

A STUDY OF VARIATIONS IN THE TERMINATION OF SHORT SAPHENOUS VEIN

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ABSTRACT

BACKGROUND

The liability of the superficial venous system of the lower limbs to varicosity has naturally attracted the attention of Clinicians and Surgeons. Variations in the superficial veins of the lower limb are very common. The extent of such variations, their connections are usually described.

Out of all the veins of the lower limb, the long saphenous and the small saphenous veins mark the major attraction clinically. Both the veins belong to superficial set of the veins, lie in the superficial fascia and possess valves.

The long (great) saphenous vein, being the longest vein in the body, begins as a continuation of the medial marginal vein of the foot and ends in the femoral vein distal to the inguinal ligament. It ascends in front of the medial malleolus followed by passing obliquely across the medial surface of the tibia. In the upper part of the leg, it is accompanied by saphenous nerve and finally opens into the femoral vein after passing through the saphenous opening. The short saphenous vein can be the natural choice for coronary arterial bypass surgery, and also can be used in arterial reconstruction. The look for the variation in the termination of short saphenous vein should be taken into account before performing any varicose surgeries. This paper puts in a sincere effort to check the variations of termination of short saphenous vein and thus help the surgeons in betterment of the techniques used for various surgeries.

METHODS

One hundred specimens were studied in the Department of Anatomy, Vinayaka Mission's Medical College and Hospital, Karaikal. The skin, superficial fascia and the deep fascia was carefully reflected and the formation of the small saphenous vein was identified. The course was followed and finally the termination was identified and noted. The variations in the termination were identified and a note was made.

RESULT

In the present study, 68% of the cases had type 2 and 38% of the cases had type 1. The other variations were not observed. In the present study, 18% and 46% were of type 1 and type 2 respectively in males. In females, type 1 was of 14% and type 2 was seen in 22% of the cases.

In the present study, 17% and 66% were of type 1 and type 2 respectively on the right side. On the left side, type 1 was of 15% and type 2 was seen in 2% of the cases.

CONCLUSION

This high extension of the short saphenous vein (Giacomini vein) can be the natural choice for coronary arterial bypass surgery, and also can be used in arterial reconstruction. The look for the variation in the termination of short saphenous vein should be taken into account before performing any varicose surgeries.

KEYWORDS

Short Saphenous Vein, Termination, Variation, Surgery, Varicose.

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INTRODUCTION: The liability of the superficial venous system of the lower limbs to varicosity has naturally attracted the attention of Clinicians and Surgeons. Variations in the superficial veins of the lower limb are very common. The extent of such variations, their connections are usually described.

Out of all the veins of the lower limb, the long saphenous and the small saphenous veins mark the major attraction clinically. Both the veins belong to superficial set of the veins, lie in the superficial fascia and possess valves.

The long (great) saphenous vein, being the longest vein in the body, begins as a continuation of the medial marginal vein of the foot and ends in the femoral vein distal to the inguinal ligament. It ascends in front of the medial malleolus followed by passing obliquely across the medial surface of the tibia. In the upper part of the leg, it is accompanied by saphenous nerve and finally opens into the femoral vein after passing through the saphenous opening.¹

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The short saphenous vein in majority of the cases begins below and posterior to the lateral malleolus. The vein is the actual continuation of the lateral end of the dorsal venous arch, supplemented by the lateral marginal vein of the foot. It ascends along the lateral end of the tendo-calcaneus and is accompanied by the sural nerve on its lateral side. This forms one of the most identifying features of the sural nerve for the operating surgeons. Thereafter, the veins run along the middle of the back of the leg, pierces the deep fascia and undergoes a subfascial course between the two heads of the gastrocnemius until it reaches the middle of the popliteal fossa where it dips sharply to terminate into popliteal vein. The posterior femoral cutaneous nerve accompanies the upper part of the vein, while passing from deep to the superficial.

