Barw Medical Journal | 2024;2(4):98-101
Journal home page: https://barw.krd/index.php/BMJ

Case Report

A Unique Positioning of Saphenofemoral Junction: A Case Report and Literature Review

Fahmi H. Kakamad[1*], Rezheen J. Rashid[2], Shvan H. Mohammed[3], Nasren Sharef Sabr[4], Ali H. Hasan[4], Ayoob A. Mohammed[1], Farman J. Ahmed[1], Dana H. Mohammed-Saeed[1], Hawkar A. Nasralla[4], Sharaza Qadir Omer[1]

1. *College of Medicine, University of Sulaimani, Madam Mitterrand Street, Sulaymaniyah, Iraq*
2. *Department of Radiology, Hiwa Hospital, Sulaymaniyah, Iraq*
3. *Xzmat Polyclinic, Rizgari, Kalar, Iraq*
4. *Smart Health Tower, Madam Mitterrand Street, Sulaymaniyah, Iraq*

[*] ***Corresponding author***: fahmi.huseein@univsul.edu.iq *(F.H. Kakamad). Doctor City, Building 11, Apartment 50, Zip code: 46001, Sulaymaniyah, Iraq*

Keywords:
Saphenofemoral junction
Varicose veins Gemini
Saphenopopliteal junction
Duplex ultrasound
Great saphenous vein

Received: August 10, 2024
Revised: August 29, 2024
Accepted: September 18, 2024
First Published: September 25, 2024

Citation: Kakamad FH, Rashid RJ, Mohammed SH, Sabr NS, Hasan AH, Mohammed AA et al. A Unique Positioning of Saphenofemoral Junction: A Case Report and Literature Review. Barw Medical Journal. 2024;2(4):98-101.
https://doi.org/10.58742/bmj.v2i3.111

Abstract

Introduction

The saphenofemoral junction (SFJ) serves as a proximal link joining the superficial and deep veins in the lower limbs. Its anatomical position is typically 2.5 cm inferior and 4 cm lateral to the pubic tubercle. This study reports an exceptional case wherein the SFJ was found in the lower thigh.

Case presentation

A 24-year-old male presented with left leg pain and swelling for five years duration. Clinically, the left lower limb showed noticeable varicose veins. The duplex ultrasound showed several enlarged varicose veins, primarily around the knee. However, the SFJ was observed roughly 15 cm below the pubic tubercle, with a reflux lasting more than four seconds. The patient declined all therapy modalities, and regrettably, he was lost to further follow-up.

Literature review

No prior reports were found in the literature describing such an abnormal positioning of the SFJ approximately 15 cm below the pubic tubercle.

Conclusion

In conclusion, while the lower limb veins have various anatomical variations, locating the SFJ in the mid-third of the thigh is rare and has not been documented in the literature.

1. Introduction

Varicose veins (VVs) are twisted or dilated veins typically located in the legs, leading to feelings of discomfort and pain. This condition ranks among the most prevalent issues affecting the venous system in the lower extremities [1]. The word "varicose" is derived from the Latin term "varix" which signifies "twisted" [2].

Veins in the legs have valves situated at different points to stop backward blood flow or reflux. The muscles in the lower limbs aid in returning venous blood to the heart by acting as a muscular pump, counteracting the pull of gravity. However, VVs typically

arise due to valve failure and reflux, often affecting the great saphenous or small saphenous veins (GSV). Various pathophysiological mechanisms weaken the vein walls, leading to the formation and progression of VVs [3].

The saphenofemoral junction (SFJ) is a proximal link connecting the superficial and deep veins in the lower limb. Among the primary superficial veins, the GSV extends from the ankle to the groin along the inner aspect of the leg, and typically, it directs its flow medially into the common femoral vein [4].

The location of the SFJ junction is typically described as being 2.5 cm inferior and 4 cm lateral to the pubic tubercle. Understanding the anatomical variations in the SFJ and the variations in the tributaries of the GSV is crucial not only for traditional VV surgical procedures like stripping the GSV with SFJ ligature but also for modern techniques such as thermal ablation when reflux is present, to ensure the safe management of the junction in the least invasive and most effective manner possible [2,5].

