

## Results of Treatment of Aseptic and Infected Arteriovenous Fistulas

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**Purpose of the study:** to compare the results of treatment of aseptic and infected arteriovenous fistulas.

**Keywords:** aseptic and infected traumatic arteriovenous fistula; surgical treatment and temporary X-ray endovascular vascular occlusion.

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### Introduction

An arteriovenous fistula is a direct communication between an artery and a vein, leading to the flow of arterial blood into the venous bed (bypassing the capillary network). The fistula develops due to damage to the artery and vein by firearms and cold steel, blunt trauma, injection of narcotic substances, etc. [1]. Communication between an artery and a vein persists, turning into an arteriovenous fistula, when a channel for blood flow is formed between an artery and a vein [2]. In peacetime, vascular injury is from 0.2 to 4% in the structure of injuries. According to a number of researchers, the cause of traumatic arteriovenous fistula (TAVS) in 63% of the victims was a wound with a sharp weapon, in 26% - a gunshot injury, in 1% - a closed injury [3]. Most often, the fistula was localized in the area: neck and chest (54% of cases), upper limbs (22%), lower limbs (20%) [4,5]. Recently, the number of patients with iatrogenic arteriovenous fistulas has increased. Thus, out of 10,271 patients after cardiac catheterization, within a follow-up period of up to 3 years, duplex scanning revealed an arteriovenous fistula in 88 (0.88%) patients [6]. The formation of post-traumatic fistulas and pseudoaneurysms is a consequence of inadequate revision of vessels during primary surgical intervention with early diagnosis of injury [7, 8].

At the end of the 20th and at the beginning of the 11th century, due to the widespread use of drug addiction in the world, the number of arteriovenous fistulas increased significantly as a result of vascular damage during the administration of narcotic substances. In these cases, arteriovenous fistulas become infected, which often prevents reconstructive operations. [9,10,11].

All education fistulas are divided into aseptic and infected, which were formed as a result of vascular injury and the introduction of narcotic substances.

### Materials and methods

The analysis of the results of examination of the treatment of 47 patients with arteriovenous fistulas was carried out. The patients were divided into 2 groups. Group 1 included 30 patients with aseptic fistulas who were treated at the V. Vakhidov RSSPMCH, the Republic of Uzbekistan. Group 2 consisted of 17 patients with infected fistulas who were treated in the emergency hospital in Kursk, Russia.

The distribution of patients by sex and age is presented in Table 1

**Table 1 Distribution of patients by sex and age**

| No.  | Age             | Number of patients |              | Of them          |                 |
|------|-----------------|--------------------|--------------|------------------|-----------------|
|      |                 | abs .              | %            | Men              | Women           |
| one. | 20-29 years old | 18                 | 38.2         | 16               | 2               |
| 2.   | 30-39 years old | 16                 | 34%          | 16               | -               |
| 3.   | 40 years older  | 14                 | 28.7         | 13               | 1               |
| 4    | <b>Total:</b>   | <b>47</b>          | <b>100.0</b> | <b>41(87.2%)</b> | <b>6(12.7%)</b> |

In gender characteristics, the number of men was 7 times more often than women. The mean age of patients ranged from 31.27±15.75 years. The social aspect of the pathology should be emphasized, most of the patients were of working age from 20 to 49 years. Especially often infected fistulas occurred in patients aged 18 to 30 years.

The distribution of patients according to the causes of arteriovenous fistulas is presented in Table 2

**Table 2 Causes of arteriovenous fistulas**

| No.   | Causes                           | Number of patients |              |
|-------|----------------------------------|--------------------|--------------|
|       |                                  | abs                | %            |
| one.  | Stab-cutting tool                | 13                 | 27.6         |
| 2.    | Gunshot wounds (bullet, shot)    | 2                  | 4.2          |
| 3.    | closed injury                    | 2                  | 4.2          |
| four. | Injection of narcotic substances | 12                 | 25.5%        |
| 5.    | Other                            | 17                 | 36.1         |
| 6     | <b>Total:</b>                    | <b>47</b>          | <b>100.0</b> |

The most common cause of fistula formation is the introduction of narcotic substances. In second place are wounds with a color - a cutting object, and in 3rd place are wounds with a firearm

The existence of arterio-venous fistulas is presented in Table 3.

