

# Hardware-Surgical Treatment For Fractures Of The Distal End Of The Forearm Bones

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**Abstract:** *According to numerous authors, fractures of the distal metaepiphysis of the forearm bones are one of the maximum not unusual place fractures with inside the shape of higher limb accidents, the percentage of this pathology is as much as 33% of all forms of accidents of the musculoskeletal system. Injuries are extra not unusual places in older folks that lead a lively way of life and more youthful human beings who've been uncovered to high-power trauma, which shows the significance of the socio-financial element of this trouble. To date, the hassle of treating this kind of harm to the forearm bones stays relevant. There isn't any typically well-known remedy method for this pathology yet. The surgical remedy of comminuted intra-articular fractures of the distal metaepiphysis of the forearm bones the usage of bone distraction osteosynthesis with diverse styles of distraction gadgets has been accredited with the aid of using several authors. The approach of outside fixation justifies itself in its simplicity, the capacity to carry out a closed fracture reposition without separating fragments. In fractures of this localization, using ligamentotaxis-traction reposition of small fragments with the aid of using keeping their reference to gentle tissue systems of the Sacro-ligamentous equipment is a biomechanical foundation for the usage of transosseous distraction osteosynthesis with extraordinary varieties of outside fixation equipment.*

**Keywords:** *breakage, distal epiphysis, bones of the forearm, the distraction, the Ilizarov apparatus.*

## 1. INTRODUCTION:

According to the literature facts in current years, harm to the distal crease of the forearm bones is a maximum not unusual place, and their percentage is set 12-36% [ 1] of all skeletal bone fractures and nearly 33% of all accidents to lengthy tubular bones[4]. The prevalence of this form of fracture is set 40-50% of all accidents to the bones of the higher limb[5] and approximately 70-90% with inside the shape of accidents to the bones of the forearm[6]. Injuries are extra not unusual to place in older those who lead an energetic way of life and more youthful human beings who've been uncovered to high-power trauma, which suggests the significance of the socio-monetary issue of this problem. [3,5,8]. Reasons for mistakes in remedy choice may be, incorrect analysis of fractures of the distal radius metaepiphysis, which in result cause severe disturbances of the feature of the radiocarpal joint, distal radioulnar joint, the wrist in General, and the outcomes may be a massive discount in disability [2]. According to the AO/ASIF classification, all kinds of fractures of this pathology are divided into three large businesses and every one of them is split into subgroups. The kind A fractures are extra-articular fractures of character, incomplete intra-

articular radius fractures are kind-V and kind-C fractures are entire articular. The surgical remedy of comminuted intra-articular fractures of the distal metaepiphysis of the forearm bones (DMEFB) by bone distraction osteosynthesis with diverse sorts of distraction gadgets has been permitted with the aid of using several authors. However, with different same advantages, the technique isn't always without drawbacks. T. Gausepohletal and co-authors concluded that outside fixation in impact multi-comminuted fractures did now no longer offer inflexible fixation and did now no longer save you the secondary influence of the articular region of the radius with lack of each the perspective of radial incline and the attitude of palmar inclination. The authors determined slight fall apart of the impact fracture sector in greater than 50% of instances of their clinical studies. It needs to be mentioned that some of the complications-the improvement of neurodystrophic syndrome, characterized using tight mobility of the fingers, ache, and violation of fracture consolidation, related to the hyper distraction of the outside fixation tool. For open and complex fractures of the distal stop of the forearm bones, through bone distraction osteosynthesis(THBDOS) stays an essential technique amongst surgical treatments. The approach of outside fixation justifies itself in its simplicity, the opportunity of appearing a closed fracture reposition without keeping apart fragments [4,9]. In fractures of this localization, using ligamentotaxis-traction reposition of small fragments using retaining their reference to smooth tissue systems of the Sacro-ligamentous apparatus is the biomechanical foundation for using THBDOS. Inaccuracies with inside the reposition of the articular floor of the forearm bones, insufficient desire for surgical remedy, and underestimation of the power of distraction cause the improvement of intense post-worrying osteoarthritis with joint deformities and contractures in 5.8-28.0% of instances [7.10]. Based on the modern-day country of the problem, it could be concluded that the questions of figuring out the strategies of the remedy of the distraction technique with using a distraction tool for comminuted fractures of DMEFB continue to be open. Existing distraction gadgets are technically complicated and feature many postoperative complications.

**Objective:** To improve the results of treatment for fractures of the distal metaepiphysis of the forearm bones by applying a compression-distraction device by ligamentotaxis.

