Original Article

A Total Proximal Interphalangeal Joint Arthroplasty Of The Hand With Secondary Destruction Of The Proximal Finger Bone Resulting In Chondrosarcoma

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Abstract

Abstract Aim The authors present the clinical case of a surgically treated patient with post-traumatic destruction of the proximal interphalangeal joint of the third finger of the left hand with chondrosarcoma of the proximal phalanx. **Methods** In the first stage of surgical treatment, the patient underwent total arthroplasty of the proximal interphalangeal joint. Three months later, a fracture of the distal portion of the implant (internal fixation) was diagnosed due to a re-injuryto the hand. **Result** The result was a diagnosis of healed chondromalacia and arthroplasty was performed. **Conclusion** This surgical procedure is worth promoting

Keywords: hand, proximal phalangeal joint, arthroplasty, chondromas.

Introduction

Open severe hand injuries, especially those involving joint destruction, are a pressing issue in modern traumatology. Surgical intervention should follow the principle of maximum preservation of living tissue so that later reconstructive surgery can be performed to restore the function of the injured finger [1, 8]. In recent decades, involved in being the "diamond of orthopedic surgery" surgeons, the hand has had the opportunity to use various types of orthopedic interventions, including intra-articular fixation devices for the finger [2]. When choosing the best internal fixation solution, the degree of damage to the very unique finger extensor device must be taken into account and care must be taken to restore the integrity of the flexor tendons [7]. If these structures are not repaired, endoscopy is meaningless. Special care should be taken in the reconstruction of the most complex proximal interphalangeal joints of the fingers in the presence of post- traumatic deformities [8,9].

1 Materials and methods

A special part of orthopedic surgery is the treatment of benign tumors, such as chondromas, which are known to affect mainly the phalanges and metacarpals (4, 6). Surgical treatment is currently the method of choice for the treatment of these benign tumors. Depending on the stage of the pathological process, surgeons use different ways to remove parts of the tumor, followed by bone grafting with autografts and allografts and, in some cases, bone cement [3, 5]. Some authors prefer to perform only intra-lesional tumor resection without subsequent plication for specified types of bone lesions (pathological processes that do not involve the cortical layer of the bone) [3, 10].The 37-year-old victim, D, was admitted to the Hand Surgery Center of the Republic of Belarus on September 15, 2014, with the diagnosis of post-traumatic deformational arthritis of the proximal interphalangeal joint of the third finger of the left hand. He suffered a traumatic injury on July 8, 2014, while working at home with a woodworking machine, with an open multiaxial fracture of the base of the middle finger shown (Figure 1). In parallel, heunderwent primary surgical treatment of the wound and Kirschner wire osteosynthesis at a regional hospital (Figure 2). A course of antibiotics was given and the wound healed by secondary stretching. Movement of the proximal interphalangeal joint of the third finger was severely restricted and painful.

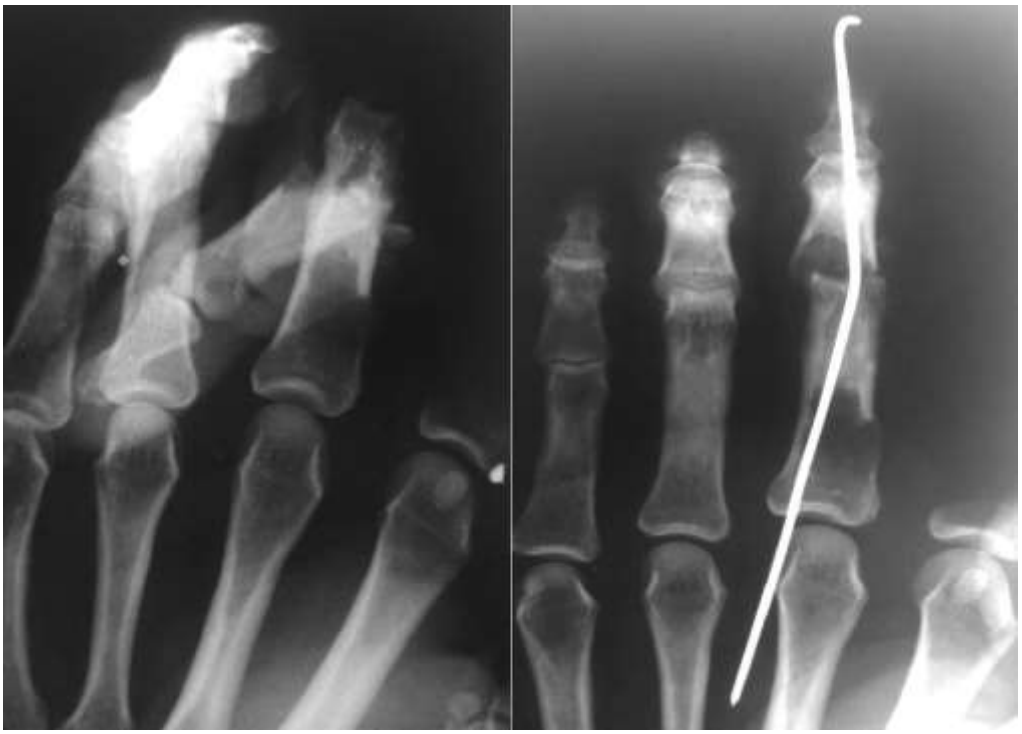

Figure 1. Radiograph of the left hand of patient D., 37 years old (after injury)

