

DEVELOPMENT OF A TREATMENT ALGORITHM ACCORDING TO THE LOCALIZATION OF THE FRACTURE OF THE PALMAR BONES OF THE HAND

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Received: 02.03.2020

Revised: 04.04.2020

Accepted: 06.05.2020

ABSTRACT: The article describes the results of treatment in patients depending on the location, nature and type of treatment of palmar fractures, and developed treatment algorithms according to the localization of fractures of the palmar bones. The results showed that early recovery of the palmar and interphalangeal joints was achieved through ligamentotaxis in the injured palmar-finger joint using an improved compression-distraction osteosynthesis device in the treatment of palmar fractures, palm fractures have shown complete restoration of palmar and finger functions through improved splints in the treatment of its complications and prevention of contractures.

KEYWORDS: Palmar bone, Fingers, Fracture, Localization, Treatment, Sprain, Contracture, Fixation.

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I. INTRODUCTION

According to the World Health Organization, hand injuries are one of the leading causes of musculoskeletal injuries, accounting for 30-50% of total fractures. 33-48% of them have fractures of the palmar bones. Despite the development of various new systems and methods of treatment, the number of complications remains high, ranging from 11.2 to 31.9%. Unsatisfactory results in the treatment of small tubular fractures of the hand are mainly due to the severity of the primary injury, anatomical and functional structure of the hand, insufficient development of standard treatment tactics and a number of shortcomings in conservative treatment of fractures. hand-palm dysfunction as a result of improper treatment leads not only to a decrease in the ability of patients to work, but also to disability. Globally, it is important to develop improved methods of surgical treatment of the wound to improve treatment outcomes and reduce the number of complications in patients with complex injuries such as fractures of the palmar bones [8].

A number of external fixation devices have been proposed for osteosynthesis of the palmar bones and finger phalanges, which consist mainly of six-sided apparatus. The most common modern surgical treatment for palmar bone fractures is fixation with splints, mini plates, and blocking metal pins. These methods are technically simpler, but do not provide complete fixation of the fracture, especially in rotational shifts and require prolonged external immobilization in the postoperative period. Experience has shown that the application of interosseous osteosynthesis can improve the anatomical and functional outcomes of the treatment of new fractures and malformations of the palmar bones. The advantage of the method is that it is easy to manage bone fragments through stable osteosynthesis, low trauma of the surgical procedure, the ability to maintain the function of the joints and the whole arm, while its application can lead to a number of significant errors and complications [1, 4].

Although much experience has been gained in providing medical care to patients with fractures of the palmar bones, not all aspects of this nosology have been fully explored. Pain, deformity, and prolonged immobilization at the site of injury preclude early functional treatment, resulting in the development of contractures in the palmar joints and causing certain problems for the patient [7]. The results of the application of different variants of osteosynthesis in palmar bone injuries were analyzed [5]. The author points out that often the growth of bone marrow into the fixators, resulting in impaired blood circulation in the bone tissue under pressure and its resorption or osteosclerosis, aseptic necrosis, and similar adverse effects, demonstrate the negative properties of osteosynthesis. One of the most popular surgical treatments is intramedullary osteosynthesis, which is also opposed to its use because it does not provide stable fixation of bone fractures and as a result they remain mobile [6].

An analysis of the data presented in the literature showed that although there is a positive development in the treatment of patients with fractures of the palmar bones, so far tactical problems, lack of standardized treatment algorithms and improved osteosynthesis devices determine the need to study this problem. Closed treatment of palmar fractures, treatment with sixes, Problems such as intramedullary osteosynthesis, treatment with bone axis rods, use of extra-articular metal fixatives, prevention of refractures, use of superficial metal plates, slow consolidation of fractures, treatment and prevention of soft tissue injuries around the joint are of great importance in traumatology practice today. Earns [2, 3].

The aim of the study was to develop a standardized treatment algorithm in the treatment of patients with various fractures of the palmar bones.

II. RESEARCH MATERIALS AND METHODS

The examinations were performed in 120 patients hospitalized with fractures of the palmar bones and their complications at the Center of Fingers and Joints of the Traumatology Department of the Clinical Hospital No. 1, Clinic No. 2 of the Tashkent Medical Academy. Of these, 114 were male and 6 were female, aged 18 to 59 years.

117 patients aged 18-44 years accounted for 97.5%, 3 patients aged 45-59 years accounted for 2.5%, and patients aged 60 years and older were not observed.

