis of all female patients presenting to our unit in from January 2013 to August 2013 was performed, and 19 sequential patients were included (mean age 40.2 years, range 29—60). Four of these presented with vulval varices and no concurrent lower limb varicose veins. The vessel diameters and TVS reports of this cohort were analysed. Patient parity, C class of CEAP (Clinical, Etiological, Anatomical, and Pathophysiological) classification, and pelvic reflux patterns were also recorded, as shown in Tables 1 and 2 and Fig. 1 respectively. Statistical testing was carried out on Microsoft Excel 2010.

**Table 1.** Patient parity data.

| Parity | Number of patients |
|---|---|
| Nulliparous | 1 |
| 1 | 4 |
| 2 | 13 |
| 3 | 3 |

## RESULTS

Thirty-four out of 38 ovarian veins were measured (17 left, 17 right); four veins were not accessible: one due to occlusion and three due to technical difficulties with catheterization. Only one of these four veins was shown to reflux on TVS, raising the possibility of a localized obstructive venous lesion in the vein itself. Venography showed no obstructive lesions in any of the iliac veins or inferior vena cavas. According to the TVS reports, reflux was identified in 16 out of 34 veins (47.1%) while an absence of reflux was observed in 18 out of 34 veins (52.9%). Mean ovarian vein diameter was similar, with a mean of 8.5 mm for refluxing veins and 7.2 mm for those that displayed no reflux. The difference between the mean diameters of refluxing and non-refluxing veins was found to be statistically insignificant at a 95% confidence level (Student $t$ test, $p = .204$).

The sensitivity, specificity and accuracy of a diagnosis according to this 8 mm cut-off were determined as shown in Table 3, along with the positive and negative predictive values. Regardless of the sensitivity and specificity of each individual diagnostic investigation, a diagnosis based on vessel diameter is no more than 56% accurate according to these data.

## DISCUSSION

For the minority of doctors that investigate PVR as part of their venous practice, a wide array of diagnostic imaging techniques are available. Among the most commonly used methods are magnetic resonance imaging (MRI),[9,10] DUS,[11—14] contrast venography,[15,16] computed tomography (CT),[9,10,14] and magnetic resonance venography (MRV).[17,18]

**Table 2.** C class of legs included in the study.

| C class | Number of legs |
|---|---|
| 0 | 0 |
| 1 | 6 |
| 2 | 23 |
| 3 | 0 |
| 4 | 3 |
| 5 | 0 |
| 6 | 0 |