**Table 3 . Terms of existence arteriovenous fistulas**

| No. | Terms of existence | Number of patients |              |
|-----|--------------------|--------------------|--------------|
|     |                    | abs .              | %            |
| 1   | up to 1 month      | 9                  | 19.1         |
| 2.  | from 2 to 1 year.  | 10                 | 21.2         |
| 3.  | from 1 to 6 years  | 18                 | 38.2         |
| 4   | 7 to 21 years old  | /                  | 17.0         |
| 5.  | More than 30 years | 2                  | 4.2          |
| 6.  | <b>Total:</b>      | <b>47</b>          | <b>100.0</b> |

In 28 (59.6%) patients, the fistula existed for more than 1 year, which led to significant changes in the anatomy of the arterial and venous walls. With the long-term existence of the fistula, the arterial wall

became thinner and lost its muscular layer, and the process of militarization of the artery took place. The venous wall, on the contrary, was hypertrophied due to the growth of muscle fibers. There was a process of arteriolization of the venous wall [11 ].

The diagnostic program was traditional and included clinical, laboratory, ultrasound and X-ray examination of patients. Clinical examination revealed a pulsating formation of various sizes with a systolic - diastolic murmur over it. Ultrasound studies determined the size of the aneurysm, the path of communication between the artery and vein. The most complete information was obtained with magnetic spiral computed tomography.

### Research results

Localization of traumatic arteriovenous fistulas is presented in Table 4

**Table 4 Localization of arteriovenous fistulas**

| No.  | Part of the body | Name of the fistula | Number of patients |              |
|------|------------------|---------------------|--------------------|--------------|
|      |                  |                     | abs .              | %            |
| 1    | Neck and head    | For the ear         | 2                  | 4.3          |
|      |                  | Brow                | 1                  | 2.2          |
|      |                  | sleepy              | 3                  | 6.4          |
|      |                  | Facial              | 1                  | 2.2          |
| 2.   | torso            | Aortic              | 1                  | 2.2          |
|      |                  | Iliac               | 2                  | 4.3          |
| 3    | Upper limb       | axillary            | 1                  | 2.2          |
|      |                  | Shoulder            | 1                  | 2.2          |
|      |                  | carpal              | 2                  | 4.2          |
| four | lower limb       | femoral             | 1                  | 2.2          |
|      |                  | Popliteal           | 1                  | 2.2          |
|      |                  | Ankle               | 4                  | 8.5          |
| 5.   | <b>Total:</b>    |                     | <b>47</b>          | <b>100.0</b> |

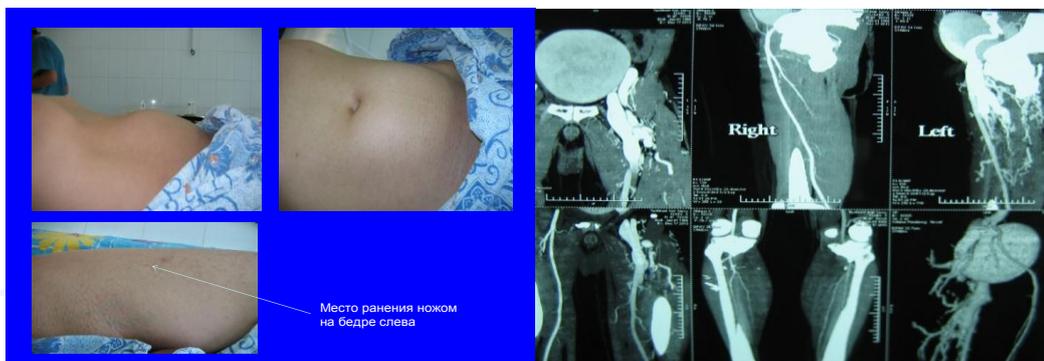
In 33 (70.2%) fistulas were localized on the lower limb, in 8 (17%) on the head and neck, in 4 (8.4%) on the upper limb, in 2 (4.2%) on the trunk. The most common fistula formed between the femoral artery , vein and popliteal artery and vein, posterior tibial artery and vein.

In recent years, high technologies have been used in surgical treatment - X- ray endovascular complete balloon occlusion of arterial vessels has been performed. A balloon catheter measuring 6x60 mm was expanded to complete occlusion to eliminate vascular patency. At the same time , the pressure in the cylinder is up to 9 atm. at RBP 10 atm. The introduction of the balloon was controlled by Unigexol contrast - 350-100 ml. The use of endovascular treatment technologies made it possible to reduce surgical blood loss by an average of 3 times from 450-500 ml to 100-150 ml of blood