Patients were divided into three groups depending on the location, nature and type of treatment of palmar fractures.

The first group consisted of 40 patients with fractures of the distal part of the palmar bone using a clinically developed external fixation compression-distraction apparatus.

The second group consisted of patients with fractures of the proximal (14 patients) and diaphyseal (21 patients) parts of the palmar bone using a surgically modified osteosynthesis method with sixes.

The control group included 45 patients who received traditional treatment.

The three groups of patients were distributed according to sex and age. Palm fractures and their complications were diagnosed based on the results of a comprehensive examination that included clinical, specific, and functional methods.

Investigations included examination of the mechanism of injury, general and local clinical examination, standard laboratory, radiological, dynamometric, electromyographic, and biomechanical examinations.

III. RESEARCH RESULTS

The peculiarities of the tactics of treatment of palmar fractures using a distraction apparatus allowed to distinguish 6 main stages of treatment to achieve a good result: preparation, surgical treatment, adaptation, correction of the condition of the fractures, stabilizing tension between the fractures, physiotherapy and social rehabilitation.

Adherence to step-by-step treatment led to an improvement in treatment outcomes. Based on the proposed hardware treatment, an algorithm for the treatment of fractures of the distal part of the palmar bones was developed (Fig. 1).

According to the results of a study to improve the quality of surgical treatment of fractures of the diaphyseal and proximal parts of the palm, 35 patients with diaphyseal and proximal fractures of the palm were treated using a modified surgical treatment method developed by us. Of these, 31 were men and 4

were women, and the patients ranged in age from 18 to 53 years. Fractures of the proximal part of the palmar bones occurred in 14 (40%) and diaphyseal part in 21 (60%) patients.

The goal of surgical treatment was to prevent solid fixation of bone fragments and rotational displacements. To achieve this goal, we used 3 Kirshner sixes for fixation of bone fragments. Fragments of both bone fragments were fixed using two intersecting sixes, and the third six was conducted perpendicular to the distal part of the adjacent bones relative to the axis of the distal segment. This results in strong fixation and prevention of rotational shifts. This will result in additional compression of the bone fragments, which in turn will create conditions for fracture consolidation, allow for early dislocation of the plaster ligament, and facilitate early initiation of active and passive movements of the fingers.