## 2. MATERIALS AND METHODS:

From 2017 to 2020, in the Bukhara Regional Multidisciplinary Medical Center and RSC EMC of the Bukhara branch, surgical treatment by legamentotaxis was performed in 61 patients with fractures of the distal metaepiphysis of the forearm bones, including 27 men (44.3%) and 34 women (55.7%) aged 25 to 60 years and older (mean age  $(45.5 \pm 9.9)$  years). During the treatment, standard research methods were used such as clinical, X-ray, and all patients underwent hand dynamometry to study the long-term results of treatment using the DASH method. According to the classification, AO/ASIF, all patients were systematized by the type of damage to the distal part of the forearm bones. Indications for surgical treatment were open and closed unstable comminuted fractures with the presence of incongruence in the wrist joint. As well as the presence of at least two radiological signs, displacement of bone fragments forming the articular surface of the radius with a step of more than 2 mm; relative shortening of the radius more than 5 mm; violation of the angle of inclination of the articular surface of the radius more than  $10^\circ$ ; a change in the radioulnar angle of more than  $10^\circ$  is also a possibility of early functional rehabilitation of the injured joint. To determine and establish an accurate diagnosis and further surgical treatment tactics during preoperative preparation of patients, the nature and severity of the damaged area were revealed, a clinical examination and x-ray examination were performed to determine the nature of the fracture,

the size, displacement of fragments, the degree of relative shortening of the radius, the radioulnar angle, the angle of inclination of the articular surface of the radius relative to its axis. The distraction method of treatment makes it possible to achieve biomechanically correct reposition, in the nearest postoperative periods, conditions for restoring painless movements in the wrist joint, especially in intra-articular comminuted fracture of this area. The problem was solved by the fact that with this method, which includes performing a surgical manual in the conditions of the Ilizarov distraction device module and fixing the forearm and hand in the back position, after twice treating the skin with antiseptic solutions of the upper limb, the needle was passed through the metacarpal bones in the direction of the Needle oriented in the direction from the distal metacarpal II, distal to the division V metacarpal bone, creating the effect of ulnar deviation, was performed with perosseous osteosynthesis of the lower third of forearm bones with the spokes of Kirchner in the position achieved. The distal spoke held through the metacarpal bones of the hand was fixed with clips to the floor ring, and the second half-ring of the Ilizarov apparatus was fixed to the spokes held from the bones of the forearm by fixing them with three supports. The angle of radial inclination of the DMEFB was restored, then distraction between the supports was performed under the control of an electro-optical device (EOD), thereby ensuring the fracture reposition due to the ligamentotaxis phenomenon. In the end, the final x-ray control was performed. Two days later, a 1.0 mm distraction was started using the device. Distraction was carried out for 5-6 days. Based on a control X-ray in the region of the wrist: the complete elimination of deformation and comparison of bone fragments and left the machine to complete fusion of the bone fragments. Then after 1.5-2 months. repeat a test radiograph. When full fusion of the bone fragments was removed apparatus. Then the patients were given physiotherapy treatment. Evaluation of results of surgical treatment carried out 6-12 months after the surgery. The results were evaluated according to the following criteria: restoration of the anatomy of the articular surface of the radius, the amplitude of movements in the hand joint, the muscle strength of the hand, and a DASH questionnaire. The following radiological criteria were used to restore the radius anatomy: the absence of displacement of fragments forming the articular surface of the radius; restoration of the radius length relative to the ulna; restoration of the angle of inclination of the articular surface of the radius relative to its axis and radioulnar angle. Radiographic examination of the wrist joint was performed in anteroposterior and lateral projections. Control radiography from the moment of reposition was performed on 3-7 days in all patients. The amplitude of movements in the wrist joint was measured using a standard goniometer. The amplitude of movements in the hand joint was determined as a percentage of the volume of movements in the intact hand joint of the same patient using a five-point scale for evaluating movements. Hand strength recovery was evaluated using a dynamometer on a six-point muscle strength rating scale. McPeak as a percentage with the strength of the opposite intact upper limb. (Table 1)

**A six-point scale for evaluating muscle strength. McPeak**

Number of points	Attitude to a healthy hand, %	The degree of restriction of the force
0	100-90	No
1	89-75	Lung
2	74-50	Moderate

3	49-25	Expressed
4	24-10	Deep
5	9-0	Paralysis

(Table 1)

For functional analysis, we used the DASH scale (Disability of the Arm, Shoulder, and Hand Outcome Measure), which was developed by the American Academy of Orthopedic Surgeons in 1996. To assess the functional ability of the upper limb, the DASH scale highlights 6 main points; the main test consists of 30 questions describing the hand movements that the patient performs in everyday life.

### 3. RESULTS.

During the follow-up period from 3 weeks to 8 weeks, all patients were able to eliminate all types of displacement and maintain the achieved reposition throughout the entire follow-up period. The data of the study in the long-term period from 6 months to 1 year showed that in 54 (88.5%) cases, the strength of the hand contraction was completely restored or there was a slight decrease in it. In five (8.2%) cases, there was a slight (5-20%) and in 2 (3.3%) patients, a moderate (21-40%) decrease in the strength of the flexors of the fingers of the hand. Fractures of the distal end of forearm bones the use of our method of ligamentotaxis CDO by the Ilizarov improves and stabilizes the reposition when impression comminuted fractures and reduces post-operative complications such as shortening of the limbs and improper fusion.

