ORIGINAL REPORT

Anatomical Variations of the Saphenofemoral Junction in Patients with Varicose Veins

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Abstract- Varicose veins are an extremely common medical condition (present in 5-30% of adults). Surgery remains the gold standard of care in patients with varicose veins, however several newer interventions have been recently introduced which need to be evaluated. During the standard surgery it is imperative to demonstrate and ligate the tributaries of the saphenofemoral junction in combination with stripping of the great saphenous vein. We studied 228 patients with varicose veins who underwent surgery during two years. The number and name of tributaries at the saphenofemoral junction, presence of external pudendal artery and its relationship to the saphenofemoral junction were recorded. The number of tributaries varied from 2 to 7 at the first five centimeters of the great saphenous vein. The average number of branches was 3.87 and the most common branch was the superficial external pudendal vein. The external pudendal artery was identified during all surgical exploration. It crossed anterior to saphenofemoral junction in 39.5% and posterior in 60.5%. Anatomical variations in venous branches at the saphenofemoral junction are varied (from 2 to 7), so it is recommended to explore the location of varicose veins precisely to ensure appropriate surgical technique.

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keywords: Varicose veins; Surgery; Saphenofemoral junction; External pudendal artery

Introduction

Varicose veins are an extremely common medical condition. The most common estimates of the prevalence of varicose veins have been between 5% and 30% in the adult population (1). The findings in patients may include dilated and tortuous veins, telangiectasias, and fine reticular varicosities (2). Patients may complain of heaviness, aching, and extremity fatigue or burning pain (3). More severe signs include thrombophlebitis, hyperpigmentation, lipodermatosclerosis, ulceration, and bleeding from attenuated vein clusters (2). Risk factors for varicose veins include female sex, older age, family history, obesity, a history of phlebitis, high number of pregnancies and prolonged standing (4). Additional behavioral factors such as smoking, physical inactivity, and low-fiber diets have also been suggested to play a role (4). Varicose veins can be classified as primary or secondary. Primary varicose veins result from intrinsic abnormalities of the venous wall, whereas secondary varicose veins are associated with deep and /or superficial venous insufficiency (2).

In cases which the source of varicosity is great saphenous reflux, surgical treatment includes greater saphenous stripping and high ligation of saphenofemoral junction and its tributaries. Therefore, precise exploration and ligation of these tributaries is very important. Regarding variations in these tributaries this study was conducted in Guilan province (Iran) to define these variations.

Materials and Methods

228 patients with clinical and duplex ultrasound evidence of the greater saphenous reflux and saphenofemoral junction insufficiency who were

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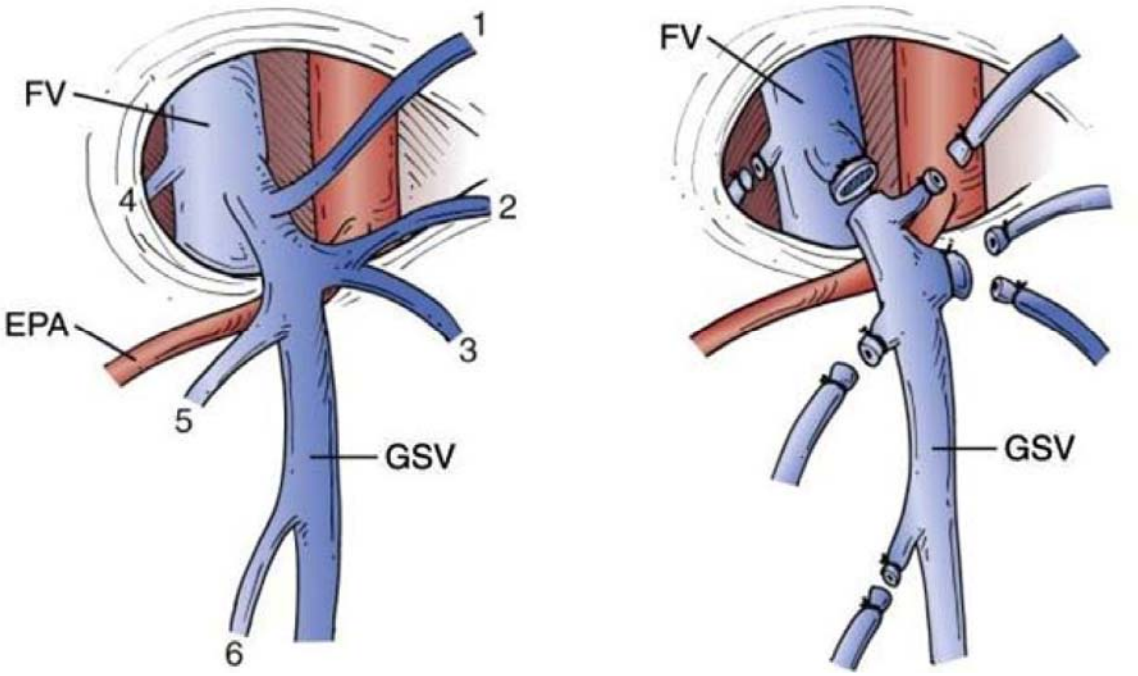

Figure 1. A) Anatomy of the saphenofemoral junction, 1; Superficial inferior epigastric vein, 2; Superficial circumflex iliac vein, 3; Superficial antrolateral thigh vein, 4; External pudendal vein, 5; Superficial external pudendal vein, 6; Superficial posteromedial vein of thigh (Giacomini vein), B) Stripping and ligation of the great saphenous vein.

candidates for surgery enrolled into this study.

