

SYMPTOMS, DIAGNOSIS, AND TREATMENT OF CHILDREN WITH FRACTURES OF THE PROXIMAL EPIMETAPHYSIS OF THE RADIUS IN CHILDREN

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Abstract. *In spite of the many existing methods of treatment of elbow fractures, proportion of complications and poor outcomes is still quite a high (15, 2–40%). Difficulties in of the treatment of elbow fractures in children caused by a number of features: a complex anatomic and topographic location, small size of the distal fracture fragment, the frequency of damage to the articular capsule, blood vessels and nerves.*

The method we use facilitates the use of plaster immobilization, enables the early possibility of physiotherapy exercise, and with careful examination of each patient with isolated damage to the proximal radial bone epimetaphysis, it is easy to establish the symptom of a fracture of the proximal part of radial bone.

Keywords: *children, fractures of the elbow joint, treatment methods.*

Despite the numerous existing methods for treating fractures in the elbow joint area, the proportion of complications and unsatisfactory outcomes is still quite high (15.2-40%), and the risk of nonunion fractures and false joints ranges from 17.5 to 20.9%.

The difficulties in treating fractures of the elbow joint in children are due to a number of features: complex anatomical and topographical location, small size of the distal fragment in case of fracture, frequency of damage to the joint capsule, blood vessels, and nerves. The review describes modern methods of treating children with this pathology.

Relevance. Intra- and periarticular fractures of the proximal epimetaphysis of the radius in children account for 17.5-20.9% of all fractures of the bones forming the elbow joint [1,4]. Fractures of the proximal epimetaphysis are diverse, characterized by the complexity of diagnosis and course, as well as frequent accompanying complications. The head of the radius bone acts as a stabilizer of the elbow joint and participates in force distribution. Fractures of the neck of the radius bone led to a complex pathobiomechanical process and disrupt the biomechanics of the elbow joint [3,5]. As a result of intra-articular fractures of the elbow joint in children and adolescents, a decrease in work capacity is observed in 20% of cases - disability. Therefore, fractures in this area require particularly careful repositioning of the fragments, as residual deformities, unlike fractures of other bones, are not compensated with age [1,2,6].

Unsatisfactory treatment results in this group of patients are due to highly differentiated anatomical structure, complexity of biomechanics, particular vulnerability of the child's elbow joint to trauma and immobilization, difficulty in reduction and fixation, and small size of bone fragments [2,5].

The treatment of patients with fractures of the proximal part of the radial bone is one of the most serious problems in childhood, which remains relevant in traumatology to this day. Due to the requirements of the present time, new technologies for bone osteosynthesis are being developed in case of their damage. In this type of fracture, the rotational movements of the forearm

are most affected and are particularly difficult to restore compared to other intra-articular fractures of the elbow joint area. To achieve positive results, precise anatomical alignment of the fragments is necessary, which creates the best biological conditions for the fusion of fragments and complete restoration of limb function.

Research objective. Improving the treatment outcomes of children and adolescents with fractures of the proximal epimetaphysis of the radial bone.

Materials and methods. In the pediatric traumatology and orthopedics clinic at TashPMI during the period of 2012-2024. 147 children with fractures of the proximal part of the radial bone, aged 5 to 18 years, were under treatment. Isolated fractures were observed in 124 patients, while fractures of the neck and head of the radial bone in combination with injuries to other bones in the elbow joint area were observed in 23 children. Of these, 69 patients were diagnosed with osteoepiphysiolyis of the head of the radial bone, while the remaining children had epiphysiolyis (23), fracture of the head of the radial bone (12), and fracture of the neck of the radial bone (43).

Results and Discussion. Analyzing the data, we observed that in all cases both direct and indirect mechanisms of injury were present, but the ratios between them varied. Indirect mechanism of injury was found in 142 patients, while direct mechanism of injury was found in only 5 injured individuals. Analysis shows that the indirect mechanism of injury (96.6%) plays a major role in proximal radial bone fractures. Analysis of the mechanism of injury and accurate diagnosis, including determining the type of displacement of the fragments and proper interpretation of X-ray images, allow for an individual approach to each case and the implementation of appropriate treatment strategies.

