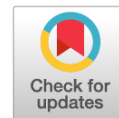


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Два редких варианта анатомии сосудов бедренного треугольника у одного пациента: клиническое наблюдение

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АННОТАЦИЯ

Введение. Верхняя треть бедра — область бедренного треугольника (БТ), или треугольника Скарпа, — имеет огромное значение как в анатомии, так и в сосудистой хирургии. Здесь проходят главные магистральные сосуды нижних конечностей: бедренная артерия, бедренная вена и их наиболее крупные притоки. В области БТ они наиболее доступны из-за поверхностного расположения. Следует отметить, что в сосудистой хирургии бедренные сосуды разделяются на общие бедренные и поверхностные бедренные в зависимости от уровня локализации относительно глубоких бедренных сосудов. Такое деление чрезвычайно важно в функциональном отношении, так как глубокие бедренные сосуды могут существенно компенсировать кровоток при нарушении проходимости по поверхностным бедренным. Кроме того, для общей бедренной вены важным притоком является большая подкожная вена, которая формирует сафенофemorальное соустье. Классическая анатомия описывает сосуды верхней трети бедра как одиночные стволы, которые имеют постоянную топографию. В то же время в литературе достаточно часто встречаются сообщения об удвоении поверхностной бедренной вены, двух стволах глубокой артерии бедра, сравнительно редко — об атипичных сафенофemorальных соустьях (около 0,02%). В работе описываются варианты анатомии сосудов БТ у одного пациента: атипичное сафенофemorальное соустье справа и удвоение общей бедренной вены слева, два ствола глубокой артерии бедра с обеих сторон.

Заключение. Представленные в статье варианты анатомии сосудов БТ являются редкими. Практикующим врачам необходимо знать о них для предотвращения ошибок при проведении диагностики или оперативного лечения.

Ключевые слова: *общая бедренная вена; глубокая артерия бедра; глубокая вена бедра; удвоение, вариантная анатомия; сафенофemorальное соустье*

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Two Rare Anatomical Variants of Femoral Triangle Vessels in One Patient: Case Report

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ABSTRACT

INTRODUCTION: The upper third of thigh — the area of the femoral triangle, or Scarpa's triangle, is of great importance both in anatomy and vascular surgery. It is the place of passage of the main vessels of the lower extremities: the femoral artery, femoral vein and their largest tributaries which are easily accessible in this region due to their superficial location. To note, in the vascular surgery, the femoral vessels are divided to common and superficial ones depending on the level of their location relative to deep femoral vessels. This division is extremely important in the functional aspect, since deep femoral vessels may significantly compensate for the blood flow in case of impaired patency of the superficial femoral vessels. Besides, an important tributary of the common femoral vein is the great saphenous vein forming saphenofemoral junction. Classic anatomy describes vessels of the upper third of thigh as single trunks with permanent topography. At the same time, in the literature there are commonly encountered reports of duplication of the superficial femoral vein, two trunks of the deep femoral artery, and relatively rare reports of atypical saphenofemoral junctions (about 0.02%). The work describes anatomical variants of the FT vessels in one patient: atypical saphenofemoral junction on the right and duplication of the common femoral vein on the left, two trunks of the deep femoral artery on both sides.

CONCLUSION: The anatomical variants of FT vessels described in the article, are rare. It is important that clinicians know about them to avoid errors in diagnosis or surgical treatment.

Keywords: *common femoral vein; deep femoral artery; deep femoral vein; duplication; variant anatomy; saphenofemoral junction*

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LIST OF ABBREVIATIONS

FA — femoral artery
FV — femoral vein
GSV — great saphenous vein
FT — femoral triangle
DFA — deep femoral artery
DFV — deep femoral vein
CFA — common femoral artery

CFV — common femoral vein
SFA — superficial femoral artery
PA — popliteal artery
PV — popliteal vein
SFJ — saphenofemoral junction
DUS — Doppler ultrasound
CDI — color Doppler imaging

INTRODUCTION

Diseases of the vascular system of the lower limbs are widely spread among the population of Russia and other countries and are a common cause of impairment of the working capacity to the extent of disability [1, 2]. Therefore, improvement of methods of diagnostics and surgical treatment is of great practical significance. At the same time, diagnostics and surgical treatment require precise knowledge of the anatomy and, in particular, of *variant anatomy*, since underestimation of this factor may entail incorrect diagnoses or iatrogenic injuries during surgical interventions [2].

The upper third of thigh — the region of the femoral triangle (FT), or Scarpa's triangle, is of great significance both in anatomy and vascular surgery [3, 4]. It is the place of passage of the main vessels of the lower limbs: the femoral artery and femoral vein which are easily accessible in this region owing to their superficial location.