The small saphenous vein may possess variable termination; sometimes it joins the great saphenous vein in the upper thigh either directly or through the accessory saphenous vein, it may bifurcate, one joining the great saphenous vein and the other ending in the popliteal or the deep posterior veins of the thigh and occasionally it may fail to reach the knee and may end in the great saphenous vein or deep veins of the leg. The small saphenous vein is provided with seven to thirteen valves.

The short saphenous vein represents the post axial vein of the lower limb bud, and it drains into the pelvis through the ischiatic vein, and in the later stage of development it drains the iliac vein, and during the 35 mm embryo, after the thigh has extended from the trunk, the short saphenous vein loses its connection with the ischiatic vein. The short saphenous vein connection with deep vein progressively moves downward during the course of development and later it transforms into a short vein opening into the popliteal vein may be the adaptation due to the elongation of the lower limb. The comparative studies in other mammals also support that the termination of short saphenous vein into popliteal vein is an adaptation seen in higher mammals² and the possible retention of connection with the ischiatic vein and with the great saphenous vein can be the reason for the formation of Giacomini vein.

Generally, the clinical assessment including tourniquet tests and Doppler ultrasound of primary varicose veins presents no problem. However, in some patients, the information so obtained is inadequate for appropriate management and difficulties arise because of abnormal communication between the long and short saphenous veins. Sometimes the main trunks alone are affected and in others only the tributaries are anomalous. In few cases both are involved. In extensive varicose veins, because of overlap of the long and short saphenous territories, it can be difficult to assess which system is involved or whether both are affected. Detailed knowledge regarding the anatomical variations such as reduplication of the long saphenous vein and unusual termination of the short saphenous vein is a prerequisite in the diagnosis and management of varicose veins. Usually the short saphenous vein terminates in the popliteal fossa a few cm above the knee joint, but in almost one half of patients it terminates at a higher or lower level.

In this study, short saphenous vein terminated at unusual sites is described. Although attention has been mainly directed to the great saphenous vein for the elucidation of the causation of the varicose condition, the study of the small saphenous vein, which phylogenetically is the more important vein, throws light upon the problem. Interestingly, variations seen in this study should be kept in mind due to its clinical and surgical significance.

Variation in the course and termination of superficial veins are prevalent. The termination of the short saphenous vein was previously classified into six types by Mercier in 1967.³

Type 1 – the saphenopopliteal junction is situated 2 to 15 cm above the popliteal crease.

Type 2 – the saphenopopliteal junction is situated 2 to 15 cm above the popliteal crease, but is extended by a trunk which anastomoses with the long saphenous vein.

Type 3 – the high saphenopopliteal junction terminates in the femoral vein, and it communicates with the long saphenous vein.

Type 4 – the saphenopopliteal junction does not exist and short saphenous vein directly terminates in the long saphenous vein.

Type 5 – the high saphenopopliteal junction terminates on the femoral vein.

Type 6 – the saphenopopliteal junction is complex with a number of intramuscular anastomoses.

The short saphenous vein can be the natural choice for coronary arterial bypass surgery, and also can be used in arterial reconstruction. The look for the variation in the termination of short saphenous vein should be taken into account before performing any varicose surgeries. This paper puts in a sincere effort to check the variations of termination of short saphenous vein and thus help the surgeons in betterment of the techniques used for various surgeries.

MATERIALS AND METHODS: One hundred specimens were studied in the Department of Anatomy, Vinayaka Mission’s Medical College, Karaikal.

Fifty of the specimens were from males and fifty were from females.

The study was done from 2010 to 2016.

The skin, superficial fascia and the deep fascia was carefully reflected and the formation of the small saphenous vein was identified. The course was followed and finally the termination was identified and noted. The variations in the termination were identified and a note was made.

RESULTS:

Type	Percentage
Type 1	32%
Type 2	68%
Type 3	Nil
Type 4	Nil
Type 5	Nil
Type 6	Nil

Table 1: Showing the Frequency of each Type of Variation that has been Described



Image 1: A Small Tributary to Popliteal Vein

In the present study, 68% of the cases had type 2 and 38% of the cases had type 1. The other variations were not observed.

