GEORGIAN MEDICAL NEWS

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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

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აღწერილობა მედიცინაში და ბერძნული საბჭოთა
GEORGIAN MEDICAL NEWS


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Abstract.

Features of treatment of venous thromboembolism in patients with abnormalities in the development of the inferior vena cava. 

Objectives: Congenital anomalies of IVC development are a rather rare pathology. The analysis of treatment results will better understand the pathophysiology of the disease and form an optimal treatment strategy.

Methods: We analyzed the results of treatment of 1243 patients with venous thromboembolism from 2010 to 2022. Congenital anomalies of inferior vena cava (IVC) development were diagnosed in 2 (0.16%) patients. One patient had IVC aplasia, the other had IVC hypoplasia. Both patients had bilateral iliofemoral deep vein thrombosis (DVT). For the treatment of patients, we used anticoagulant therapy and elastic compression of the lower extremities.

Results: During the study period, venous thromboembolic complications in the form of pulmonary embolism were not recorded, fatal complications were not diagnosed.

Conclusions: Thus, the results of treatment of patients with venous thromboembolism and anomalies in the development of IVC suggest that the use of anticoagulant therapy in this category of patients allows to obtain positive results of treatment.

Key words. Venous thromboembolism, bilateral iliofemoral deep vein thrombosis, inferior vena cava abnormalities.

Introduction.

The annual incidence of newly diagnosed symptomatic deep vein thrombosis in the adult population ranges from 50 to 100 per 100,000 population, with an overall incidence of venous thromboembolism approximately 25% higher with the addition of pulmonary embolism. The incidence of deep vein thrombosis is slightly higher in women aged 20 to 45 years, while it is higher in men aged 45 to 60 years [1-3]. Pulmonary embolism causes up to 300,000 deaths per year in the United States, which is the highest cause of cardiovascular mortality [4,5]. In six European countries with a total population of 454.4 million, more than 370,000 deaths were related to venous thromboembolism in 2004, according to estimates based on the epidemiological model [6]. Of these patients, 34% died suddenly or within hours of an acute event before treatment. In 59% of patients, the cause of death as a consequence of acute pulmonary embolism was established after death, and only in 7% of patients who died rapidly, the correct diagnosis of pulmonary embolism was made before death [6,7].

Although estimates of associated health care costs vary widely, venous thromboembolism direct costs in the United States are astronomical, reaching up to 10 billion per year.

Congenital anomalies of inferior vena cava development are a rather rare pathology, but in many cases, it is accompanied by complications in the form of bilateral venous thrombosis. To date, there are no consensus and recommendations for the treatment of this category of patients, so the analysis of treatment results will better understand the pathophysiology of the disease and form an optimal treatment strategy.

Materials and methods.

We analyzed the results of treatment of 1243 patients with venous thromboembolism from 2010 to 2022. Among them, 162 (13%) patients had pulmonary embolism. 7 (0.5%) patients with IVC thrombosis were observed. From this group 2 (28.5%) patients had pulmonary embolism. 32 (2.5%) patients had bilateral thrombosis of the iliofemoral venous segment. Among them, 14 (43.75%) patients had pulmonary embolism. Congenital anomalies of inferior vena cava development were diagnosed in 2 (0.16%) patients. Thus, among patients with bilateral venous thrombosis in 6.2% of cases, we diagnosed congenital anomalies in the development of inferior vena cava. One patient had inferior vena cava aplasia, the other had inferior vena cava hypoplasia.

Both patients had bilateral iliofemoral deep vein thrombosis. The patient with inferior vena cava aplasia was 35 years old, the patient with inferior vena cava hypoplasia was 26 years old. Both were men. The period from the onset of the disease in our study ranged from 1 to 22 days, with an average of 9 days.

Patients had clinic of edema, cyanosis of both lower extremities. The symptoms of Moses and Homans were positive. They appealed to clinic with urgent indications.

To diagnose venous thromboembolism, we used clinical examination, duplex scanning of the veins of the lower extremities, CT scan phlebography.

Duplex scanning of the veins of the lower extremities allows to clearly visualize the presence of thrombotic masses in the studied venous segment. Duplex ultrasound is a non-invasive method of diagnostic, which gives the possibility of visualized deep veins and thrombotic masses. We used this method for diagnostic of deep veins thrombosis when patients appealed to clinic.

Echogenicity of thrombotic masses is an important criterion for the diagnosis of venous thrombosis because it is an indirect sign of the time elapsed since the onset of the disease, which plays a role in determining further treatment tactics. In both cases of congenital anomalies of inferior vena cava development, duplex scanning allowed us to visualize the existing anatomical anomalies and clearly diagnose deep vein thrombosis of both iliofemoral venous segments.