The FA is the main vessel supplying arterial blood to the lower limb, it can be easily palpated in the upper third of the thigh to determine pulse on it. The access to FA in the area of FT is commonly used in open reconstructive interventions in the vascular surgery and in X-ray endovascular surgery.

The deep femoral artery (DFA) is the main branch of FA, its importance in the development of collateral circulation in obliterating diseases of the lower limb arteries is so high that the portion of the FA below the point of its origin is denoted in vascular surgery as superficial femoral artery (SFA).

The FV is the main vessel of venous return from the lower limbs, in the FT area, the main branches open into it: the deep femoral vein (DFV) and the great saphenous vein (GSV) with tributaries. By analogy with the SFA, the section of FV below the entry of the DFV is often referred to in the literature as the superficial femoral vein, but since 2001 it has been assigned the official name '*femoral vein*', and the section above the entry of the DFV — the common femoral vein (CFV) [5]. Superficial veins provide only about 10% of the total venous return from the lower limbs, therefore, the location of the level of the saphenofemoral junction (SFJ) was not reflected in the nomenclature of the CFV.

In the operative phlebology, the level of the entry of the DFV is a landmark for resection of the FV in patients with signs of flotation of the thrombus in the proximal part of the deep veins of the lower limb, and in patients with varicose veins of the lower limbs, the access from the upper third of the thigh in the area of SFJ is most often used in phlebectomy in the GSV system.

According to the classic anatomy, the common femoral artery (CFA) is a continuation of the external iliac artery and appears in the upper third of the thigh from the vascular lacuna; medially and near it the CFV is located. DFA — the largest branch of CFA — originates from it laterally 4 cm below the inguinal ligament. On the anteromedial surface, the GSV opens into the CFV forming the SFJ, and posteriorly and 7 cm distally of the inguinal ligament, the DFV opens into it. The DFV and DFA are represented by single trunks [6].

At the same time, there are reports in the world literature about the duplication of FV, DFV, several trunks of the DFA and their variant anatomy, atypical locations of SFJ [7–11]. However, these reports, as a rule, describe only one anatomic variant of the blood vessels: superficial or deep veins, arteries.

In this clinical observation we describe the existence in one patient of a variant anatomy of the CFV, DFA, SFJ. When searching in Scopus, Pubmed, eLibrary, ResearchGate databases, we did not find any similar observations.

The **aim** of this study to familiarize doctors of practical healthcare with rare variants of the development of vessels of the femoral triangle.

Case Report

A female patient K., 64 years old, on 2022, April 15 was directed to the consultation of vascular surgeon with complaints of pain in the lower limbs in walking for about 200 m.

On examination: pulse on the CFA on both sides; blood circulation in the lower extremities compensated.

Duplex ultrasound (DUS) of the vessels of lower extremities showed echosigns of atherosclerosis of the lower limb arteries, of occlusion of the SFA in the lower

third of the thigh, popliteal artery on both sides with segmental filling of tibial arteries.

The patient **was diagnosed with** Atherosclerosis of the lower limb arteries. IIB stage femoro-popliteal occlusion on both sides, in Pokrovsky–Fontaine classification.

A course of conservative therapy was prescribed. Ultrasound examination revealed a variant anatomy

of vessels of the FT area on both sides. Below, a detailed description of these variants is given.

On the left: DFA separates from the CFA with two trunks on the medial and lateral sides, slightly inferiorly the inguinal ligament. The CFV and SFJ are located between the medial trunks of the DFA and SFA. DFV is presented by two trunks opening into the FV on the lateral and posterior surfaces (Figures 1, 2).