This study reports a unique case of the SFJ being 15 cm distal to the pubic tubercle within the mid-third of the left thigh. To the best of our knowledge, the identification of the SFJ at such a distance from the pubic tubercle has not been previously documented in the literature. This report adheres to ethical publishing standards by avoiding referencing predatory journals, and it is structured following the CaReL guidelines [6].

2. Case Presentation

2.1. Patient information

A 24-year-old male presented with left leg pain and swelling for five years duration. He had a history of polidocanol injection three years ago for the management of varicose veins. The case was a nonsmoker, and his past medical history was unremarkable.

2.2. Clinical findings

Throughout the clinical assessment, notable findings included prominent varicose veins in the left lower limb, while all vital signs were within normal range. Apart from these observations, the overall clinical examination was unremarkable.

2.3. Diagnostic assessment

A duplex ultrasound on the left lower limb indicated multiple dilated varicose veins, predominantly around the knee. It also revealed that the great saphenous vein (GSV) was entering the superficial femoral vein at the site of the mid-third of the thigh, making the SFJ approximately 15 cm distal to the pubic tubercle with reflux lasting more than four seconds (Figure 1). In addition, reflux lasting more than four seconds was also observed at the SFJ.

2.4. Therapeutic intervention

The patient declined any form of treatment.

2.5. Follow-up and Outcome

The patient was lost to follow-up.

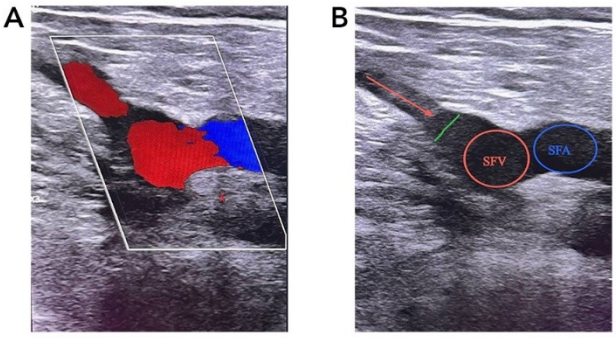

Figure 1: Longitudinal view of the mid-thigh SFJ in the supine resting position. (a) Color Doppler image. (b) Grey-scale image showing the superficial femoral artery (blue circle), superficial femoral vein (red circle), GSV (red arrow), and SFJ (green line).

3. Discussion

The VVs are a widespread medical issue, with prevalence estimates ranging from 5% to 30% among adults. Symptoms in patients often involve enlarged and twisted veins, telangiectasias, and fine reticular varicosities [7]. However, patients might express feelings of heaviness, aching, fatigue in the extremities, or a burning sensation. In more severe cases, symptoms may include thrombophlebitis, hyperpigmentation, lipodermatosclerosis, ulceration, and bleeding from weakened clusters of veins [7].

Factors that increase the risk of developing VVs include being female, advancing age, a family history of the condition, obesity, previous episodes of phlebitis, multiple pregnancies, and prolonged periods of standing. Furthermore, behavioral factors such as smoking, lack of physical activity, and diets low in fiber have also been proposed as contributors to the condition [8].

The lower leg contains two venous systems: one superficial and one deep. The superficial venous system facilitates drainage from the skin and subcutaneous tissue. In contrast, the deep venous system within the muscles is responsible for conveying blood from the rest of the limb. Numerous connections, known as perforators, link the two systems, facilitating the transfer of blood from the superficial to the deep system. In the superficial system, the prominent truncal veins are the great and small saphenous veins that connect to the deep system through the SFJ and saphenopopliteal junction, respectively. Skeletal muscle contractions surrounding the veins are the primary driving force for venous blood flow, acting as pumps to compress and empty the veins. Valves exist in both venous systems to ensure one-directional blood flow, specifically from the superficial to the deep system, aiding blood circulation toward the heart and counteracting the effects of gravity [4,9].