All patients underwent surgery by a vascular surgeon in Razi hospital in Rasht during the period from October 2007 to October 2009. The incision about 2 cm was created in the groin skin crease below and parallel to the inguinal ligament at the site of the saphenofemoral junction (below and lateral to the pubic tubercle). The incision was carried down through the subcutaneous tissues so that the greater saphenous vein was identified. The veins were explored in first five centimeters of greater saphenous vein from saphenofemoral junction and were ligated separately. The greater saphenous vein was stripped from groin to knee (Figure 1).

The number and name of tributaries at the saphenofemoral junction, the presence or absence of the external pudendal artery in surgical exploration and its relationship to the saphenofemoral junction were recorded in questionnaires. Data are expressed with corresponding 95% confidence intervals. Analysis was performed using the statistical package SPSS-16 software.

Results

Out of 228 patients, 146 were male and 82 were female. The mean age of patients was 45.03 (range 17 to 81 years). The number of tributaries varied from two to seven at the first five centimeters. The mean number of them was 3.78 with a standard deviation of 0.99. There were two tributaries in 7.9%, three tributaries in 26.8%, four tributaries in 41.2%, five tributaries in 18.9%, six tributaries in 4.8% and seven tributaries in 0.4% of patients (Table 1).

The most frequent branch was superficial external pudendal vein seen in 96.4% of patients. The least frequent branch was superficial posteromedial vein of thigh (superficial Giacomini vein) (27.6%).

Frequency of inferior superficial epigastric, superficial circumflex iliac and superficial antrolateral thigh were 92.9%, 90.3% and 70.1% respectively (Table 2).

Table 1. Distribution of the number of tributaries at the SFJ.

The number of tributaries	N (%)
2	18 (7.9%)
3	61 (26.8%)
4	94 (41.2%)
5	43 (18.9%)
6	11 (4.8%)
7	1 (0.4%)

SFJ: Saphenofemoral Junction

Table 2. Distribution of the name of tributaries at the SFJ.

The name of tributaries	N (%)	CI 95%
Superficial External Pudendal Vein	220 (96.4%)	93.9, 98.8
Superficial Inferior Epigastric Vein	212 (92.9%)	89.5, 96.2
Superficial Circomflex Iliac Vein	206 (90.3%)	86.94, 4.1
Superficial Antrolateral Thigh Vein	160 (70.1%)	64.1, 76.0
Superficial Posteromedial Vein of Thigh	63 (27.6%)	21.8, 33.4

CI: Confidence Intervals, SFJ: Saphenofemoral Junction

Table 3. Distribution of relationship between external pudendal artery and SFJ

Position	N (%)
Anterior	90 (39.5%)
Posterior	138 (60.5%)

SFJ: Saphenofemoral Junction

The external pudendal artery was identified during all surgical exploration crossed anterior to saphenofemoral junction in 39.5% and posterior in 60.5% of patients (Table 3).

Discussion

Varicose veins are the most common manifestation of chronic venous insufficiency (5). Varicose veins can be associated with great discomfort, and they bear a significant impact on productivity and quality of life, which can improve by surgery (6,7). Adequate surgery is essential to prevent unnecessary recurrence and avoidable complications (8).

In our study the number of tributaries at the first five centimeters saphenofemoral junction was between two and seven. According to a paper of Donnelly *et al.* the tributaries varied from one to ten (9). This may be either due to racial differences or due to different ways of counting the branches. That is some surgeons tend to count all the branches on a single trunk as one at the saphenofemoral junction.

In current study the most common frequency (71.20%) of tributaries was four. It was related to three tributaries in 57.4% of patients in a study done by Pourhassan *et al.* (10).

In our study the most common tributary at the saphenofemoral junction was the superficial external pudendal vein. According to a study, it was related to the superficial epigastric vein (11), and in a study by Pichot *et al.* the superficial epigastric vein and circumflex iliac vein were the most common tributaries of saphenous vein located close to the saphenofemoral junction (12). This might be for genetic and regional variations and also for the difference of interpretation by surgeons. It seems that the frequency of branches is not so important, but the most important issue is precise exploration and ligation of all branches in saphenofemoral junction.

We observed external pudendal artery in all patients during surgery. In some studies it was not found in all patients (13,14). It may be due to inadequate exploration in those surgeries. If external pudendal artery is damaged, it may lead to significant bleeding during exploration. The surgeon may be confused and serious complications such as damage to femoral vein may occur. It is therefore recommended to explore and cut external pudendal artery or remove it from the field before the exploration of the saphenofemoral junction.

Recurrence of varicose veins is a serious public health problem. Reports have demonstrated a high recurrence rate following varicose veins surgery, which may have arisen due to an inadequate first operation (15,16). Tributaries of the saphenous vein near the saphenofemoral junction usually cause recurrent varicose veins (17). Therefore a proper understanding of the anatomy of superficial veins is essential for improving the results of operative treatment (18).

In conclusion, adequate knowledge of the anatomy of tributaries at the saphenofemoral junction and ligating them in combination with great saphenous vein stripping are associated with a lower rate of recurrence of varicose veins and a better quality of life. It is imperative to explore first five centimeters of great saphenous vein precisely to identify all saphenofemoral junction tributaries (about four tributaries by average) to ensure appropriate surgical technique.

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