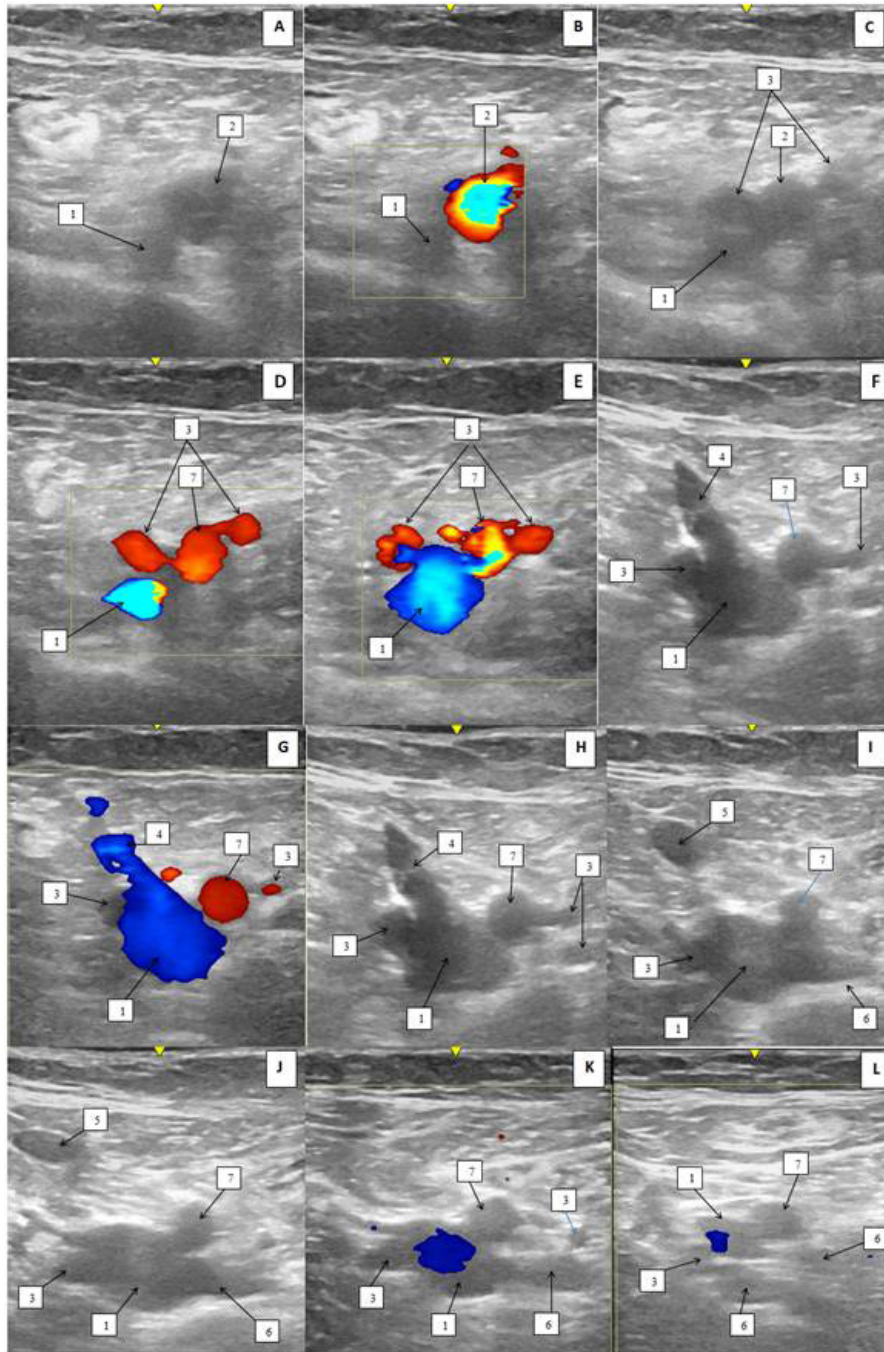


Fig. 1. US duplex scan of the vessels of the upper third of thigh on the left of patient K. (two-dimensional, gray scale mode (B-mode) and color Doppler imaging mode; cross-section): (A–E) superiorly the saphenofemoral junction; (F–H) the level of saphenofemoral junction; (I–L) — inferiorly the saphenofemoral junction.

Notes: (1) common femoral vein, (2) common femoral artery, (3) deep femoral artery, (4) saphenofemoral junction; (5) great saphenous vein, (6) deep femoral vein, (7) superficial femoral artery.

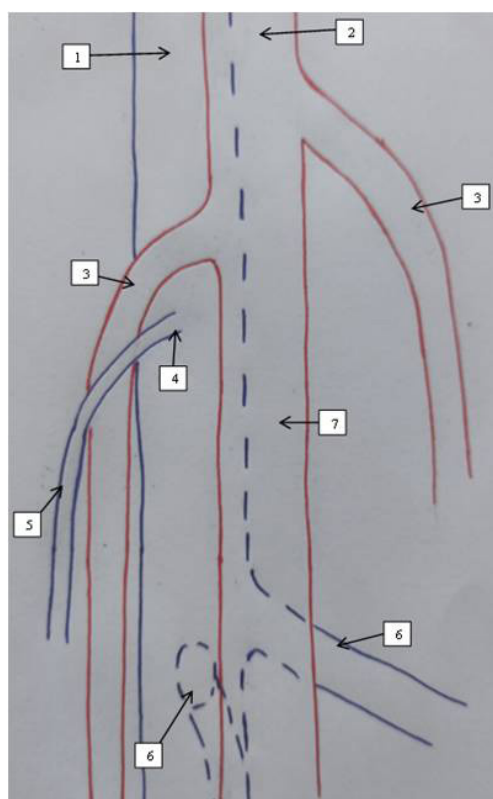


Fig. 2. A scheme of variant anatomy of vessels of the upper third of thigh on the left in patient K.