Examinations of patients with fractures of the proximal section of the radial bone begin with an interview. Usually, patients indicate a fall on an outstretched arm (112 cases) or on the elbow (30 patients), only in 5 cases a direct blow to the outer surface of the elbow joint. In all cases, severe pain in the area of the elbow joint was noted. The pain is localized specifically in the projection of the head and proximal section of the radial bone. The slightest movements in the elbow joint and fingers of the hand intensify the pain. During the examination, the presence of deformity, hemorrhage, and swelling in the area of the elbow joint can be determined. Objective clinical data depend on the severity of the main and accompanying injuries. In cases of epiphysiolyis and osteoepiphysiolyis of the head and fractures of the neck of the radial bone without significant displacement of the fragments, the forearm is slightly pronated, and in fractures with pronounced displacement, attention is drawn to the forced position of the limb: the patient supports the injured arm with the healthy one, which is usually bent at the elbow joint at an angle of 130°-150° and abducted at the shoulder joint. The forearm is in a neutral position or slightly pronated, which increases due to shoulder abduction. Such a position of the injured hand was noted in 114 out of 124 children with isolated fractures of the neck and head of the radial bone. During the examination, we determined a slight increase in valgus position of the forearm due to damage to the medial-lateral ligaments of the elbow joint in 86 patients.

Active and passive movements are limited due to pain. The main focus is on a sharp limitation of forearm supination. This symptom is characteristic of a proximal radial bone fracture. Pronation is also limited and painful, but to a lesser extent. Flexion in the elbow joint often reaches normal, while extension is sharply painful and limited. Among our patients, we observed significant limitations in forearm extension in 65 cases. The clinical examination ends with determining the pulsation in the radial artery, sensitivity, and finger movements in the hand. When

determining sensitivity in 4 patients with gross displacements of the central fracture fragment of the radius outward and forward, we noted a slight paresis of the motor branch of the radial nerve. This is due to the fact that the motor branch of the radial nerve is located closer to the surface and is compressed by a displaced fragment or hematoma.

The treatment of patients was carried out using both conservative and operative methods.

We propose a stable-functional osteosynthesis for the treatment of fractures of the neck and head of the radius in children and adolescents using the Ilizarov apparatus. Indications include fractures with displacement of bone fragments of grade III-IV.

The technique involves exposing the site of the fracture under general anesthesia. If the joint capsule is intact, it is not opened, and the fragments are aligned using a subcapsular method. If the joint capsule is ruptured, the joint cavity is revised, blood clots are removed, and the head is placed back in its position. The integrity of the joint capsule is restored and layered sutures are applied to the wound. In order to promote early mobilization of the elbow joint, we used stable-functional osteosynthesis. From day 4-6, after the acute pain subsides, passive motion exercises are prescribed, and after 8-10 days, active motion exercises are initiated for the elbow joint. The apparatus is removed after 16-18 days, usually by this time the function of the elbow joint is fully restored, both in terms of flexion-extension and rotation. This technique was applied in 44 patients with good anatomical and functional results.

CONCLUSIONS. The lightweight stable-functional osteosynthesis method we use eliminates the use of plaster immobilization.

This method allows for early development of the elbow joint.

Upon careful examination of each patient with an isolated injury of the proximal epimetaphysis of the radial bone, it is easy to establish symptoms of a proximal fracture of the radial bone.

REFERENCES

1. P.S. Andreev, I.V. Tsoi, A.P. Skovorsov, R.V. Talalaev, O.N. Amairi. Treatment of fractures of the proximal section of the radial bone in children and adolescents// *Practical Medicine*, Volume 19, No. 4, 2021, pp. 141-145
2. Semenov S.V., Malakhov O.A., Sharpar V.D., Neganov O.A., Kamenskikh M.S., Malakhov O.O. The use of elastic titanium rods in fractures of the radial neck in children. // *Pediatric Surgery*, No. 5, 2015, pp. 38-40
3. Ya.N. Proshchenko, N.A. Ovsyankin, N.A. Pozdeeva. Methods of treating children with injuries to the elbow joint area // *Traumatology and Orthopedics Russia* 2011-4 (62)
4. U.K. Narzikulov, U.B. Sangilov. Clinic, diagnosis and treatment of fractures of the proximal radius in children// *International scientific journal, Science and innovation*, Volume 2 Issue 12, 2023: 559-564
5. Pogorelić Z, Kadić S, Milunović KP, et al. Flexible intramedullary nailing for treatment of proximal humeral and humeral shaft fractures in children: a retrospective series of 118 cases. *Orthop Traumatol Surg Res.* 2017;103(5):765–70.
6. Kachooei AR, Baradaran A, Ebrahimzadeh MH, van Dijk CN, Chen N. The rate of radial head prosthesis removal or revision: a systematic review and meta-analysis. *J Hand Surg Am* 2018; 43:39-53, e1