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SURGICAL TREATMENT OF VASCULAR INJURY WITH TRAUMATIC SHOCK

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ABSTRACT:

Purpose of the study: Identify the features and offer the best tactics for the surgical treatment of vascular injuries in traumatic shock.

Material and methods: The clinic has 36 patients with hemorrhagic and traumatic shock. Of them: 33 men (91.6%), women 3 (8.3%). We found, among those admitted to the clinic, 36 patients with hemorrhagic and traumatic shock. So, in 5 patients, the condition was extremely serious. The use of angiography and MSCT is of great importance for the early diagnosis of traumatic vascular damage.

Results: We have performed 36 different operations for patients with shock after vascular injury: vessel ligature-19; lateral suture-5. Of them: at the same time imposed side seam venous vessels. Circular suture-4; autovenous shunting-3; prosthetics-4: primary amputation - 1 and 7 patients with epineural suture.

Along with this, severe shock, massive tissue damage and irreversible ischemia were indications for limb amputation in 1 (2,7%) patients with vascular damage. Arrosive bleeding was observed, only in one patient. In 24 (94,4%) patients, wound healing was primary, in 2 (5,5%) patients, wounds healed by secondary intention.

Conclusions. The high efficiency of timely application of reconstructive-restorative operations - autovenous shunting and vascular prosthetics after stabilization of hemodynamic parameters depends on the degree of traumatic and hemorrhagic shock.

Key words: traumatic shock, causes, localization, features and tactics of surgical treatment.

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INTRODUCTION

This work analyzes the current state of etiology, methods of early diagnosis and treatment of traumatic vascular injuries of the extremities [6]. Recent years have been characterized by a sharp increase in the number of injuries accompanied by damage to the great vessels. Damage to large arterial and venous vessels leads to death in 10-56% of patients. According to M.P. Korolev. et al. [8], such outcomes were observed in 25.3% of cases. It should be noted that damage to the great cervical vessels is a serious type of injury. Until now, it remains a complex and difficult task. All these problems lead to unsatisfactory treatment results, sometimes reaching from 27-75% of cases. One of the tendencies in the change in the nature of these injuries, in particular, combat gunshot injuries, is the number of concomitant wounds, mainly of the

limbs with damage to large blood vessels and bones from 40-75%. [1-3]

However, despite this, vascular trauma remains a problem for the surgeon. This is due to the persisting contradictions in the choice of the optimal treatment tactics for arterial injuries. At the same time, injuries with damage to the vessels of the extremities are a common cause of disability and death of victims.

Wartime damage to the subclavian and axillary arteries of the upper limb ranges from 3.2-23.7%, and in peacetime from 15-30% [4,7]. In 38.4-95% of cases, damage to the arteries of the extremities is accompanied by bone fractures. Mortality in case of damage to the vessels of the upper limb reaches 80-90% [7].

As part of our work, we do not pretend to be an exhaustive solution to this problem. However, some opinions and provisions on the problem under study, in our opinion, are controversial and require clarification.

Purpose of the study: Reveal the features and propose the optimal tactics for the surgical treatment of vascular injuries in traumatic shock.

Key words: traumatic shock, causes, localization, features and tactics of surgical treatment.

Material and methods:

Features of specialized care for traumatic and hemorrhagic shock is a complex surgical problem. In our study, when providing emergency care to 170 patients with traumatic vascular injuries, 36 patients admitted to the clinic were found to have hemorrhagic and traumatic shock, of which 33 men (91.6%), 3 women (8.3%). thorough analysis and determination of the optimal approach to treatment with traumatic shock, we distributed them by gender and age, which are presented in the table. №1.

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Table 1. Distribution of patients by sex and age

Patient age	Including		number sick (in percentage)
	Men	Women	
Up to 20 years	3	-	8,3%
21-30 years	14	1	41,6%
31-40 years	10	1	30,5%
41-50 years	5	1	16,6%
51-60 years	1	-	2,7%
61-70 years and older	2	-	5,5%
Total:	33	3	100,0

It should be noted that the main causes of vascular damage were sharp cutting objects: knife-9; window glass-19; razor blade-2; explosion-2; blunt trauma-1; pilorema-1; cotton picker-1 and other-3 patients. In addition, traumatic vascular injuries were actions of a criminal nature: suicide, attempted murder, received in a state of strong intoxication.

It should be emphasized that the tactics of a surgeon in providing specialized care to patients with vascular injuries, especially in traumatic shock, cannot be of the same type. The leading factors in the choice and tactics of treatment should be: the general condition of the patient; the degree of ischemia; the nature of the vascular injury; anatomical formations in the limbs and associated injuries. Shock conditions were often observed in acute blood loss. So, in 45-72% of patients, it was accompanied by damage to the great vessels.