#### The average X-ray diffraction and functional indices before and after treatment.

Indicator	The survey period	Woman	Man
Displacement of bone fragments forming the articular surface of the radius with a step of more than 2 mm	before treatment	35	24
	Recovery 12 months after surgery	33	23
Relative shortening of the radius more than 5 mm	before treatment	17	10
	Recovery 12 months after surgery	16	10
Violation of the angle of inclination of the articular surface of the radius is greater than 10°	before treatment	10	6
	Recovery 12 months after surgery	8	5
Violation of the radioulnar angle of more than 10°	before treatment	8	8
	Recovery 12 months after surgery	6	7

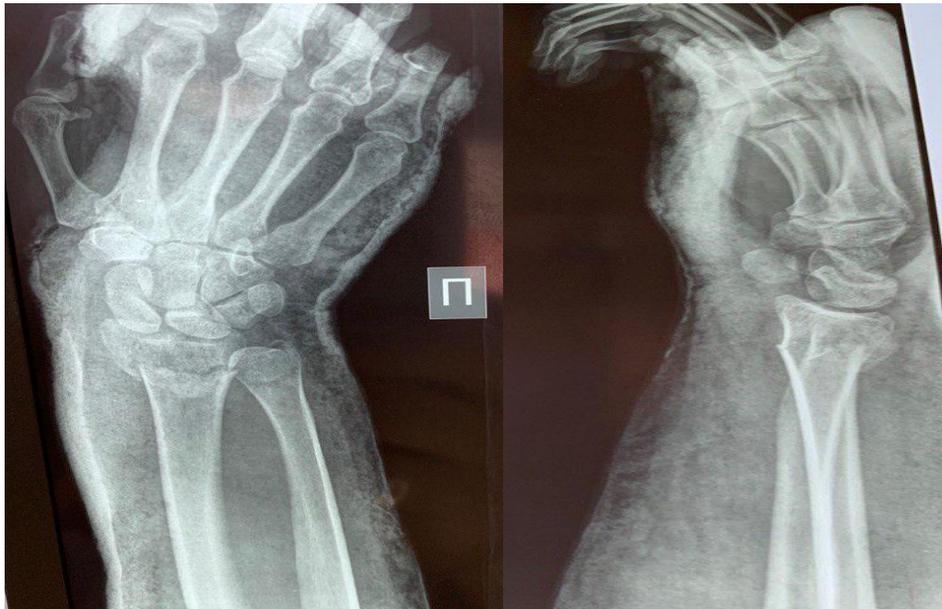
(Table 2)

Comparable outcomes were obtained in the DASH questionnaire: in 40 (65.6%) patients, the results were evaluated as excellent and in 9 (14.7%) - as good, satisfactory in

10(16.4%) and unsatisfactory in three (3.3%) patients. Comparing the results of treatment of patients in subgroups with different types of fractures using the DASH system showed that 100% of patients with extra-articular fractures achieved excellent and good results. In the case of type A and B fractures, an excellent result was recorded in 66.7%, and type C - in 76.7% of victims. In other patients with intra-articular fractures of DMEFB, the postoperative result was assessed as good and satisfactory (Table 2). recovery of working capacity occurred on average after 6-8 months. Patients of working age who had a permanent place of work before the injury were taken into account.