CT phlebography is a modern method of diagnosing thrombosis of the inferior vena cava system. This method of diagnosis allows to determine the diagnosis in complex clinical situations when
Duplex scanning does not allow to fully assess the complexity of the clinical situation. In the case of inferior vena cava hypoplasia, it was CT phlebography that allowed us to establish a definitive clinical diagnosis. To exclude pulmonary embolism, spiral chest CT with intravenous contrast of the pulmonary artery was used. Spiral chest CT did not show any pathological changes. Patients were diagnosed with thrombophilic risk factors. There was absence of thrombophilies for these patients. Any other pathological changes and structures were absent.

For the treatment of patients with congenital anomalies of inferior vena cava and bilateral iliofemoral deep vein thrombosis, we used anticoagulant therapy and elastic compression of the lower extremities. We prescribed enoxaparin at a dose of 0.1 mg / weight twice a day for 7 days, followed by switching to warfarin under the control of international normalized ratio (INR) in the range of 2.0-3.0. In addition to medical therapy, the patient was treated with elastic compression stockings at a strong level of compression.

**Results and Discussion.**

After treatment, the patient's condition significantly improved, edema and cyanosis of both lower extremities regressed. Dynamic control using duplex scanning showed no progression of the thrombotic process and recanalization of the affected venous segments.

Duplex ultrasound during the two weeks after treatment showed beginning of recanalization of the infrarenal part of the inferior vena cava in case of inferior vena cava hypoplasia and iliofemoral venous segments of the lower extremities. The patients were treated with long-term oral anticoagulants and elastic compression stockings.

During the study period, venous thromboembolic complications in the form of pulmonary embolism were not recorded, fatal complications were not diagnosed. Massive bleeding was not diagnosed in this category of patients during the study period.

As for the anomalies of inferior vena cava development, they are extremely rare. There are no randomized clinical trials of congenital inferior vena cava abnormalities as a result of the small number of patients treated. The development of inferior vena cava is a complex process that involves the formation of anastomoses between three pairs of embryonic veins in the 4-8th week of pregnancy [8]. Violation of these processes leads to the formation of anomalies in the development of inferior vena cava. The frequency of such anomalies is 0.05-8.7% [9]. inferior vena cava aplasia is the rarest anomaly with a development rate of 0.0005-1% [9].

In most cases, inferior vena cava aplasia occurs in the suprahepatic segment (90%) and is usually associated with congenital heart disease in 0.6-2% of cases or with other heart abnormalities in 0.3% -0.5% of cases [10]. Agenesis of the hepatic, renal and infrarenal segments is only 6% [11,12]. This may explain the fact that most patients are asymptomatic, as the presence of a strong network of collaterals can compensate for venous blood flow in the presence of aplasia of the suprahepatic segment of inferior vena cava. However, anomalies of inferior vena cava remain a significant risk factor for venous thromboembolism, as blood flow through the venous system is significantly slowed [13].

Congenital anomalies of inferior vena cava are often associated with congenital heart defects, intestinal malrotation, pulmonary dysgenesis, polysplenia, asplenia and renal agenesis [14-17]. In our study, patients were not diagnosed with any of these abnormalities. It should be noted that most often inferior vena cava abnormalities are diagnosed in young patients. The level of venous thrombosis in the group of young patients is 1 in 10 000 [18]. Among this group, the percentage of patients with inferior vena cava abnormalities is 5% [3,19] There are some reports of bilateral iliofemoral thrombosis in patients with congenital anomalies of inferior vena cava [20,21].

We attribute the bilateral nature of the impression of venous segments to a decrease in blood flow in the venous basins of both lower extremities, which ultimately leads to the formation of thrombosis. It is the result of formation venous collaterals from vessels of iliofemoral venous segment to inferior vena cava. To date, only a few cases of treatment of deep vein thrombosis and pulmonary embolism in patients with congenital anomalies of inferior vena cava have been described in world literature. It is clear that for these reasons there are no consensuses and recommendations on this issue. Specialists rely on their own experience and treatment results of individual patients, described in the literature [22-24]. The basic principles of treatment of venous thromboembolism in congenital anomalies of inferior vena cava are identical to the general ones for the treatment of venous thromboembolism. Absence of treatment these patients can lead to severe venous insufficiency with formation of venous ulcers. This leads to a significant reduction in the quality of life of patients. Given that patients with abnormalities in the development of inferior vena cava and venous thromboembolism as a result of impaired venous hemodynamics, usually at a young age, this is a serious problem for them.