A hypothesis suggests that valvular dysfunction, leading to reflux, is the primary pathological event in VVs. Reflux results in blood stasis and increased venous pressure, damaging the vein wall and causing weakness and dilation. This dilation further

compromises valve function, perpetuating a cycle of incompetence. Distal valves may also fail due to proximal reflux and dilation, exacerbating the condition [9]. The present study noted that the SFJ and saphenopopliteal junction exhibited incompetence, with reflux lasting more than four seconds at each intersection.

Various imaging methods are used to diagnose VVs. Traditionally, invasive procedures like fluoroscopy and phlebography were standard, but they are costly, non-portable, and associated with complications. Consequently, they are mainly used for deep vein treatments. In recent decades, duplex ultrasound has become the preferred imaging tool for VV diagnosis and monitoring.

Duplex ultrasound allows simultaneous evaluation of venous anatomy and function. It is non-invasive, cost-effective, portable, reproducible, and safe for prolonged use [10,11]. In this study, a duplex ultrasound examination of the left lower extremity revealed numerous enlarged VVs clustered around the knee area. The management of VVs has undergone significant evolution with the introduction of endovenous ablation, marking a departure from open surgery, which had been the primary treatment approach for over a century [12]. However, regardless of the chosen method, predicting which patients develop severe symptoms, complications, or experience recurrence after treatment remains challenging. These challenges stem partly from a limited understanding of the disease. For instance, VVs recur in 20–40 % of patients post-surgery [13]. Recurrence has been attributed to factors such as suboptimal surgical technique, mainly when procedures are performed by surgical trainees, existing anatomical variations, the intricate nature of the SFJ, and disease progression [9]. In this study, the patient declined all forms of treatment and, regrettably, was no longer under observation.

Comprehending the anatomy of the SFJ and its variant veins is crucial. This knowledge is essential for traditional VV surgical procedures like stripping the GSV with SFJ ligature and modern techniques such as thermal ablation when reflux is present [5]. The way the SFJ is marked on the body's surface varies in contemporary texts on general surgery, vascular surgery, and anatomy. Some sources indicate its position as either 3 or 3.5 cm under and lateral to the pubic tubercle or nearly 4 cm inferior and lateral to the pubic tubercle [14]. The femoral pulse, the groin skin crease, and the general vicinity of the SFJ below the medial end of the inguinal ligament have all been suggested as a guide [15].

A literature review did not identify instances of such abnormal positioning of the SFJ. Nonetheless, various reports on rare anatomical variations of the thigh veins are documented in the literature [16-22] (Table 1).

In a study by Riju R., 80 patients with primary VVs of the GSV system, with or without complications, were included to investigate the positioning of the SFJ relative to the pubic tubercle. Among the participants, 50 were male, and 30 were female. The mean distance of the SFJ was reported to be 2.7 cm

Table 1. Some rare anatomical variations of the lower limb veins have been documented in the literature**.**

Author, year[reference]	Study type	Gender	Age (Year)	Reason of Evaluation	Rare anatomical variations	Detection method
Rajagopal et al. 2013 [16]	Case report	Male	51	Carcinoma of the penis with metastasis to the inguinal lymph nodes	Bilateral transposition of the femoral vessels in the femoral triangle	Dissection
Kurt et al. 2014 [17]	Case report	Female	47	Lower extremity venous insufficiency	The GSV emptied into the SFV instead of the CFV.	Doppler ultrasound
Quickert et al. 2018 [4]	Case report	Male	23	Lower extremity venous	The GSV was situated between the superficial femoral and profunda arteries at the saphenofemoral junction.	Doppler ultrasound
Marcucci et al. 2010 [18]	Case report	Female	47	insufficiency	Complete transposition of the femoral artery and vein	Dissection
Kalinin et al. 2023 [19]	Case report	Female	64	Primary symptomatic varicose veins of the left leg	FT vessels in a single patient: an unusual saphenofemoral junction on the right side, duplication of the common femoral vein on the left side, and two trunks of the deep femoral artery on both sides.	Duplex ultrasound
Kumar et al. 2017 [20]	Case report	Female	N/A	Pain in the lower limbs in walking	bifurcated GSV encountered in	Dissection
Padavinangadi et al. 2015 [21]	Case report	Male	60	N/A	the right lower limb of an elderly male human cadaver	Dissection
Mehandi et al. 2015 [22]	Case report	Male	60	Cadaveric dissection	unilateral duplication of GSV with its morphological	Dissection

CFV: common femoral vein, GSV: great saphenous vein, SFV: superficial femoral vein, FT: femoral triangle

below (range 2.6–3 cm) and 3.0 cm lateral to the pubic tubercle [15].