Notes: (1) common femoral vein, (2) common femoral artery, (3) deep femoral artery, (4) saphenofemoral junction, (5) great saphenous vein, (6) deep femoral vein, (7) superficial femoral artery.

On the right: The DFA is represented by two trunks originating from the lateral and posterior surfaces of the CFA. Superiorly the SFJ, the CFV is represented by one trunk, inferiorly the SFJ — by two trunks located between one of the DFA trunks, which originates from the posterior surface of the CFA. The DFV opens into the lateral trunk of the CFV. At the level of the entry of the DFV, the medial and lateral trunks of the CFV are connected through a communicating branch. Distally to this level, the medial trunk of the CFV accompanies the DFA that originates from the posterior surface of the CFA. The lateral trunk of the CFV accompanies the SFA (Figures 3, 4).

DISCUSSION

The venous system of the lower limbs has a more complex organization than the arterial one, because the veins of the lower limbs are most distant from the heart and are under the greatest influence of gravitation. P. G. Schwalb believes that 'the lower limbs of a human experience the greatest effect of external mechanical and temperature factors in connection with upright walking.

This determines the structural peculiarities of the lower limb veins, and in their anatomical organization the basic functional principle can be traced: the existence of reserve and duplicating mechanisms to ensure stability of venous return'. This is achieved not only due to the superficial and deep venous systems, but also due to various types of structure of vessels: trunks, disintegrating, intermediate types. Different types of structure underlie individual anatomical variability [12, 13].

According to the literature, the duplication of the FV is not uncommon (the incidence can reach 46%) [14]. With this, there may be both true duplications of vessels (when they are of equal diameter), and variants of development (when one of the trunks is significantly smaller in diameter than the main one). In such cases, P. G. Schwalb speaks about 'satellite veins'. According to his observations, the incidence of satellites of the FV is about 35% [12]. At the same time, there are practically no data on the duplication of the CFV in the world literature. K. V. Mazaishvili, et al. reported a satellite vein of the CFV which was located on the anterior-inner surface of the CFV, near the SFJ [15].