Most often, anticoagulant therapy is used to treat venous thromboembolism. According to studies, the risk of thromboembolic complications in the treatment of low molecular weight heparin was 3.6%, while in the treatment of UFH 6.4%, relative to the level of massive bleeding, in the treatment of low molecular weight heparin was 3.6%, while in the treatment of UFH 6.4%, relative to the level of massive bleeding, in the treatment of low molecular weight heparin they were 1%, while in the treatment of UFH 2.1% [25]. The use of low molecular weight heparin also does not require coagulation monitoring, while the use of UFH should be monitored for hemostasis [26].

Vitamin K antagonists are used for long-term treatment. Compared with low molecular weight heparin, the use of vitamin K antagonists for long-term treatment reduced mortality [27]. The Einstein- deep vein thrombosis and Einstein-PE studies analyzed the results of treatment of 8282 patients with venous thromboembolism. The use of rivaroxaban at a dose of 15 mg twice daily for 21 days, followed by switching to 20 mg, and enoxaparin at a dose of 1 mg / kg twice daily with subsequent switching to Vitamin K antagonists were compared. Efficacy was slightly higher in rivaroxaban (2.1% recurrence of venous thromboembolism compared with 2.3% in the enoxaparin group), while bleeding was significantly lower in the rivaroxaban group (1% and 1.7%, respectively) [28].

Thus, new oral anticoagulants are actively used today for the treatment of venous thromboembolism. According to the literature, in most cases, patients with venous thromboembolism
and anomalies in the development of inferior vena cava were treated with low molecular weight heparin, followed by switching to Vitamin K antagonists or factor X inhibitors [29]. In our study, in both patients with inferior vena cava abnormalities and bilateral iliofemoral deep vein thrombosis, we treated low molecular weight heparin with subsequent switching to Vitamin K antagonists under INR control. In the literature, we found 7 cases of catheter-directed thrombolysis in the treatment of deep vein thrombosis in anomalies of inferior vena cava [23,29].

In two cases, ultrasound-enhanced catheter-directed thrombolysis was used. In 3 cases, when using Actilyse at a dose of 20-60 mg, a positive result was obtained. In our study, patients had bilateral venous thrombosis, which complicated catheter-directed thrombolysis in this category of patients. In addition, when prescribing anticoagulant therapy, we obtained a positive effect in both cases, which thus avoided catheter-directed thrombolysis.

Regarding surgical treatment, it should be noted that in the literature this method of treatment for anomalies of inferior vena cava in venous thromboembolism is described in isolated cases. Thus, the successful placement of a polytetrafluoroethylene graft in a symptomatic patient with the absence of infrarenal inferior vena cava and the formation of venous collateral, which led to venous stasis and the formation of limb edema. The graft connected the common femoral vein with the suprarenal part of the inferior vena cava [30].

In our clinic, we did not use such approaches, because we believe that this surgery is traumatic for the patient, in addition, the presence of bilateral venous thrombosis increases the risk of rethrombosis and thromboembolic complications in the postoperative period.

Conclusion.

Thus, the results of treatment of patients with venous thromboembolism and anomalies in the development of inferior vena cava suggest that the use of anticoagulant therapy in this category of patients allows to obtain positive results of treatment with regression of clinical symptoms and no thromboembolic complications in the near and long term. Of course, the availability of low data and relevant experience in specialists around the world requires further research to improve the treatment outcomes of this category of patients.

REFERENCES
Резюме.
Особенности лечения венозных тромбоэмболий у больных с аномалиями развития нижней полой вены.

Цель исследования. Врожденные аномалии развития НПВ являются достаточно редкой патологией. Анализ результатов лечения позволяет лучше понять патофизиологию заболевания и сформировать оптимальную тактику лечения.

Материалы и методы. Проанализированы результаты лечения 1243 больных с венозной тромбоэмболией с 2010 по 2022 г. Врожденные аномалии развития нижней полой вены (НПВ) диагностированы у 2 (0,16%) пациентов. У одного пациента была аплазия НПВ, у другого — гипоплазия НПВ. У обоих пациентов был двусторонний илиофеморальный тромб глубоких вен (ГТВ). Для лечения больных применяли антикоагулянтную терапию и эластическую компрессию нижних конечностей.

Результаты. За период исследования венозных тромбоэмболических осложнений в виде тромбоэмболии легочной артерии не зарегистрировано, летальных осложнений не диагностировано.

Заключение. Таким образом, результаты лечения больных с венозной тромбоэмболией и аномалиями развития НПВ свидетельствуют о том, что применение антикоагулянтной терапии у данной категории больных позволяет получить положительные результаты лечения.

Ключевые слова: венозная тромбоэмболия, двусторонний илиофеморальный тромб глубоких вен, аномалии нижней полой вены.