In another study conducted by Mirjalili et al., one hundred healthy adults were scanned by an experienced sonographer to map the SFJ using ultrasound accurately. The SFJ center was bilaterally recorded to the most superficial point of the pubic tubercle. The SFJ was successfully identified in all participants. On average, its center was determined to be 2.4 ± 0.6 cm lateral (with a range of 1–4.5 cm) and 1 ± 0.9 cm inferior to the pubic tubercle (ranging from 2.5 cm above to 4 cm caudal to it). In 90% of lower limbs, the junction was inferior to the pubic tubercle, while 10% was at or above that level [15].

Another study conducted by Manerikar et al. involving 50 patients revealed that, on average, the location of the SFJ was approximately 2.24 ± 0.55 cm below and 3.77 ± 0.61 cm to the side of the pubic tubercle as determined by duplex ultrasound [2]. In contrast to the literature mentioned above, the current report observed an atypical finding during duplex ultrasound of the right lower limb in a 24-year-old male patient. The SFJ was approximately 15 cm distal to the pubic tubercle in the mid-third of the left thigh. To our knowledge, such a finding has not been documented in the literature.

4. Conclusion

While the lower limb veins have various anatomical variations, locating the SFJ in the mid-third of the thigh, is rare and has not been documented in the literature.

Declarations

Conflicts of interest: The author(s) have no conflicts of interest to disclose.

Ethical approval: Not applicable.

Patient consent (participation and publication)**:** Written informed consent was obtained from the patient for publication.

Funding: The present study received no financial support.

Acknowledgements: None to be declared.

Authors' contributions: FHK was a significant contributor to the conception of the study and the literature search for related studies. SHM, NSS, AAM, and FJA were involved in the literature review, the study's design, and the critical revision of the manuscript, and they participated in data collection. DHMS, HAN, and SQO were involved in the literature review, study design, and manuscript writing. RJR and AHH Literature review, final approval of the manuscript, and processing of the tables. FHK and HAN confirm the authenticity of all the raw data. All authors approved the final version of the manuscript.

Use of AI: AI was not used in the drafting of the manuscript, the production of graphical elements, or the collection and analysis of data.

Data availability statement: Not applicable.