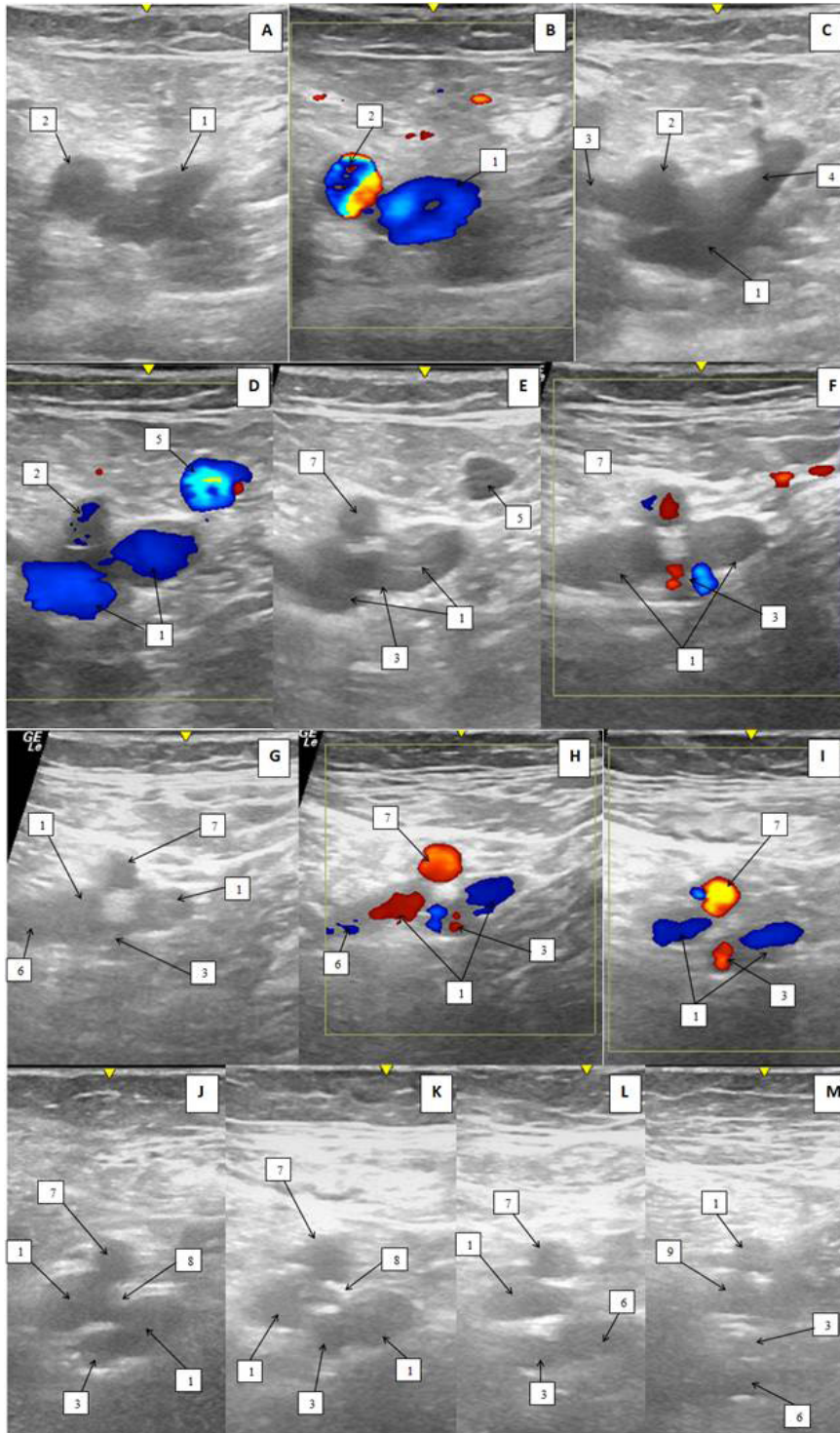


Fig. 3. US duplex scan of the vessels of the upper third of thigh on the right of patient K. (two-dimensional, gray scale mode (B-mode) and color Doppler imaging mode; cross-section): (A–B) superiorly the saphenofemoral junction; (C) the level of saphenofemoral junction; (D–M) inferiorly the saphenofemoral junction.

Notes: (1) common femoral vein, (2) common femoral artery, (3) deep femoral artery, (4) saphenofemoral junction; (5) great saphenous vein, (6) deep femoral vein, (7) superficial femoral artery, (8) anastomose with the common femoral vein, (9) femoral vein.

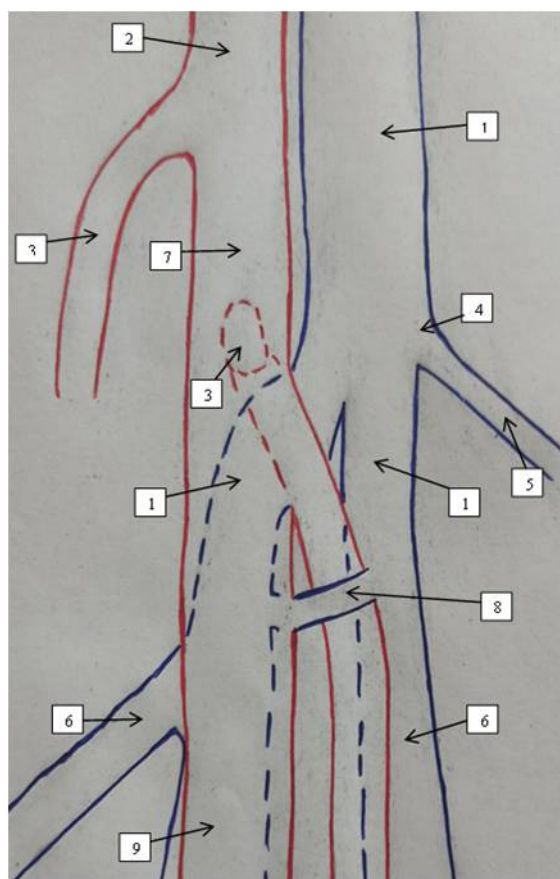


Fig. 4. A scheme of variant anatomy of vessels of the upper third of thigh on the right of patient K.

Notes: (1) common femoral vein, (2) common femoral artery, (3) deep femoral artery, (4) saphenofemoral junction, (5) great saphenous vein, (6) deep femoral vein, (7) superficial femoral artery, (8) anastomose with the common femoral vein, (9) femoral vein.

This variant creates difficulties and can be dangerous in resection of the GSV.

In the previous work, we reported two cases of true duplication of the CFV inferiorly the SFJ [8]. In both cases, the FV was represented by two trunks. The DFV was also represented by two trunks, only in one of the cases two trunks of the DFV opened into two different trunks of the FV, and in the other case both trunks of DFV opened into one of the trunks of the DFV. The DFA was represented by two trunks in only one case. The SFJ had a typical anatomy in both cases. We consider the limitation to our first work to be the fact that the contralateral limbs were not examined.