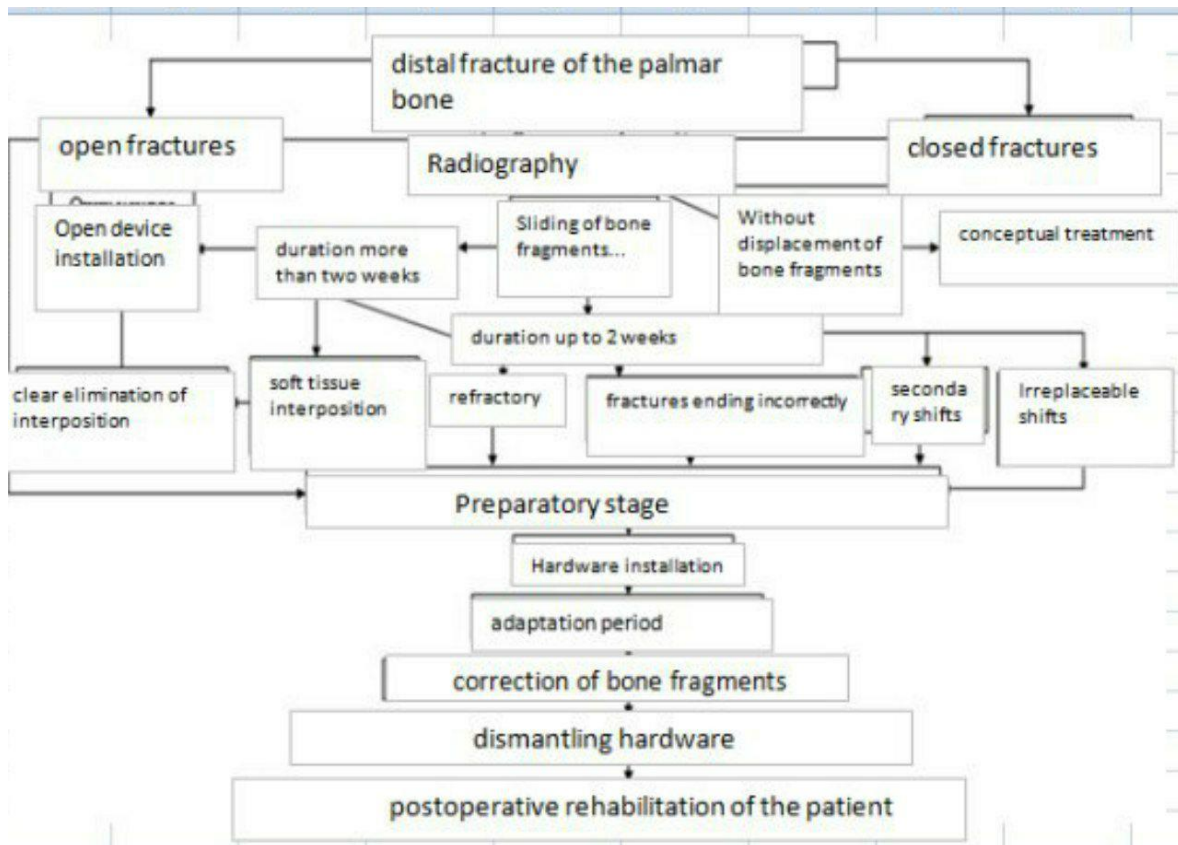


Figure 1: Diagnostic Algorithm for the Treatment of Fractures of the Distal Part of the Palmar Bone

Procedure: The operation was performed under intraosseous anesthesia. Using a semicircular incision, fractures of the I, II, and III palmar bones were made along the outer surface of the wrist, and fractures of the IV and V palms were made along the surface of the outer elbow. After that, the writer's stakes were pushed aside in sharp and impassable ways. The fracture site was opened, blood clots were removed, and tissue interposition was eliminated. The bone fragments were then repositioned and 2 Kirshner's six intersecting in both fragments were held, and one was held along the bone axis perpendicular to the distal fragment, providing firm fixation and preventing rotational displacement of the fragments.

Superficial resection of bone fragments for cosmetic purposes is indicated in fractures and malformed fractures of the proximal part of the palmar bones. The soft tissue interposition between the protrusion, the fracture, and the bone fragments is shown to open the exit and fracture and to hold the intersecting sutures. In older wounds, even in the presence of a gap between the joint surfaces, open placement and fixation with intersecting sutures have been shown.

In 12 cases where the palmar bones had open fractures and non-repositioned closed diaphyseal fractures, the fracture axes were repositioned using reinforcement using 3 sixes.

In 2 patients with an incomplete fracture, the ends of the bone fragments were opened during surgery and 3 were fixed with six. After clearance of the ends of the bone fragments in 1 patient with a palmar bone prosthesis

treated at the location, autos bone plasticity was performed to improve regeneration by correcting the injured bone axis before fixation with 3 intersecting Kirshner’s six. This method helps to eliminate the anatomical defect of the deformed segment, preventing the formation of contractures.

In 1 case with soft tissue interposition, the interposition was eliminated, the bone fragments were repositioned, and 3 were fixed with Kirshner six.

Using the surgical method proposed by us, a treatment algorithm was developed for patients with fractures of the diaphyseal and proximal parts of the palmar bones (Figure 2-3). Using this algorithm, the tactics of treatment are determined based on the types of injuries and localization of the fracture of the palmar bone and its complications.