Type	Male	Female
Type 1	18%	14%
Type 2	46%	22%
Type 3	Nil	Nil
Type 4	Nil	Nil
Type 5	Nil	Nil
Type 6	Nil	Nil

Table 2: Showing the Frequency of each type of Variation in Each Sex

In the present study, 18% and 46% were of type 1 and type 2 respectively in males. In females, type 1 was of 14% and type 2 was seen in 22% of the cases.

Type	Right	Left
Type 1	17%	15%
Type 2	66%	2%
Type 3	Nil	Nil
Type 4	Nil	Nil
Type 5	Nil	Nil
Type 6	Nil	Nil

Table 3: Showing the Frequency of each type of Variation in Each Side

In the present study, 17% and 66% were of type 1 and type 2 respectively on the right side. On the left side, type 1 was of 15% and type 2 was seen in 2% of the cases.

DISCUSSION: Majority of the cases comes under the type II category.

The thigh extension of short saphenous vein is termed as Giacomini’s vein as this extension was first described by Giacomini.

Giacomini reported this extension in 86.3% of cases,⁴ Kosinski – 82.2%,⁵ Mercier – 85%(8), Stolic E – 95%,³ Prakash – 92%.⁶

Many authors have given different views for the reason for this thigh extension of short saphenous vein.

Bush RG and Hammond – reported that when there is insufficiency of the short saphenous vein it leads to Giacomini vein.⁷

Delis KT studied that the presence of the Giacomini vein has no way altered the anatomy of short saphenous vein termination and also reported that this Giacomini vein less often susceptible to reflux than the saphenous trunks.⁸

Variations in the superficial veins of the lower limb are not uncommon, particularly in their mode of termination. Considering the fact of varied drainage pattern of short saphenous vein, the earlier studies categorised its termination into three types. In type 1, it drains into the popliteal vein as its normal pattern of termination. However, this type is further subdivided into two subtypes where it may completely drain into the popliteal vein or it may bifurcate to drain into both popliteal and great saphenous veins. In type 2, it extends up to the thigh and it may drain into the femoral vein, veins of the posterior compartment of the thigh or into the great saphenous vein.

In the present study, the incidence of type 2 termination is low when compared to other studies. This may be a regional variation as the study population considered in the subject are different.

This study may pave a way for further studies to find out the local differences and may also better assist the cardiac and vascular surgeons. In this study, there were no cases to which the type 3, 4 and 5 were linked. This may also be classical to our own population.

Although anatomical aspects of the small saphenous vein have been widely discussed, very little attention has been drawn to the possibility of a reverse blood flow in a specific pattern of cranial extension of the small saphenous vein. Such condition occurs when there is a saphenopopliteal junction and a subfascial-route small-calibre vein that originates from small subcutaneous veins at the upper or mid-third of the posterior thigh. This extension shows a caudal blood flow, since this vein acts as a tributary of the posterior thigh. According to Giacomini, the small saphenous vein shows saphenopopliteal junction, this branch ends in the subcutaneous/subfascial tissue at the upper posterior thigh. Obviously, it carries blood to the small saphenous vein since there was a pair of valves arranged so as to prevent flow in cranial direction. "This specific pattern was characterised in 14% of the limbs studied by Giacomini and in 23% of the limbs studied through Doppler ultrasound examination by Oliveira et al. The remaining anatomic studies do not refer to its frequency; whose presence was either omitted or included in the pattern in which an exclusive termination into the popliteal vein occurs.

CONCLUSION: This thigh extension of the short saphenous vein (Giacomini vein) can be the natural choice for coronary arterial bypass surgery, and also can be used in arterial reconstruction. The look for the variation in the termination of short saphenous vein should be taken into account before performing any varicose surgeries.

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