A peculiarity of the variant anatomy of the CFV in the given case was the fact of representation of the DFA by two trunks originating from the lateral and posterior surfaces of the CFA. The trunk of the DFA originating from its posterior surface, sort of separated two trunks of the CFV, which were located below the SFJ. These two trunks of the CFV were connected through a communicating branch at the level of the entry of the DFV into the lateral trunk of the CFV. It is also interesting

that below the communicant branch, the medial trunk of the CFV accompanied the DFA originating from the posterior surface of the CFA. The medial trunk of the CFV can be regarded as the *second trunk of the DFV*, which connects with the FV at the level of the SFJ. Near the SFA, one trunk of the FV was located.

On examination of the contralateral limb, an atypical variant of the SFJ was found — it was located between the SFA and the DFA. Here, the DFA was also represented by two trunks, but they originated from the lateral and medial surfaces of the CFA. To note, the emergence of the DFA from the medial surface of the CFA is quite rare — in about 4% of observations [16].

According to the world medical statistics, the incidence of atypical SFJ does not exceed 3 cases per 10,000 population [17]. We did not find any literature data on the duplication of the CFV, but we analyzed the results of duplex scanning of the vascular system of lower limbs in the period from January 2020 to June 2022 in 5,000 patients aged 25 to 71 years, who underwent diagnostics at the vascular surgery department of the Regional Clinical Cardologic Dispensary (Ryazan). Based on these

data we can suggest the incidence of duplication of the CFV being 3 cases per 15,000 population.

The question of the embryogenesis of the SFJ region and the causes of these structural variants remains unclear. The development of the neurovascular bundles of the lower limbs is first of all provided by the development of the arterial network which facilitates the growth of the nerve trunks of the lower limbs [18]. For the lower limb, this is the axial artery which provides the growth of the sciatic nerve, and the anterior artery which provides the growth of the femoral nerve. Until the 50th day of the intrauterine development, the axial artery is the main supplying artery of the lower limb. The venous system arises and develops along the nerves that induce its growth. Development of the venous system of the lower limbs in the embryogenesis passes three stages:

- 1) development of the primary venous network — the precursor of the superficial venous system;
- 2) formation of the deep venous system;
- 3) creation of anastomoses between them.

At the 4th–5th weeks of the intrauterine development, blood outflows from the limb bud primarily through the postaxial venous plexus. The postaxial vein drains into the sciatic vein. At 6th–7th week, the GSV develops from the posterior caudal vein. Simultaneously with this, the FV begins to develop also from the posterior caudal vein. The limb grows in length, and the *venous return system* restructures from the postaxial to the preaxial system. The main vessel of venous return is the GSV, but the priority gradually shifts to the FV.

The formation of SFJ remains a subject for discussion. Yu. M. Stoiko and K. V. Mazaishvili believe that the GSV and FV develop *simultaneously*, and SFJ has been existing *initially*, and with the development of the limb only redistribution of blood flows occurs [19]. Taking into account the fact that the arterial system is a trigger for the development of the nervous system, and the latter, in turn, is a trigger for the venous system, it is logical to assume the influence of the development of DFA on the formation of SFJ and FV.

On the 50th day, the pelvic rotation takes place and the limb grows further. When the length of the embryo reaches 19 mm, formation of DFA begins, which, together with the FA becomes the main source of nutrition for the lower limb, and the axial artery is reduced. Between these systems, anastomoses are preserved. A typical location of the DFA is the lateral and posterolateral surface of the FA, which is closest to the topography of the femoral nerve. Incomplete reduction of the axial artery may contribute to the fact of its remaining a significant source of blood supply, so, there is no necessity in the external location of the DFA, which may influence the anatomy of SFJ and FV. At the same time, another reason can be intermittent,

non-rhythmic development of the limb. According to L. M. Litvinenko, this is the main factor of the appearance of variant anatomy of the vascular bed [18].

Practical aspects of these anatomic variants of the vessels are:

- 1) atypical structure of SFJ in case of varicose transformation of the GSV will require isolation of the femoral vessels in resection of the GSV to reduce the length of the stump;
- 2) detection of the area of CFV duplication in Doppler ultrasound will require a thorough evaluation of the patency of deep veins of the lower limbs, and from a surgeon — more precise manipulations in the surgical wound if it is necessary to isolate the DFA.

CONCLUSION

The paper describes the anatomic variants of the femoral triangle vessels on both sides in one patient including atypical safenofemoral junction on the right, duplication of the common femoral vein on the left, two trunks of the deep femoral artery on both sides. These variants are rare. Practitioners should be aware of them to avoid mistakes in diagnosis and/or in surgical treatment.