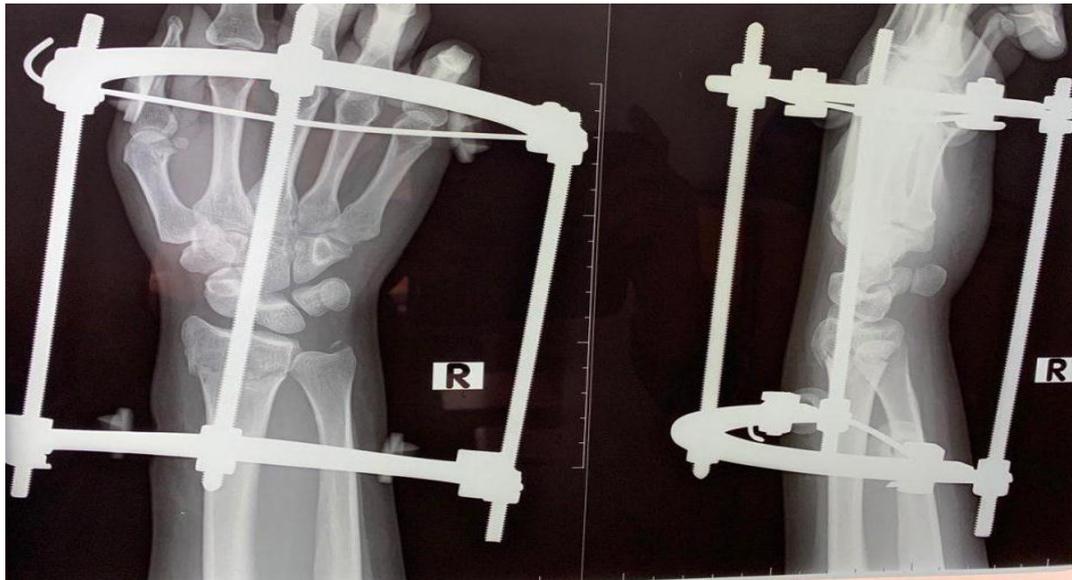
**Clinical example 1:**

Patient V., 56 years old, number of complaints received about a closed comminuted intra-articular fracture of the distal metaepiphysis of the right radius with a displacement of fragments (type C2) in the trauma department of the Republican Clinical Hospital No. 1(Fig. 1).



**(Fig.1).**

After 2 days of operation - closed reposition, osteosynthesis of distal metaepiphysis right radius with external fixation device with an additional two needles for fixing the styloid process of the radius bone and fragments from the middle column metaepiphysis of the distal radius (Fig.2.). 2 months after the operation, the apparatus was dismantled, the fracture healed with full restoration of congruency of the articular facet of the radius.



**(Fig.2).**

Restoration of the amplitude of movements in the wrist joint 6 months after surgery: complete restoration of flexion and extension in the wrist joint is determined (Fig. 4). DASH score - 34 points. from the anamnesis: the injury was received in everyday life when falling. two attempts of closed reposition were made on an outpatient basis. In connection with the relapse of dislocation of fragments, the patient was sent for surgical treatment to the trauma department of the RKB No. 1. 2 weeks after the injury, the patient underwent surgery: closed reposition of fragments, osteosynthesis with the Ilizarov spokes (distally through the wrist of one, through the bones of the forearm with two), (Fig. 3.). One and a half rings and supports were mounted. As a result, reposition and stable fixation of epiphysis fragments were achieved.



**(Fig.3).**

Long-term results of patients were studied in all patients. Good and excellent results were obtained in 52 (85.2%), 9 satisfactory. (11.5% and failures 2 (3.3%) after treatment pain.

#### 4. DISCUSSION:

This clinical study allowed us to conduct a comparative analysis of various surgical treatment methods used in modern trauma practice for the treatment of patients with fractures of the distal metaepiphysis of the radius. For the analysis, we used data obtained as a result of both objective (radiography, motion amplitude measurement, dynamometry) and subjective (DASH questionnaire) examination methods. Primary restoration and preservation of THE DMEFB anatomy, especially in the case of intra-articular fractures, directly on the articular surface of the radius, was of primary importance for predicting and further analyzing the final result of surgical treatment. These studies have shown that the use of a distraction device allows 85.2% of patients to restore the anatomy of the articular surface of the radius. While in the treatment with the use of an external fixation apparatus in 2% of patients with intra-articular fractures, it was not possible to preserve anatomical relationships in the long-term period. The worst functional result in the patient is associated with a long period of overload of the ligamentous apparatus of the wrist joint as a result of distraction efforts of the external fixation apparatus and, as a result, the formation of a complex regional pain syndrome with persistent post-immobilization contracture.

Conclusion: evaluation of the effectiveness of the distraction method of treatment of patients with fractures of DMEFB allowed to develop indications for the choice of method of surgical treatment depending on the kind (type) of fracture. Fractures of types A and b can be operated in any of the above methods of treatment. However, the results of our study showed that shortened the average terms of operational and in-patient treatment by Ilizarov preferred, easy maintenance, and simple and faster restores of disability of the patients. Intra-articular comminuted fractures (type C) require accurate reposition of fragments with the restoration of the integrity of the articular facet, stable fixation for the entire period of formation of the bone callus, and early development of movements in the joint. In general, the results of the study showed that it meets the requirements to the greatest extent.

#### 5. CONCLUSIONS:

the assessment Method for DASH showed 82% of the patients with extra-articular fractures, good results in 18% of patients satisfactory. In this case the fracture type In the good results recorded at 66.7 percent, and the s – from 76,7% of the victims. Fractures of type A and the spokes are conducted through the distal end of the metacarpal bones parallel to the second pin, which is held through the lower third of both bones of the forearm. In the case of impression-comminuted fractures of the distal end of the forearm bones, the use of our ligamentotaxis technique with Ilizarov CDO improves and stabilizes reposition and reduces postoperative complications such as shortening of the limb and improper fusion.

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