

## Investigation Of The Effectiveness Of The Carpini Scale In Patients, Those Subjected To Endovascular Intervention

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### Abstract

Venous thromboembolic complications are one of the leading problems in surgical practice. Prevention of venous thromboembolic complications is an important point of administration for patients in the postoperative period. In most cases, the risk assessment of surgical patients is carried out on the Carpini scale. It is a common scale for risk stratification of all surgical patients, which takes into account both the general condition of the patient at the time of surgery, as well as the type of surgery, its duration and traumatism. The aim of the study was to study the effectiveness of the Carpini scale in patients undergoing endovascular intervention. 115 patients participated in the study. The frequency of venous thromboembolic complications in neurosurgical patients with anesthesia lasting more than 2.5 hours is  $6.6 \pm 3.1\%$  (4 out of 62 cases). The incidence of venous thromboembolic complications in patients undergoing endovascular intervention with anesthesia lasting less than 1.5 hours is  $1.9 \pm 2.1\%$  (1 out of 53 cases). The use of the Caprini scale to stratify the risk of venous thromboembolic complications in endovascular interventions can be considered rational.

**Keywords:** endovascular surgery, deep vein thrombosis, venous thromboembolic complications, patient, pulmonary embolism

### 1. Introduction

Venous thromboembolic complications are a collective concept that combines thrombosis of the superficial and deep veins of the lower extremities, as well as pulmonary embolism (PE). PE is an occlusion of the arterial bed of the lungs (trunk, right or left pulmonary artery and/or their branches) by fragments of a blood clot that initially formed in the veins of the large circle of blood circulation or in the right cavities of the heart and migrated to the arteries of the lungs with the blood flow [1,2].

Venous thromboembolic complications are the third most the world, second only to myocardial infarction and stroke. In developed countries of Europe and North America, PE is registered with a frequency of 39-115 cases per 100 thousand adults per year and is one of the main causes of death [3].

In European countries, 34% of patients with PE died suddenly or within a few hours of an acute event, 59% of patients with pulmonary embolism as the cause of death were diagnosed post-mortem, and only 7% of those who died were correctly diagnosed during their lifetime. The likelihood of developing venous thromboembolic complications increases with age. Thus, in senile age ( $\geq 80$  years), the frequency of venous thromboembolic complications is 8 times higher compared to younger people (50-60 years) [4].

In the Russian Federation, the incidence of PE is about 35-40 cases per 100 thousand people annually, while 20-30% of patients with this diagnosis die. However, there are still no accurate statistics on the prevalence of PE. This is primarily due to the fact that pulmonary embolism remains one of the most unrecognized diseases, since it has no specific symptoms, and about half of the cases of the disease are little or asymptomatic. According to autopsies, PE is the leading cause of death among patients who died from an unspecified cause. It should be noted that the fatal outcome in PE directly depends not only on the timely correct diagnosis, but also on the timely initiation of adequate therapy. With a massive lesion of the pulmonary bed, the mortality rate among untreated patients is 40-70%, and with adequate therapy, it does not exceed 8-10%. According to some studies, only 15% of patients with PE receive the necessary amount of treatment [5].

In the vast majority of cases (about 80%), the source of PE is the inferior vena cava basin, most often deep vein thrombosis of the lower extremities of the proximal parts (popliteal-femoral and ilio caval segments), much less often – thrombosis of other localization (distal deep veins of the lower extremities, pelvic veins). According to modern concepts, PE is considered as a manifestation of venous thromboembolism, thereby emphasizing the pathogenetic relationship between PE and venous thrombosis [6].

Blood clots from the superior vena cava basin (for example, as a result of venous catheters) or from the right chambers of the heart (for example, from the right atrium on the background of atrial fibrillation) are much less common (about 3.5%) in PE [7].

According to various sources, the primary localization of a blood clot cannot be established in approximately 13-20% of cases. In such situations, local thrombosis is likely to occur already in the pulmonary artery system (thrombosis in situ), for example, with congestive phenomena in the small circle of blood circulation, as well as a congenital tendency to thrombosis [8].

Depending on the identified risk factors, PE can be primary (presence of inherited risk factors), secondary (presence of acquired risk factors), and idiopathic (no predisposing factors). Congenital thrombophilia (a condition characterized by increased thrombosis) is one of the innate risk factors for venous thromboembolic complications. The most common is a genetic mutation of coagulation factor V (Leiden factor V), which occurs in 3% of the population and increases the risk of thrombosis several times. In addition, there is a hereditary deficiency of antithrombin III, protein C and S, prothrombin mutation, dysfibrinogenemia, etc. A congenital predisposition to pathological thrombosis may be indicated by the development of unexplained thrombosis and / or thromboembolism at the age of up to 40 years, the presence of similar conditions in 8 relatives of the patient, recurrent deep vein thrombosis or PE in the absence of secondary risk factors [9].

