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**INCREASING THE EFFICIENCY OF COMPRESSION
DISTRACTION ILIZAROV APPARATUS IN SHOULDER BONE DISTAL
FRACTURES**

Annotation: The article shows the relevance of the problem of treating patients with multiple bone fractures of various localizations, including the upper extremities. It is said about the features of transosseous osteosynthesis according to Ilizarov in the treatment of this category of traumatological patients. The conclusion is made about the high efficiency of the Ilizarov method in the treatment of patients with multiple fractures of the bones of the upper extremities.

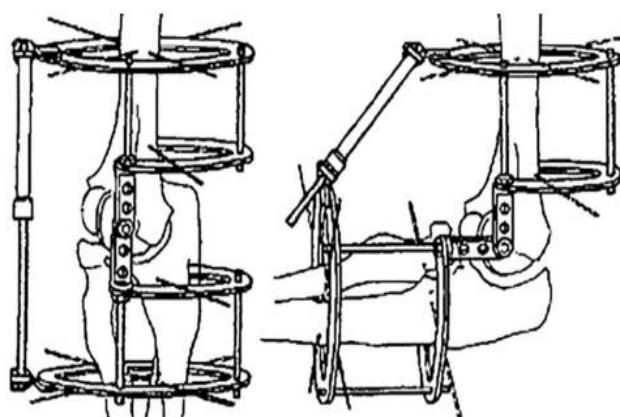
Keywords: upper limbs, multiple fractures, transosseous osteosynthesis, Ilizarov apparatus.

Recently, as a result of the development of industry, the mechanization of agriculture, an increase in the fleet and its speeds, etc., the structure of injuries has changed all over the world, not only quantitatively, but also qualitatively - the number and severity of polytrauma have significantly increased, which include multiple fractures of bones, including upper limbs.

Our analysis of the literature data showed that various methods of conservative and surgical treatment of the above category of patients are very far from perfect both in terms of comparing bone fragments and fragments and their subsequent fixation, and in terms of functional rehabilitation, which naturally leads to a large number of various kinds of complications, unsatisfactory anatomical and functional results, access to disability, as well as to high mortality. Therefore, it is quite understandable that traumatologists are dissatisfied with the existing methods of treating patients with multiple fractures of long tubular bones in general and fractures of the bones of the upper extremities in particular, as well as the reasons

for their search for new, more rational and effective methods of treating this complex category of traumatological patients.

The widespread introduction into clinical practice of the method of transosseous compression-distraction osteosynthesis using external fixation devices of various designs, the best of which, according to most authors, is the apparatus of G.A. Ilizarov, allowed solving many of the problems that traumatologists face in the treatment of patients with multiple fractures of the bones of the upper extremities.



The main result of his work was the discovery of a general biological regularity of the stimulating effect of stretching on the genesis and growth of tissues, now known as the "Ilizarov effect". Subsequently, methods of osteosynthesis of limb fractures were developed by the author's apparatus, including a method of treating fractures of the distal humerus with the Ilizarov apparatus. The essence of the method was that after repositioning the fragments, 2 pairs of spokes were carried out through the proximal fragment, forming an intersection in the sagittal and frontal planes. The ends of the spokes were fixed on an external support in a ring and a half-ring. In the upper third of the forearm, 2 pairs of crossed spokes were also carried out, fixed in a ring and a half-ring. The half-rings and rings were stabilized by rods.

Successfully solving the tasks set, favorably differing from the means of internal fixation, external fixation devices have a number of disadvantages that hinder the wider application of the method of external transosseous osteosynthesis.

The effectiveness of the Ilizarov apparatus is generally recognized and well-known, however, successfully solving the problems of treating the pathology of the lower leg, spoke devices have limited use on other limb segments due to many complications, limitations, inconveniences for the patient and the complexity of performing osteosynthesis. With transegmental insertion of spokes on the shoulder, there is a high risk of damage to large blood vessels and nerves. The device has an excessively cumbersome design, which not only negatively affects the quality of life of patients, but also significantly complicates rehabilitation treatment in the postoperative period. The fixing ability of spoke devices significantly depends on a number of technical conditions: the thickness of the spokes, the strength of their tension, the magnitude of the intersection angle, the magnitude. Clinical experience shows that it is extremely difficult to fully fulfill all these conditions that ensure optimal stable fixation of bone fragments. For example, it is impossible to create a sufficient base of fixation points with spokes of short fragments in periarticular fractures, in particular, it is satisfactory to fix the distal shoulder, especially in osteoporosis. Biomechanical tests of fixation rigidity have shown that spoke devices have less durable and stable fixation of fractures under all types of load compared to rod analogues. The spokes fixators in the metaphysical parts of the bones are easily rotated, which leads to loosening of the spokes in the bone and secondary infection of the channels. When passing through the bone and mounting the device, small deformations of the spokes occur. In the places where the spokes bend, resorption occurs when exiting the bone. The stretched spoke gradually straightens and lengthens, its tension drops. To maintain the required level of fixation rigidity, it is necessary to re-tighten the spokes once every 7-10 days. Against the background of soft tissue sliding along the spokes, many infectious and other complications occur – from 12 to 60%, up to the development of osteomyelitis of the spokes - up to 2% of cases. Thus, with all the versatility of spoke devices, including the Ilizarov apparatus, the breadth of therapeutic tasks solved with their help, spoke ring compression-distraction devices are of little use for osteosynthesis of humerus fractures, contain an increased risk of injury to

neurovascular formations, are time-consuming to use, have a significant size and contribute to a large number of complications. For this reason, rod fixation of fractures with the location of the rods on the outer surface of the segment is becoming increasingly common. The advantages of rod devices include:

1. Reducing the complexity of the method by simplifying the installation of the device, which provides a significant reduction in the operation time;

2. Minimal risk of damage to blood vessels and nerves, since the rods do not require transegmental insertion;

3. The possibility of placing the rods in functionally neutral zones, excluding the fixation of muscle arrays and tendons, which allows you to quickly restore the function of the limb;

4. Convenience for patients by reducing the weight and dimensions of the devices;

5. Increased rigidity of fixation (the stiffness coefficient of the rod for linear movements is 2-3 times higher than the stiffness coefficient of the spoke, and when bending 3-4 times, therefore, due to the greater rigidity of the rods, the required level of stability can be provided by fewer of them than when using spoke devices);
6. Reduction of the injury rate of intervention (total surface area and the number of wound channels from fixators in rod osteosynthesis is 1.5-2.5 times less than in spoke osteosynthesis, and therefore the traumatic nature of the operation is lower);

7. Reducing the likelihood of inflammatory complications around the rods.

Thus, based on the literature data, it can be concluded that when using rod devices for transosseous osteosynthesis, constant rigid compression of fragments is ensured, the stability of osteosynthesis increases, the mass and dimensions of external fixation devices decrease, it is possible to start developing movements and loads in the early postoperative period, and the time of stay of patients in the hospital is reduced. In the last decade, there has been a tendency for two alternative systems of external fixation to converge in order to optimize the method, eliminate

mutual disadvantages and strengthen the known advantages of external transosseous fixation.

Thus, our experience in the treatment of patients with multiple fractures of the bones of the upper extremities by the method of transosseous osteosynthesis according to Ilizarov testifies to its high efficiency, since it allows an accurate comparison of bone fragments and fragments in a closed way, ensures their stable controlled fixation, makes it possible to activate the victims from the very first days after surgery. With open fractures, in addition to the positive aspects listed above, this method makes it possible to perform timely and full-fledged surgical treatment of wounds and prevent the development of infectious complications. All of the above allows us to recommend this method of treatment for wider implementation in clinical practice.

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