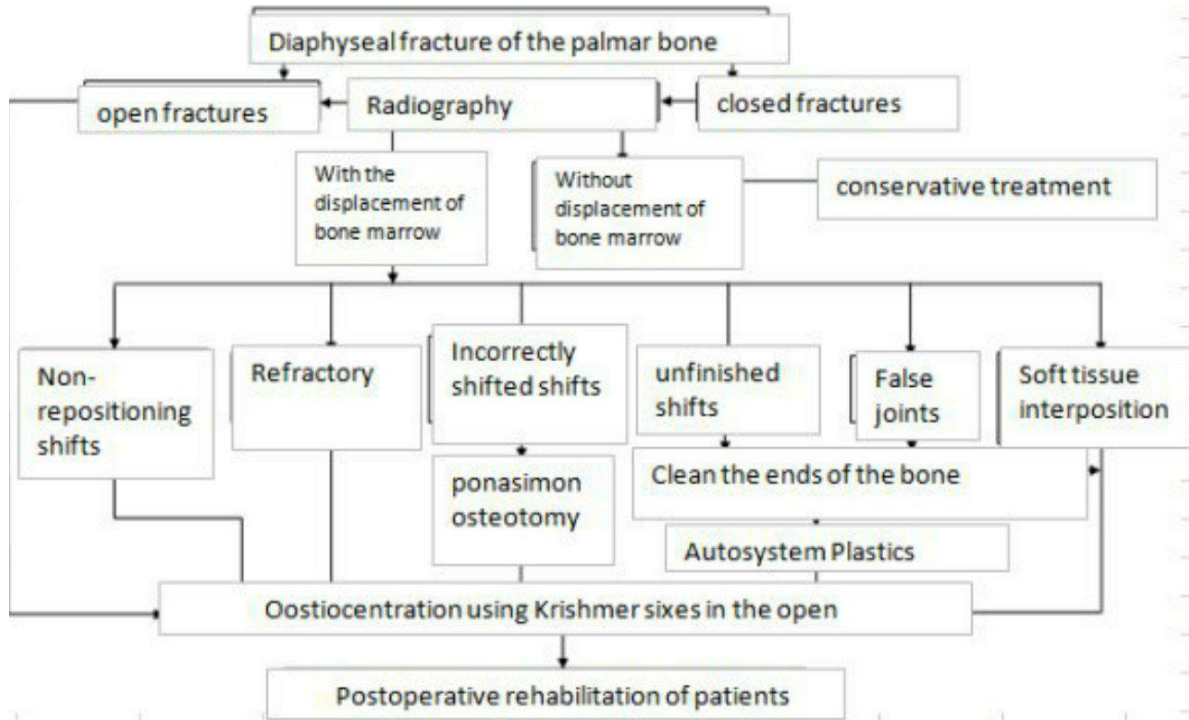


Figure 2: Therapeutic-diagnostic Algorithm in Diaphyseal Fractures of the Palmarbones