Secondary venous thromboembolism is usually the result of acquired factors. The most significant ones are severe injuries, including fractures of the lower extremities, orthopedic interventions, operations, and spinal cord injuries

In operated patients, PE develops not only in the immediate postoperative period, but also 15-30 days after the operation and even later, while a significant proportion of outpatient patients (about 79%) are patients who have undergone relatively simple surgical interventions – hernia repair, appendectomy and cholecystectomy [10].

Another well-known risk factor is cancer. The risk of PE depends on the prevalence, location of the cancer, as well as the antitumor therapy performed. The most unfavorable for venous thromboembolism are tumors of the pancreas, stomach, lungs, brain, as well as hematological types of cancer [11].

In women of reproductive age, one of the most common risk factors is the use of oral contraceptives containing estrogens. Combined estrogen-progestogen drugs prescribed for contraception increase the risk of venous thromboembolic complications by 2-6 times, but the absolute number of cases of venous thromboembolism that occur against the background of the use of these drugs is small. Intrauterine devices that release hormones and some progesterone-only pills (used in contraceptive doses) are not associated with a significant increase in the risk of PE.

Another common provoking factor for venous thromboembolic complications is infection, as well as blood transfusions and administration of erythropoiesis stimulants [12].

The relationship between arterial and venous thrombosis is known. Thus, myocardial infarction and heart failure increase the risk of venous thromboembolism. Conversely, patients who have had PE are more likely to develop a heart attack, stroke, and peripheral arterial thrombosis. In this regard, we can talk about the commonality of risk factors, such as smoking, arterial hypertension, diabetes mellitus and hyperlipidemia [13].

It is impossible to accurately predict which patients with risk factors will develop PE. We can only talk about the varying degree of probability of venous thromboembolism in the presence of a particular predictor [14].

Venous thromboembolic complications are one of the leading problems in surgical practice. Prevention of venous thromboembolic complications is an important point of introduction for patients in the postoperative period. In surgical patients, the risk of venous thromboembolic complications depends on the somatic condition, concomitant diseases, degree of dehydration, duration of immobilization, type, duration and trauma of the operation. Currently, the risk of venous thromboembolic complications is being stratified for both therapeutic and surgical patients. There is no specific risk scale for venous thromboembolic complications specifically for endovascular operations. In most cases, the risk assessment of surgical patients is based on the Carpini scale. It is a general scale for risk stratification of all surgical patients, which takes into account both the general condition of the patient at the time of surgery, and the type of operation performed, its duration and trauma. In particular, endovascular interventions on this scale are classified as minor surgery and such patients are awarded a minimum score [15,16,17,18].

## 2. Objectives

Purpose of the study: to study the effectiveness of the Carpini scale in patients undergoing endovascular intervention.

### 3. Methods

Material and methods of research. The study involved 115 patients. The study group included 53 patients who underwent endovascular intervention, the duration of anesthesia was less than 1.5 hours. The average age in the study group was  $45.7 \pm 5.8$ . The control group included 62 patients who underwent neurosurgical intervention, which is long and traumatic due to the specifics of the pathology, and the duration of anesthesia was more than 2.5 hours. The mean age in the control group was  $65.1 \pm 6.2$ . As a method for determining venous thromboembolic complications, ultrasound examination of the veins of the lower extremities was chosen, which was performed in the postoperative period during the first day. Within the framework of the study, each of the groups was divided into risk groups.

The risk level of venous thromboembolic complications	The study group	The control group
0-1 score (very low risk)	19	—
2 points (low risk)	23	9
3-4 points (moderate risk)	8	32
5 or more points (high risk)	3	21

Table 1 Stratification of the risk of venous thromboembolic complications on the Caprini scale

### 4. Results

In the study group, echo signs of venous thromboembolic complications were detected in 1 patient: thrombosis of the trunk of the small saphenous vein (MPV) bilaterally, thrombosis of the anterior tibial vein, without flotation (the patient belonged to the high-risk group). The frequency of venous thromboembolic complications in patients undergoing endovascular intervention with an anesthesia duration of less than 1.5 hours is  $1.9 \pm 2.1\%$  (1 out of 53 cases). In the second group, 4 patients were found to have venous thromboembolic complications: the first patient had echographic signs of occlusive thrombosis of the small saphenous vein (MPV) of the right tibia; the second patient had sural vein thrombosis of the left tibia, without flotation; the third patient had echographic signs of thrombosis of the MPV trunk bilaterally, expansion of intradermal venous inflows of superficial veins from both sides; in the fourth patient, echo signs of fibular vein thrombosis on the right, failure of the Coquette perforant on the right were revealed. All patients belonged to the high-risk group. The frequency of venous thromboembolic complications in neurosurgical patients with anesthesia duration of more than 2.5 hours is  $6.6 \pm 3.1\%$  (4 out of 62 cases).

### 5. Discussion

Based on the results of statistical processing, we can draw conclusions:

1. Confirm the existence of a relationship between the duration and trauma of surgical intervention, and the risk of venous thromboembolic complications
2. The use of the Caprini scale to stratify the risk of venous thromboembolic complications in endovascular interventions can be considered rational.

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