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Angiography for Injuries of the Main Vessels of the Extremities

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One of the unsolved problems of modern surgery is the treatment of combined injuries of blood vessels and limb bones. Combined vascular and osteoarticular injuries account for 4.3-10% of the total number of limb fractures. When treating this group of patients, surgeons often face a dilemma — to perform primary amputation or try to save the limb. Despite success in surgical treatment of patients with combined injuries of the arteries and bones of the extremities, there is a high frequency of amputations (3-60%) and deaths.

For a long time, it was believed that simultaneous damage to bones and main vessels in peacetime is rare. The increase in injuries resulted in a significant increase in the incidence of bone and vascular injuries. Currently, vascular damage in limb bone fractures is observed in 0.6-10% of cases, averaging 4-5%. Before the modern development of vascular surgery, the only method of treatment most often used was ligation of the damaged vessel, which was accompanied by a number of complications, one of which is gangrene and, as a result, amputation of the limb.

Vascular damage is more likely to occur in fractures of the surgical neck of the shoulder, supracondylar fractures of the shoulder, hip fractures in the lower third, metaphyseal fractures of the tibia in the upper third, dislocations of the lower leg. So, надмыщелковыйа supracondylar shoulder fracture is accompanied by an artery injury in 8%, a hip fracture in the lower third-in 11%, a dislocation of the lower leg – in 8%, an intra — articular tibial fracture-in 19%.

Analysis of literature data shows that surgical treatment of patients with combined injuries of bones and large vessels of the limb is very difficult, and the outcome is very unfavorable. When choosing a method for stabilizing bone fragments in patients with combined injuries of blood vessels and limb bones, some authors prefer external methods of fixation, while others prefer internal methods of fixation of bone fragments. At the same time, the scope and priority of surgical care needs to be clarified *4,5,10+.

Diagnosis of injuries to the main vessels often causes certain difficulties, especially in conditions of mass admission of wounded with combined and multiple injuries. Errors in determining vascular damage during closed blunt trauma in peacetime conditions are quite common — in 30-50% of the total number of victims with injuries to the magistral vessels of the extremities. The complexity of diagnosis and the reasons for unsatisfactory results of treatment of combined bone-vascular injuries are that the absolute majority of them are accompanied by shock, blood loss and limb ischemia. It is the severity of the condition of the victims that causes a large number of diagnostic and tactical errors both at the pre-hospital and hospital stages and causes a significant number of postoperative complications. Diagnosis of vascular damage in fractures is difficult and often occurs late. According to V. K. Minachenko (1983), 28.8% of patients were consulted by vascular surgeons a day or more after the injury. Thus, the diagnosis of vascular damage was established only after the medical aid for the fracture (plaster cast, traction, etc.) in

27% of the victims, and 16.2% of them already had an irreversible degree of ischemia, which required the primary amputation of the limb.

In their opinion, the importance of X-ray contrast studies lies in the fact that they make it possible not only to diagnose vascular pathology, but also to determine the nature of damage to specific vessels. K.Inaba and co-authors *19+ based on 20 years of experience in treating arterial wounds in peacetime, came to the conclusion that urgent arteriography is one of the most effective methods of treatment of arterial injuries. the main methods of diagnosis and evaluation of the effectiveness of treatment of vascular wounds. In all cases of using this method, an accurate diagnosis of damage was made. Angiography should be more widely used in cases of suspected damage to the main vessel in bone fractures. The use of angiography transforms diagnostic tactics from waiting-passive to active. A non — invasive method of investigation-Dopplerography-successfully competes with angiography in terms of information content. The greatest informative value of the method is observed when calculating the systolic pressure index — if the index decreases below 0.7, complete damage to the limb artery can be suspected with a high degree of confidence. The method can be used for systemic hypotension, as well as for differential diagnosis of ischemia associated with an artery injury, and for traumatic ischemia of soft tissues and bones. By the pressure gradient, you can determine the parietal damage to the vessel, with severe edema-the safety of blood flow in the limb, as well as the patency of the vessel. Normally, the pressure difference on symmetrical limbs usually does not exceed 15 mm Hg.

Bone-vascular injuries are the most difficult for surgical treatment. It is in this case that soft tissues are most often affected, which sometimes adversely affects the results of surgical treatment. The literature discusses the question of what to perform first – to restore the damaged vessel or to reposition and fix bone fragments? Most authors believe that first of all, osteosynthesis should be performed, which creates favorable conditions for the restoration of the vessel and reduces the likelihood of injury and thrombosis of the latter.

However, there is an opinion that vascular repair should take priority in time over the restoration of all other injuries. This minimizes the possibility of developing irreversible ischemic disorders. But care must be taken to avoid tearing the vascular suture line when fixing bone fragments. In addition, peripheral blood circulation should be assessed very carefully after the fracture is fixed. Some authors consider it fundamentally important in the treatment of combined bone-vascular injuries to first restore the main blood flow, and then apply transosseous osteosynthesis using the Ilizarov method. Obviously, this should be decided in each individual case individually, depending on the degree of manifestation of limb ischemia. After osteosynthesis, a second revision of the main vessels is required to exclude shunt thrombosis, which was observed in several cases when the recovery operation preceded osteosynthesis.

The number of prerequisites for initial bone stabilization or initial revascularization is the same. If the restoration of the vessel precedes bone stabilization, then subsequent osteosynthesis can destroy the reconstruction zone, cause secondary damage to soft tissues, nerves, and intact collaterals. At the same time, it is difficult to determine the optimal length of the venous shunt used for vessel reconstruction in the absence of bone rigidity. It is also interesting to suggest that the initial temporary stabilization of the fracture area should be carried out as soon as possible, then blood flow should be restored, and then the final stabilization of the fracture site should be carried out. If the reduction of fragments and fixation of the fracture require a long time, then the restoration of the vessel and control of venous damage should precede orthopedic restoration, and at the end of the restoration, the vascular surgeon should check the patency of the anastomoses. In practice, this dilemma is solved together by traumatologists and vascular surgeons in each case separately.

Thus, it is necessary to improve and develop differentiated tactics for providing emergency surgical care to the wounded with combined injuries of the bones and vessels of the extremities

at the stages of medical evacuation, and to prepare specific recommendations on the priority and scope of surgical interventions.

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