**Clinical example. Patient I.V., 47 years old,** and/b No. 34, received on 01/03/2014. Complaints about the presence of a pulsating formation in the left half of the abdomen, below the navel; pain in the left lower limb and general weakness. An objective examination revealed: asymmetry due to hypertrophy of the left lower limb, the difference in the left lower limb of the lower third - 2 cm, upper third of the leg - 6 cm, lower third of the thigh 4 cm, upper third - 4 cm; in the thigh area, on the left, a tumor-like formation measuring 12x13x15 cm. (Fig.1.). Above it is determined systole - diastolic trembling and systole - diastolic murmur. According to magnetic spiral computed tomography (MSCT), aneurysms of the common iliac and femoral veins are observed; arteriovenous fistula

between the femoral artery and vein (Fig. 2-3). On the basis of clinical symptoms, ultrasound and X-ray studies, the diagnosis was made: post-traumatic arteriovenous fistula of the femoral artery and vein, aneurysmal expansion of the iliac and femoral veins, on the left. The patient underwent surgery: separation of the arterio-venous fistula between the femoral artery and vein, on the left. The aneurysm of the external iliac vein, on the left, was eliminated. Drained pelvis.

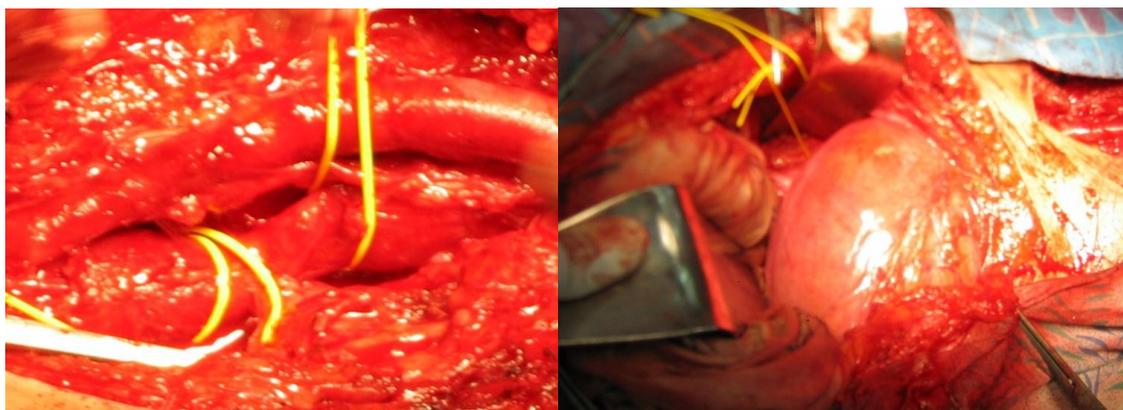
The fistula was located between the deep femoral artery and the femoral vein. In this regard, the operation was accompanied by great technical difficulties, and the deep femoral artery was tied and sutured (Fig. 4-5). After that, the systole -diastolic trembling of the femoral artery and vein disappeared. During the operation, there was bleeding in the amount of 500 ml. Blood was taken into the SELSEVER apparatus. In addition, the patient had an aneurysmal expansion of the internal iliac artery. In this regard, it was decided to bandage it at the mouth. Further, the anterior wall of the aneurysmally dilated external iliac vein was isolated (the dimensions of the external iliac vein were 12x10x10 cm). Resection of the aneurysmal sac was performed with plication of the prolene thread 3/0 of the external iliac vein (Fig. 6-7). Under control of the iliac vein, it was patent. At the control ultrasound, there is a decrease in the linear velocity along the femoral artery and the absence of a systolic - diastolic flow. The patient was discharged in a satisfactory condition, with the restoration of active movements on the limbs. Inspection is made in a year, systolic trembling and noise are absent.



**Fig..1. Patient I.V., 47 years old. Fig.2. Patient I., 47 years old. MSCT: Stab wound in aneurysmal expansion thigh area on the left . iliac vein. Arteriovenous fistula between deep femoral artery and vein.**



**Fig.3. Patient I., 47 years old. Fig. 4. Patient I., 47 years old. MSCT: General aneurysm and Intraoperative photo external iliac arteriovenous fistula, veins, on the left between the deep artery and vein**



**Fig.5. Intraoperative photo Fig.6. Patient I., 47 years old. separation of the ABC, between the deep Intraoperative – photo femoral artery and vein, left . and neurovasculars of the external iliac veins, left.**



**Fig. 7. Intraoperative photo 8 . postoperative wound in plication of the aneurysm of the outer region of the thigh, left a ( 8 years later). iliac vein, left.**



**Rice. 9 . Postoperative wound in the abdomen, 8 years later.**

According to the ultrasound examination, in the left lower limb there is a 2-fold expansion of the diameter of the femoral artery, an increase in the linear velocity of blood flow. The general condition of the patient is good after 8 years (Fig.8-9).