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СПИСОК ИСТОЧНИКОВ

- Ascher E., editor. *Haimovici's Vascular Surgery*. 6th ed. Blackwell Publishing Ltd; 2012.
- Российские клинические рекомендации по диагностике и лечению хронических заболеваний вен // *Флебология*. 2018. № 3. С. 146–240.
- Sidawy A.N., Perler B.A. *Rutherford's Vascular Surgery and Endovascular Therapy*. 9th ed. Elsevier; 2018.
- Матюшкин А.В., Лобачев А.А. Методы улучшения результатов применения синтетического протеза в подколенно-берцовом сегменте при критической ишемии конечности // *Российский медико-биологический вестник имени академика И.П. Павлова*. 2020. Т. 28, № 2. С. 200–212. doi: [10.23888/PAVLOVJ2020282200-212](https://doi.org/10.23888/PAVLOVJ2020282200-212)
- Caggiati A, Bergan J.J., Gloviczki P., et al. Nomenclature of the veins of the lower limbs: an international interdisciplinary consensus statement // *Journal of Vascular Surgery*. 2002. Vol. 36, No. 2. P. 416–422. doi: [10.1067/mva.2002.125847](https://doi.org/10.1067/mva.2002.125847)
- Гайворонский И.В. *Нормальная анатомия человека*. 10-е изд. СПб.: СпецЛит; 2020. Т. 2.
- Калинин Р.Е., Сучков И.А., Климентова Э.А., и др. Клиническая анатомия глубоких сосудов бедра области бедренного треугольника // *Ангиология и сосудистая хирургия*. 2021. Т. 27, № 1. С. 17–22. doi: [10.33529/ANGIO2021107](https://doi.org/10.33529/ANGIO2021107)
- Калинин Р.Е., Сучков И.А., Шанаев И.Н. Редкие варианты топографии общей бедренной вены // *Флебология*. 2020. Т. 14, № 4. С. 356–361. doi: [10.17116/flebo202014041356](https://doi.org/10.17116/flebo202014041356)
- Калинин Р.Е., Сучков И.А., Пучкова Г.А., и др. Варианты топографии сосудов зоны *trigonum femorale Scarpae* // *Вестник Авиценны*. 2017. Т. 19, № 3. С. 431–435. doi: [10.25005/2074-0581-2017-19-3-431-435](https://doi.org/10.25005/2074-0581-2017-19-3-431-435)
- Вахитов М.Ш., Радионов К.К., Чехута С.М., и др. Роль анатомического фактора в развитии первичного варикозного расширения вен нижних конечностей // *Региональное кровообращение и микроциркуляция*. 2005. № 2. С. 20–24.
- Калинин Р.Е., Сучков И.А., Климентова Э.А., и др. Редкий вариант топографии глубокой артерии бедра // *Наука Молодых (Eruditio Juvenium)*. 2020. Т. 8, № 4. С. 591–598. doi: [10.23888/HMJ202084591-598](https://doi.org/10.23888/HMJ202084591-598)
- Швальб П.Г., Ухов Ю.И. *Патология венозного возврата из нижних конечностей*. Рязань: Тигель; 2009.
- Большаков О.П., Семенов Г.М. *Оперативная хирургия и топографическая анатомия*. СПб.: Питер; 2004.
- Uhl J.-F., Gillot C., Chahim M. Anatomical variations of the femoral vein // *Journal of Vascular Surgery*. 2010. Vol. 52, No. 3. P. 714–719. doi: [10.1016/j.jvs.2010.04.014](https://doi.org/10.1016/j.jvs.2010.04.014)
- Мазайшвили К.В., Хлевтова Т.В., Акимов С.С., и др. *Ультразвуковая анатомия вен нижних конечностей*. М.: Медпрактика; 2016.
- Кованов В.В., Аникина Т.В. *Хирургическая анатомия артерий человека*. М.: Медицина; 1974.
- Kim D.S., Kim S.W., Lee H.S., et al. Rare Vascular Anomalies in the Femoral Triangle During Varicose Vein Surgery // *The Korean Journal of Thoracic and Cardiovascular Surgery*. 2017. Vol. 50, No. 2. P. 99–104. doi: [10.5090/kjtc.2017.50.2.99](https://doi.org/10.5090/kjtc.2017.50.2.99)
- Литвиненко Л.М. *Сосудисто-нервные комплексы тела человека*. М.: Бизнес Олимп; 2011.
- Стойко Ю.М., Мазайшвили К.В. Об эмбриогенезе венозной системы нижних конечностей человека // *Флебология*. 2010. Т. 4, № 1. С. 4–10.