Currently, there are all possibilities for performing reconstructive and restorative operations on vessels with simultaneous anti-shock measures. However, the operation on the great vessels against the background of shock can have serious consequences. This is due to the entry into the general bloodstream of products of ischemic tissue damage. To resolve the issue of the possibility of performing reconstructive surgery on the vessels against the background of shock, an objective assessment of the degree of limb ischemia and its progression is required.

Depending on the nature and localization of vascular damage in patients with shock, the distribution was as follows: brachial artery - 17 (12.3%); femoral artery-5 (3.6%); carotid artery-1 (0.7%); occipital artery-1 (0.7%); subclavian-1 (0.7%); ray-2 (1.4%); ulnar-7 (5%); shins (popliteal artery, tibial artery and vein) -1 (0.7%).

Along with this, we have established the nature and connections of injuries with other local injuries (Fig. 1-6).

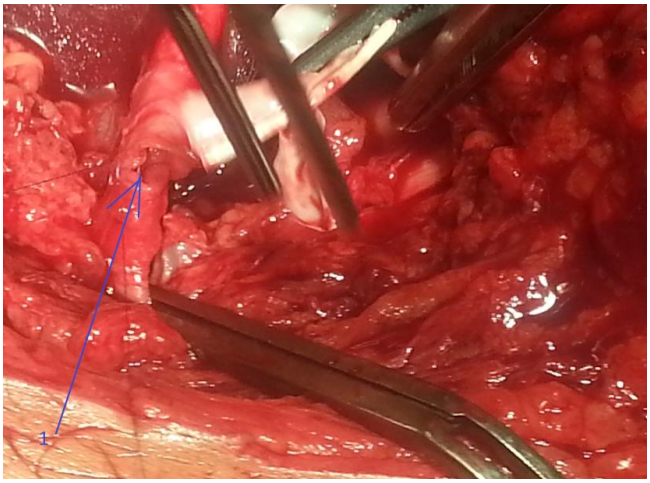

Fig. 1. Lateral suture on the left external iliac artery.

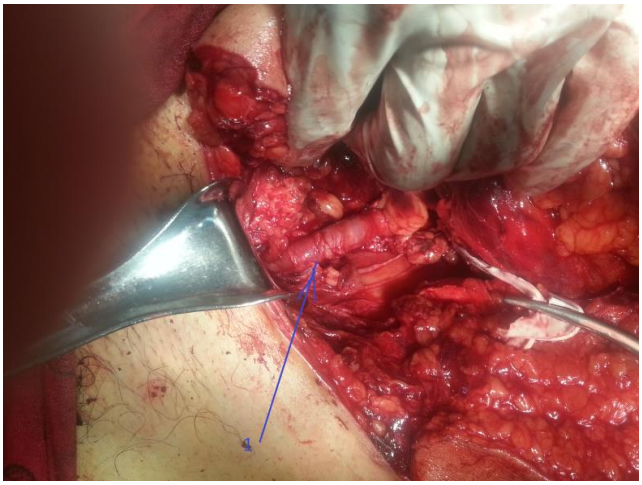

Fig. 2. Condition after the application of a lateral suture on the left external iliac artery.

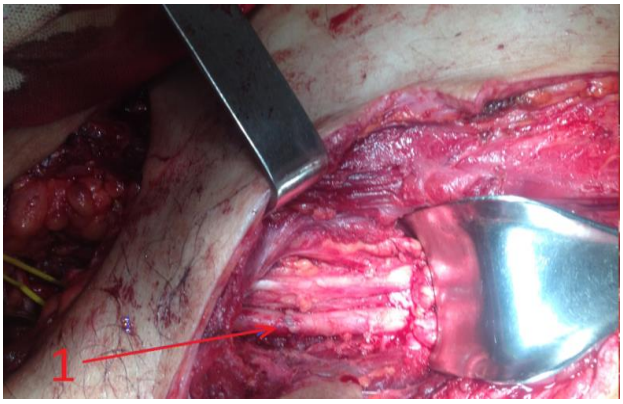

Fig. 3. 1. Stab-cut wound of the subclavian region with complete intersection of the subclavian artery, on the left. The subclavian artery is repaired by forming an end-to-end anastomosis.

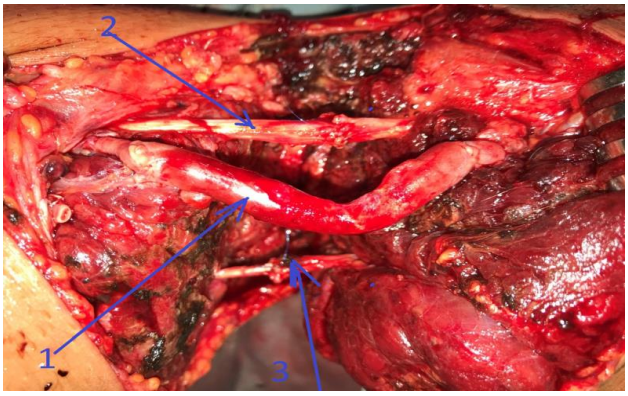

Fig. 4. 1.Autovenous prosthetics of the brachial artery, right. 2. Restoration of the median nerve end-end. 3. End-end ulnar nerve restoration.