Types of surgical treatment of aseptic arteriovenous fistulas in patients of group 1 are presented in Table 5

**Table 5 Types of surgical treatment of aseptic arterio -in enous fistulas**

| damaged vessel            | Operation types |           |                   |                   |                 |            | Total sick |
|---------------------------|-----------------|-----------|-------------------|-------------------|-----------------|------------|------------|
|                           | dressing        | Side seam | Circular The seam | Autovenous plasty | Alloprosthetics | Hole patch |            |
| femoral artery            | 1               | 2         | 4                 | 2                 |                 | 1          | 10(33.3%)  |
| Popliteal artery          |                 | 1         | 1                 |                   |                 | 1          | 3(10%)     |
| Leg arteries              | 3               | 1         |                   |                   |                 |            | 4(13.3)    |
| Brachial artery           |                 |           |                   |                   | 1               |            | 1(3.3%)    |
| aorta and innominate vein |                 | 1         |                   |                   |                 |            | 1(3.3%)    |
| iliac artery              | 1               |           |                   |                   | 1               |            | 2(6.6%)    |
| behind the ear artery     | 1               | 1         |                   |                   |                 |            | 2(6.6%)    |
| Superciliary artery       | 1               |           |                   |                   |                 |            | 1(3.3%)    |
| Ulnar artery              | 1               | 1         |                   |                   |                 |            | 2(6.6%)    |
| Internal jugular vein     | 1               |           |                   |                   |                 |            | 1(3.3%)    |
| Carotid artery            | 2               |           |                   |                   |                 |            | 2(6.6%)    |
| Occipital vein            | 1               |           |                   |                   |                 |            | 1(3.3%)    |
| <b>Total:</b>             | 12              | 7         | 5                 | 2                 | 2               | 2          | 30(100%)   |

Performed the following types of operations: ligation of blood vessels - 12 (34.4%); lateral suture of vessels - 7 (23.3%); circular suture of vessels - 4 (13.3%); autovenous prosthetics, alloprosthetics - 2 (6.6%); prosthetics - 1 (3.3%) and others - 4 (13.3%) patients.

In 27 (90%) patients, the wounds healed by primary intention, and in 3 (10%) - by secondary intention. The blood flow after the operation was restored in all cases, both in the arterial and venous channels.

Good long-term results in the treatment of aseptic fistulas (no symptoms of impaired arterial and venous circulation) were registered in 24 (80%) patients, and satisfactory results (presence of persistent clinical syndromes of chronic arterial ischemia and venous insufficiency ) in 6 (20%) patients.

All 17 (100%) patients with infected fistulas were admitted to the clinic with various purulent complications. An abscess in the inguinal region was detected in -11 (64.7%) cases, in the axillary region - in 1 (5.9%) cases, and widespread phlegmon of the thigh in -5 (29.4%) cases. Fistula without arrosive bleeding was in 6 (35.3%) patients, and with bleeding in 11 (65%) patients. The 1st degree of blood loss was in 5 (29.4%) patients, moderate in 2 (11.8%), severe in 4 (23.5%) patients.

In 13 (76.5%) patients, there were no manifestations of a general infection, and in 4 (23.5%) patients angiosepsis .

In patients of the 2nd group with infected fistulas, the following types of surgical interventions were performed: ligation of the femoral artery and vein in 13 patients (76.4%) ligation of the axillary artery

and vein in 1 patient (5.9%), autovenous replacement of the femoral artery, vein suture in 1 (5.9%), suture of the femoral artery and vein in -1 (5.9%), plasty of the femoral artery, suture of the vein in -1 (5.9%)

In total, reconstructive operations were performed in 3 (17.6%) patients , palliative -14 (82.4%) Good long-term results: (preservation of the limb without signs of arterial and venous insufficiency was found in 3 (17.6 %) satisfactory (preservation of the limb with severe chronic arterial and venous insufficiency) in -10(58.2%), unsatisfactory (limb amputation) in 4 (23.5%) patients, 15 (88.2%) patients recovered and were discharged from the hospital, 2 (11.7%) people died from angiosepsis .

## CONCLUSIONS

1. The main way to optimize the surgical treatment of aseptic arteriovenous fistulas is the use of temporary endovascular occlusion of damaged vessels, which reduces surgical blood loss and ensures a dry surgical field.
2. Surgical treatment of infected arteriovenous fistulas must be carried out before the development of a purulent process in the area of the fistula and arrosive bleeding, which creates conditions for the restoration of vascular conductivity.

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