References

1. Kim R, Lee W, Park EA, Yoo JY, Chung JW. Anatomic variations of lower extremity venous system in varicose vein patients: demonstration by three-dimensional CT venography. Acta Radiologica. 2017;58(5):542-9. doi:10.1177/0284185116665420
2. Manerikar K, Bawa AP, Pithwa AK, Singh G, Shrotri H, Gooptu S. Risk factors and saphenofemoral junction in varicose veins. Indian Journal of Vascular and Endovascular Surgery. 2015;2(4):134-8. doi:10.4103/0972-0820.180110
3. Tavlaşoğlu M, Güler A, Gürbüz HA, Tanrıseven M, Kürklüoğlu M, Yeşil FG. Anatomical variations of saphenofemoral junction encountered during venous surgery. Journal-Cardiovascular Surgery. 2013;1:5-7. doi:10.5455/jcvs.2013112
4. Quickert T, Alagha M. A rare anatomical variation of great saphenous vein at the level of saphenofemoral junction. Radiology Case Reports. 2018;13(6):1128-9. doi:10.1016/j.radcr.2018.07.028
5. Cirocchi R, Henry BM, Rambotti M, Tomaszewski KA, Cappelli M, Vettorello G,. Systematic review and meta-analysis of the anatomic variants of the saphenofemoral junction. Journal of Vascular Surgery: Venous and Lymphatic Disorders. 2019;7(1):128-38. doi:10.1016/j.jvsv.2018.06.006
6. Prasad S, Nassar M, Azzam AY, García-Muro-San José F, Jamee M, Sliman RK, et al. CaReL Guidelines: A Consensus-Based Guideline on Case Reports and Literature Review (CaReL). Barw Med J. 2024;2(2):13-19. doi:10.58742/bmj.v2i2.89
7. Hemmati H, Baghi I, Zadeh KT, Okhovatpoor N, Nejad EK. Anatomical variations of the saphenofemoral junction in patients with varicose veins. Acta Medica Iranica. 2012:552-5. doi:N/A
8. Henke PK. Venous pathology. Rutherford's Vascular Surgery. 7th ed. Philadelphia, PA: Saunders Elsevier. 2010:171-2. doi:10.1308%2F003588411X561062
9. Lim CS, Davies AH. Pathogenesis of primary varicose veins. Journal of British Surgery. 2009;96(11):1231-42. doi:10.1002/bjs.6798
10. Lensing AW, Prandoni P, Büller HR, Casara D, Cogo A, ten Cate JW. Lower extremity venography with iohexol: results and complications. Radiology. 1990;177(2):503-5. doi:10.1148/radiology.177.2.2217792
11. Malgor RD, Labropoulos N. Diagnosis and follow-up of varicose veins with duplex ultrasound: how and why?. Phlebology. 2012;27(1_suppl):10-5. doi:10.1258/phleb.2011.012s05
12. Gohel MS, Davies AH. Choosing between varicose vein treatments: looking beyond occlusion rates. Phlebology. 2008;23(2):51-2. doi:10.1258/phleb.2008.081000
13. Tsang FJ, Davis M, Davies AH. Incomplete saphenopopliteal ligation after short saphenous vein surgery: a summation analysis. Phlebology. 2005;20(3). doi:10.1258/0268355054985848
14. Ali Mirjalili S, Muirhead JC, Stringer MD. Redefining the surface anatomy of the saphenofemoral junction in vivo. Clinical Anatomy. 2014;27(6):915-9. doi:10.1002/ca.22386
15. Riju R. Sapheno-Femoral Junction Anatomy and Haemodynamics in Indian Patients. Amrita J Med. 2016;12:16-22. doi:N/A
16. Rajagopal Y, Roy R, Sharma V, Singh S, Sharma RG. Complete bilateral transposition of femoral vessels: A rare case report. Journal of the Anatomical Society of India. 2013;62(2):182-3. doi:10.1016/j.jasi.2013.12.006
17. Kurt A, Akturk Y, Hekimoglu B. A rare anatomical variation of the greater saphenous vein. Case report. Medical Ultrasonography. 2014;16(1):60-2. doi:10.11152/mu.2014.2066.161.ak1ya2
18. Marcucci G, Antonelli R, Accrocca F, Siani A. A rare anomaly of the femoral vessels: complete transposition of the femoral artery and vein. Interactive CardioVascular and Thoracic Surgery. 2010;11(6):838-9. doi:10.1510/icvts.2010.250423
19. Kalinin RE, Igor'A S, Klimentova EA, Shanayev IN, Khashumov RM, Korbut VS. Two Rare Anatomical Variants of Femoral Triangle Vessels in One Patient: Case Report. IP Pavlov Russian Medical Biological Herald. 2023;31(1):127-36. doi:10.17816/PAVLOVJ109525
20. Kumar N, Aithal AP, Swamy RS, Nayak SB, Rao MK, Abhinitha P. Bifurcated great saphenous vein: a report on its therapeutic and diagnostic perspectives. Journal of Cardiovascular Echography. 2017;27(3):107-9. doi:10.4103/jcecho.jcecho_7_17
21. Padavinangadi A, Kumar N, Swamy RS, Satheesha NB, Rao KM. Unilateral double great saphenous vein: a clinically significant case report. Journal of Cardiovascular Echography. 2015;25(4):116-8. doi:10.4103/2211-4122.172491
22. Mahajan MV, Devi D, Kalpana R. A complete duplication of the right and a segmental duplication of the left great saphenous vein-a case report. National Journal of Clinical Anatomy. 2015;4(2):93-7.doi:10.4103/2277-4025.297308