Figure: 5. General view of the limb after restoration of the brachial artery, median and ulnar nerves, on the right.

Figure: 6. After recovery after 5 days.

Based on the analysis of indicators of various vascular injuries in their treatment of shock patients, the degree of hemorrhagic shock was established. We have identified 4 degrees of hemorrhagic shock.

1 degree of hemorrhagic shock in 5 (3.6%) patients. BCC deficit up to 15%. BP is above 100 mm Hg. Art. central venous pressure (CVP) within normal limits. Slight pallor of the skin and increased heart rate up to 80-90 beats / min, hemoglobin 90 g / l or more.

II degree of hemorrhagic shock was found in 27 (19.5%) patients. BCC deficit up to 30%. With a state of moderate severity, weakness, dizziness, darkening of the eyes, nausea, lethargy, pallor of the skin are observed. Arterial hypotension up to 80-90 mm Hg. Art., a decrease in CVP (below 60 mm water column), tachycardia up to 110-120 beats / min, a decrease in urine output, hemoglobinado 80 g / l and less.

III degree of hemorrhagic shock was found in 4 (2.8%) patients. BCC deficit is 30-40%. Moreover, the condition is severe or very severe, lethargy, confusion, pallor of the skin, cyanosis. HELL is below 60-70 mm Hg. Tachycardia up to 130-140 beats / min, weak pulse filling. Oliguria.

IV degree of hemorrhagic shock was found in 1 (0.7%) patients. BCC deficit is more than 40%. The extreme degree of oppression of all vital functions: there is no consciousness; AD and CVP; and the pulse in the peripheral arteries is not determined. Breathing is shallow and frequent. Hyporeflexia. Anuria. Roughly, the amount of blood loss can be estimated by calculating the shock index. Laboratory blood tests were carried out in 36 patients against a background of shock: hemoglobin from 62 to 109 g / l - 22; hematocrit - 6 from 20 to 39%; 1 PTI - 84%; fibrinogen-4 from 4210 to 6660 g / l. and one patient was -1776 g / l.

So, in shock of I-II degree, the restoration of blood flow was carried out with anti-shock measures. In case of traumatic and hemorrhagic shock of the III degree, reconstructive and restorative operations were performed after stabilization of hemodynamic parameters. We found out of all those admitted to the clinic, 36 (26%) patients with hemorrhagic and traumatic shock. Moreover, in 5 (3.6%) patients, the condition was extremely serious. At the same time, we determined the level of blood loss: 1000-1500 ml - 6; 1500-2000 ml - at 25; 2500-3000 ml - in 5 patients. Along with this, we have established the degree of shock for: first -5 (3.6%); the second - 27 (19.5%); the third - 4 (2.8%) patients. At the same time, the patients' blood pressure ranged from 60/30 to 100/60 mm. rt. Art. and a pulse from 60 to 130 beats in one minute.

During surgery under local anesthesia, 6F introducer sheaths are installed in the femoral artery on both sides. Further, an endovascular temporary complete balloon occlusion of arterial vessels was performed. At the same time, a balloon catheter (6x60 mm in size) was used to expand to complete occlusion and vascular patency. The occlusion occurred at a pressure in the balloon up to 9 atm with an RBP of 10 atm. Contrast Unigexol-350 - 100 ml (1 bottle of 100 ml). At the same time, 3 thousand MED heparin was introduced (Fig. 7).

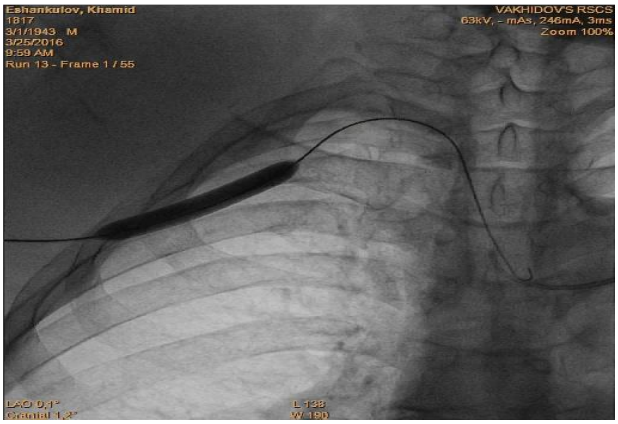

Fig. 7. Rentgenendovascular complete occlusion of the subclavian artery, left.