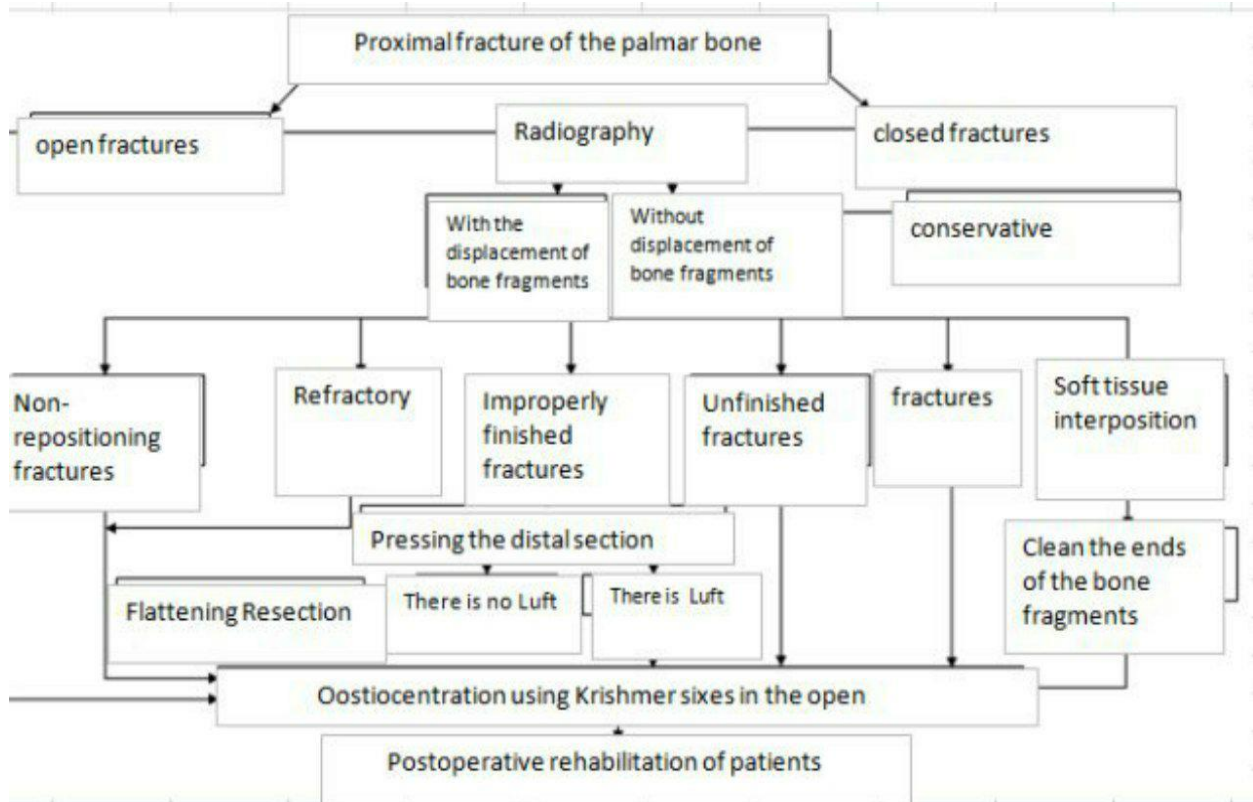


Figure 3: Therapeutic-diagnostic Algorithm in Proximal Fractures of the Palmar Bones

We divided the postoperative period of patients undergoing surgery into 3 stages:

In the first stage, patients perform inactive movements, which include bending and writing each finger separately, which are performed using a healthy hand. The movements should be painless with a dosed weight.

In the second stage, patients are allowed to perform active movements with the fingers of the hand at an increasing rate. In doing so, patients perform a variety of exercises, from simple to complex.

In the third stage, patients are allowed to perform exercises with objects in order to restore all types of palm rest. Measures at this stage should be appropriate to the profession and age of the patient.

4-5 weeks after surgery, massage, electrophoresis with calcium chloride, hydrocortisone ultrasound (all 10-15 treatments) are recommended.

In the treatment of posttraumatic contractures of the palmar joints and rehabilitation of the palmar bones and their complications, we used a fully developed “Device for the use of injured fingers”.

The device consists of additional plates and a fixative connected to the G-shaped device for finger fixation. It consists of a fastener 4 fastened with bolts 3 in the short part and a connecting sleeve 6 in the long part. It is made of leather tape and fastened with a fastener 7, and at the ends is provided with adhesives 8. The fastener for finger fixation is reinforced with 4 threaded holes 5 and nuts 12 on both sides.

A device designed to use contractures of the injured finger joints of the palm is used as follows. The G-shaped curved, fastened device is fastened to the palm face by means of bolts 3 on the short part 4 of the fastener 4, which is provided with elements for the use of fingers, and is made of leather straps, provided with adhesives 8 at the ends, the long part of the plate is reinforced with zaklepka 7, the cuff is reinforced using 6. The position of the finger is adjusted by means of nuts 12 using a threaded shaft 11 at the distal end screwed into the threaded hole 4 of the clamp 5. The fingers are placed in the desired position between the two elements 2, 9, which are passed through the threaded axis 11 at the proximal end of the device. The position of the fingers is controlled by means of a threaded shaft 11 screwed into the 4 holes 5 in the clamp.

Complications of palmar fractures 26 (21,7%), joint contracture 7 (5,8%), arthrosis 11 (9,1%) and 8 long-term pain syndromes (6,7%) observed in the patient. Complications of palmar fractures were observed in 6 (17,1%) patients who underwent surgery (2 with joint contracture, 2 with osteoarthritis, and 2 with long-term pain syndrome). Complications of palmar fractures were observed in 5 (12,5%) of 40 patients treated with the device

(arthrosis arthritis 3 and long-term pain syndrome 2 patients). The highest number of palmar fracture complications was observed in conventionally treated patients - 15 (33.3%): 5 with contractures (11.4%), 6 with arthrosis (13.3%) and long-term pain syndrome in 4 (11.4%).

IV. CONCLUSION

1. In the treatment of fractures of the palmar bones, early recovery of the palmar and interphalangeal joints was achieved through ligamentotaxis in the injured palmar-finger joint through an improved compression-distraction osteosynthesis device.
2. In the treatment of fractures of the palmar bones, primary closure of the bone fragments and early activation of the palmar-finger-finger joints were performed through stable functional fixation.
3. Complete restoration of the functions of the palms and fingers through the improved tire in the treatment of fractures of the palmar bones, its complications and prevention of contractures;
4. A complex treatment algorithm was developed taking into account the clinical appearance, fracture localization and anatomical-functional features of fractures of the palmar bones of the hand.

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