REFERENCES

- Ascher E, editor. *Haimovici's Vascular Surgery*. 6th ed. Blackwell Publishing Ltd; 2012.
- Diagnosics and Treatment of Chronic Venous Disease: Guidelines of Russian Phlebological Association. *Flebologiya*. 2018;(3):146–240. (In Russ).
- Sidawy AN, Perler BA. *Rutherford's Vascular Surgery and Endovascular Therapy*. 9th ed. Elsevier; 2018.
- Matyushkin AA, Lobachev AA. Methods for improving the results of using a synthetic prosthesis in the popliteal-tibial segment in critical limb ischemia. *I. P. Pavlov Russian Medical Biological Herald*. 2020;28(2):200–12. (In Russ). doi: [10.23888/PAVLOVJ2020282200-212](https://doi.org/10.23888/PAVLOVJ2020282200-212)
- Caggiati A, Bergan JJ, Gloviczki P, et al. Nomenclature of the veins of the lower limbs: an international interdisciplinary consensus statement. *Journal of Vascular Surgery*. 2002;36(2):416–22. doi: [10.1067/mva.2002.125847](https://doi.org/10.1067/mva.2002.125847)
- Gayvoronskiy IV. *Normal'naya anatomiya cheloveka*. Saint-Petersburg: SpecLit; 2020. Vol. 2. (In Russ).
- Kalinin RE, Suchkov IA, Klimentova EA, et al. Clinical anatomy of deep femoral vessels in the area of femoral triangle. *Angiology and Vascular Surgery*. 2021;27(1):17–22. (In Russ). doi: [10.33529/ANGIO2021107](https://doi.org/10.33529/ANGIO2021107)
- Kalinin RE, Suchkov IA, Shanaev IN. Rare Topography of the Common Femoral Vein. *Flebologiya*. 2020;14(4):356–61. (In Russ). doi: [10.17116/flebo202014041356](https://doi.org/10.17116/flebo202014041356)
- Kalinin RE, Suchkov IA, Puchkova GA, et al. Variants of topography of vessels of the *trigonum femorale Scarpae* zone. *Avicenna Bulletin*. 2017;19(3):431–5. (In Russ). doi: [10.25005/2074-0581-2017-19-3-431-435](https://doi.org/10.25005/2074-0581-2017-19-3-431-435)
- Vakhitov MSh, Radionov KK, Chekhuta SM, et al. Rol' anatomicheskogo faktora v razvitii pervichnogo varikoznogo rasshireniya ven nizhnikh konechnostey. *Regional'noye Krovoobrashcheniye i Mikrotsirkulyatsiya*. 2005;(2):20–4. (In Russ).
- Kalinin RE, Suchkov IA, Klimentova EA, et al. Rare version of topography of deep femoral artery. *Nauka Molodykh (Eruditio Juvenium)*. 2020;8(4):591–8. (In Russ). doi: [10.23888/HMJ202084591-598](https://doi.org/10.23888/HMJ202084591-598)
- Shval'b PG, Ukhov Yul. *Patologiya venoznogo vozvrata iz nizhnikh konechnostey*. Ryazan': Tigel'; 2009. (In Russ).
- Bol'shakov OP, Semenov GM. *Operativnaya khirurgiya i topograficheskaya anatomiya*. Saint-Petersburg: Piter; 2004. (In Russ).
- Uhl J-F, Gillot C, Chahim M. Anatomical variations of the femoral vein. *Journal of Vascular Surgery*. 2010;52(3):714–9. doi: [10.1016/j.jvs.2010.04.014](https://doi.org/10.1016/j.jvs.2010.04.014)
- Mazayshvili KV, Khlevtova TV, Akimov SS, et al. *Ul'trazvukovaya anatomiya ven nizhnikh konechnostey*. Moscow: Medpraktika; 2016. (In Russ).
- Kovanov VV, Anikina TV. *Khirurgicheskaya anatomiya arteriy cheloveka*. Moscow: Meditsina; 1974. (In Russ).
- Kim DS, Kim SW, Lee HS, et al. Rare Vascular Anomalies in the Femoral Triangle During Varicose Vein Surgery. *The Korean Journal of Thoracic and Cardiovascular Surgery*. 2017;50(2):99–104. doi: [10.5090/kjtc.2017.50.2.99](https://doi.org/10.5090/kjtc.2017.50.2.99)
- Litvinenko LM. *Sosudisto-nerвные komplekсы tela cheloveka*. Moscow: Biznes Oлимп; 2011. (In Russ).
- Stojko YuM, Mazaishvili KV. On embryogenesis of the lower limb venous system in man. *Flebologiya*. 2010;4(1):4–10. (In Russ).

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