Determination of the circulating blood volume deficit was carried out according to the value of the shock index by the Algover method (the ratio of the pulse rate to the level of systolic blood pressure), and the shock index was the volume of blood loss (BCC), which is shown in Fig. 2.

To prevent such a complication, we suggested performing perfusion of the ischemic organ. For this, the composition of the perfusion solution was made: broad-spectrum antibiotics (cefuroxome, brolumycin, cyptrioxan) - 1.0; FFP -200 ml; rheomacradex 400 ml; physiological solution - 500 ml; papaverine solution - 5 ml; novocaine solution-200 ml; 4% sodium bicarbonate solution - 150 ml; heparin-20000ED; fibrinolysin - 20,000 ED; diphenhydramine solution-4 ml. and hemosorption to combat acute limb ischemia.

Table 2 Algover shock index indicators

Shock index value	Circulating volume deficit blood
0,5	15%
1,0	30%
1,5	50%
2,0	70%

Results and discussion: In order to eliminate the vascular injury, in shock, we

performed 36 operations of a different nature, which is presented in Table 3.

Table 3. The nature of the operation for vascular wounds

Locale-damage denium	Operations on vessels					
	Boco howl the seam	Circus-lar-ny the seam	Autovenous shunt	Prosthetics dying	Amputation	Re-knitting
Region shoulder	1	5	3	4		4
Region shins						1
Region hips	3				1	3
Nadkluchic region	1					
Beam region						2
Ulnar region						7
Areas shins						1
Delays luchny						1
Total:	**5**	**4**	**3**	**4**	**1**	**19**

Ligation of the vertebral artery, when it is injured in the first segment, is performed from a typical supraclavicular or vertical approach. When an artery is exposed on the left, the thoracic lymphatic duct may be tied. Ligate, all damaged lymphatic tributaries. The artery is isolated along its entire length, from its mouth to the entry into the opening of the transverse process of the C6 vertebra, and ligated. Operations for injured vertebral artery, in the second segment, in case of impossibility of ligation of the proximal segment of the transected artery, the canal of the transverse processes can be sealed with wax, tamponed with muscles. In the operation of wounding the vertebral artery, in the third segment, bleeding from the ends of the vertebral artery can be stopped by tamponing the muscle with deep sutures, closer to the mastoid process of the temporal bone. In this leaf, the vertebral artery is most superficially located in relation to the skin. In this case, the bleeding is stopped by the imposition of a vascular suture. The vascular suture is one of the most important stages of vascular reconstructive surgery. However, very often the imposition of a vascular suture is the main stage, the essence of reconstructive surgery. The advances in vascular surgery are largely associated with the development and improvement of the vascular suture technique. When applying a suture, it is necessary to take into account the following basic provisions: sufficient mobilization of the vessel; thorough exsanguination of the operating field with temporary clamping of the proximal and distal parts of the vessel. Further, the suture is applied

using special instruments and atraumatic needles, which ensures minimal trauma to the vessel wall, especially intima. The suture is applied through the weight layer of the vessel wall. The ends to be stitched should touch along the seam line with their inner sheath. The suture material should not enter the vessel lumen. This is to ensure minimal contact with blood, in order to avoid thrombosis. The needles are inserted from the edge of the vessel approximately 1 mm from the edge of the vessel, the seam stitches are placed at a distance of 1-2 mm, one from the other.

Vascular ligation-19; side seam-5. Of these: the lateral suture of the venous vessels was simultaneously imposed. Circular seam-4; autovenous shunting-3; prosthetics-4 primary amputation-1 patient. At the same time, 7 patients underwent an epineural suture.To solve tactical issues in a patient's state of shock, we were guided by an assessment of the severity of the condition; the nature of the injury and the progression of ischemia. Early reconstructive surgeries for rapidly progressing ischemia and shock, along with anti-shock measures, were performed by us in 36 patients. Severe shock, massive tissue damage and irreversible ischemia were indications for limb amputation in 1 (2.7%) patients. Arrosive bleeding was observed in only one patient. In 24 (94.4%) patients, wound healing was primary, in 2 (5.5%) patients, wounds healed by secondary intention.

CONCLUSIONS:

1. The use of angiography and MSCT has an effective treatment for the early diagnosis of traumatic vascular injuries.

2. Surgical tactics for reconstructive operations consists in stitching the circular end-end suture, even in cases of diastasis reaching up to 3 cm. With a large vessel defect, it is necessary to use autovenous bypass grafting or vascular prosthetics

3. The high efficiency of the timely use of reconstructive and restorative operations - autovenous bypass grafting of vessels after stabilization of hemodynamic parameters depends on the degree of traumatic and hemorrhagic shock by means of endovascular complete occlusion of the vessels.

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