Figure 2. Radiograph of the left hand of patient D., 37 years old (after situational osteosynthesis at the CDH)

Figure 3. Radiograph of patient D., on admission to the Republican Center for Hand Surgery

Figure 4. radiograph of patient D., after placement of an endoprosthesis

Active and passive flexion and extension of the metacarpal was moderately limited, indicating preservation of the deep flexor tendon and recovery of thedorsal tendon (through tissue scarring). A closer examination of the radiographs showed that the patient had a radiological picture of a chondrosarcoma: the tumor process affected the base and middle third of the proximal phalanx and also sharplythinned the radial aspect of the phalanx (Figure 3). The patient had no clinical manifestations of the tumor prior to the injury. The patient flatly rejected the proposed arthrodesis of the proximal interphalangeal joint and insisted on trying aninternal fixation. The decision was made to perform a two-stage procedure: thefirst stage was a total arthroplasty of the destroyed joint, and the subsequent stage was the elimination of the tumor process, which left no doubt about its benign nature.

On September 16, 2014, under anesthesia and hemostasis, the head of the main phalanx and the base of the injured middle phalanx were exposed through a dorsal approach, using a graft applied to the proximal third of the forearm. The dorsal portion of the intact deep flexor tendon was the base of the wound; the superficial flexor tendon was not present (apparently removed during the initial surgery). The head of the main phalanx is excised and a canal is created into whichthe opaque metal portion of the Safar prosthesis is pressed. The proximal portionof the middle finger is sawed off and a hooked prosthetic Teflon rod is inserted, which is attached to the metal bridge of the anterior portion of the prosthesis. The dorsal tendon above the prosthesis was sutured as a duplicate. After careful hemostasis and x-ray monitoring, the wound was closed. A sterile dressing and a plaster splint were applied from the palmar surface of the finger to the lower third of the forearm for fixation. An X-ray performed in the operating room showed that the proximal portion of the metal part of the prosthesis had penetrated the tumor cavity (Figure 4). The patient received postoperative antibiotic therapy. The wound healed under primary tension and the sutures were removed after 2 weeks. plaster immobilization was discontinued after 3 weeks, followed by a short course of physical therapy.

On November 3, 2014, the patient was readmitted to the Hand Surgery Department and underwent the planned second stage of surgery: exhalation of the tumor (confirmed as chondrosarcoma) through the dorsal channel at the base of theproximal phalanx, followed by intensive filling of the cavity with allogeneic fibrin.The wound also healed under primary tension. The patient started working 3 weeksafter surgery.

On February 4, 2015, patient D noticed a deformity in his left hand during a fall and found limited movement of the prosthetic joint of the 3rd finger. radiography (Figure 5) showed a lid displacement at the base of the middle phalanx.

Figure 5. Radiograph of patient D., after re-injury (dislocation of the middle phalanx as a result of damage to thedistal component of the endoprosthesis)

2 Results

He was again admitted to the Hand Surgery Center of the Republic of Belarus and was admitted to the operating room. During revision of the proximal interphalangeal joint, it was found that the Teflon rod of the internal fixator had broken at the entrance into the medial phalanx, apparently as a result of significant mechanical action. The locking hook, however, was intact. The distal prosthesis was replaced. Control radiographs showed that the tumor nodule was completely replaced by its own bone tissue (Figure 6). The patient was followed up as of 2022,and functional recovery of the 3rd finger of the left hand was possible.

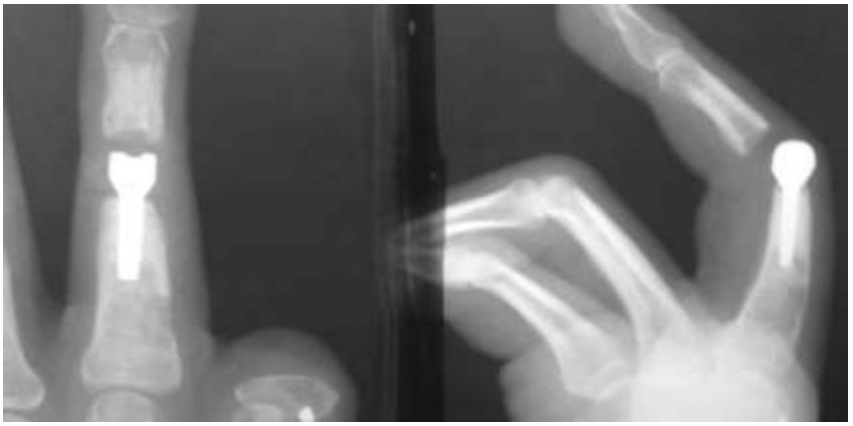

Figure 6. Radiogamma of patient D., after bone alloplasty of the main phalanx and revision endoprosthesis

3 Discussion

This clinical observation is unique because patient D, 37 years old, underwent total internal fixation of the proximal interphalangeal joint of the third finger of the left hand in the context of his existing and initially identified osteochondroma of the injured segment. We could not find such pathologicalhealing in the available data.

4. Conclusion

The results obtained with the two-stage surgical intervention confirm the correct sequence of the two stages and allow us to recommend its practical application in similar situations. The patient's insistence on replacing the prosthesisin case of recurrent trauma indicates that he was satisfied with the results of both the primary total internal fixation prosthesis and the performed intervention of allograft shaping after focal intraoperative resection of the tumor process.

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