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Management of thumb chronic osteomyelitis with extrusion of the proximal phalanx in a low-resource setting

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ABSTRACT

Objective: We report the case of a 14-year-old girl that presented chronic osteomyelitis with extrusion of the proximal phalanx, after a traumatic event three months before, in the rural setting of Djoum, Cameroon. Massive defects of the proximal phalanx of the thumb are uncommon, mostly associated with traumatic amputations or tumors. The aim of this study is to describe our experience in the management of this injury in a low resource center and its mid-term clinical results.

Methods: The presence of an active infection and the lack of technological support determined our treatment choice. Extensive debridement, metacarpophalangeal arthrodesis with 2 Kirschner wires and first web space deepening were performed. Rifampicin and trimethoprim-sulfamethoxazole were prescribed empirically for four months.

Results: At 6-month-following-up the patient was pain-free. Complete arthrodesis of the distal phalanx and first metacarpal was confirmed in clinical assessment. The thumb was slightly pronated, and it permitted good opposability against second, third and fourth fingers. The sensitivity of the thumb tip kept intact. The overall function was rather good, with a QuickDASH score of 18 at the two-year follow-up visit. She was satisfied with final pinch ability and had returned to her normal activities.

Conclusions: We suggest that in a disadvantaged rural environment, metacarpophalangeal arthrodesis associated to first web space deepening may be a reliable treatment for a massive defect of the proximal phalanx of the thumb due to chronic osteomyelitis achieving a satisfactory hand function.

Key words: *Thumb, osteomyelitis, phalanx, arthrodesis*

Introduction

The thumb is thought to account for nearly the 40% of hand function. The opposition is the thumb's differentiating movement, for which proper length, stability, strength, and mobility are major requirements [1]. This explains why any thumb impairment is such a disabling condition.

Massive defects of the proximal phalanx of the thumb are uncommon, mostly associated with traumatic amputations or tumors. Efforts must be made to replant or reconstruct a deficient thumb. There are five goals when reconstructing a thumb. These are the restoration of functional length, stability, mobility (especially opposition), sensibility, and aesthetic appearance

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[2]. Many treatment options have been reported such as free toe transfer, osteoplastic reconstruction, pollicization, metacarpal lengthening, phalangization or bone graft reconstruction associated to a double arthrodesis of the adjacent joints [1-10].

To choose the proper procedure, some factors must be taken into accounts, such as the mechanism or the severity of the lesion, the status of the amputated thumb and the personal and environmental circumstances of the patient [3].

We report the case of a 14-year-old girl that presented chronic osteomyelitis with extrusion of the proximal phalanx, after a traumatic event three months before, in the rural setting of Djoum, Cameroon. The aim of the present study is to describe both radiological and medium-term clinical results.

Methods

A 14-year-old girl who had suffered an open dislocation of the interphalangeal joint of her left (nondominant) thumb presented to Abing Dispensary (Djoum, Cameroon) in March 2014. The mechanism of injury was a fall from a palm tree while harvesting three months ago. She underwent treatment of some antibiotics and nonsteroidal anti-inflammatory that she did not remember. She provided neither medical reports nor radiographies. During that three months period, she related a progressive enlargement of the wound and bone exposure. On examination, she had no fever and presented a wound at the dorsum of the thumb. Condyles and diaphysis of the first phalanx were extruded, and devitalised (Figure 1) and purulent drainage were observed when the digit was manipulated. The thumb tip was well perfused, and its sensitivity was preserved. We explained the patient and her family the diagnosis and the goal of eliminating the infection trying to prevent the thumb amputation and discussed the possibility of performing various procedures if necessary. Informed consent for undergoing surgery was obtained from the patient and her parents.

Remnants of the devitalised proximal phalanx were removed, and soft tissues were debrided and irrigated (Figures 2, 3). We preserved both digital nerves and resected a segment of Flexor Pollicis Longus and Extensor Pollicis Longus. The proximal and distal joints were inspected, and no viable cartilage was found. Curettage of the distal phalanx base and the first metacarpal head was performed before fixating both bones with two longitudinal K-wires to achieve fusion. No additional coverage with either a local or distant flap was needed since enough soft tissue was available. Subsequently, we deepened the first web space using simple Z-plasty and released the adductor muscle to enlarge the relative length of the reconstructed thumb. The hand was placed in forearm-based thumb spica splint, and the K-wires were left in for six weeks (Figure 4). Then, active range of motion exercises of the thumb were permitted.

Figure 1. Post-traumatic chronic extrusion of the thumb proximal phalanx of the left hand and secondary chronic osteomyelitis associated.

Figure 2. Extensive debridement of the skin and soft tissue after proximal phalanx resection. Z-plasty at de first web space and release of the adductor muscle was also performed.

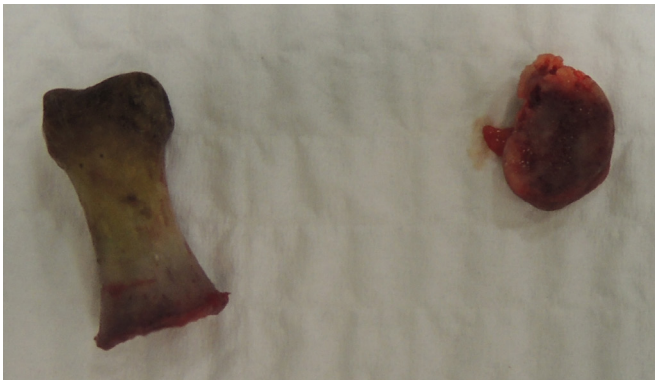

Figure 3. Detail of the resected thumb devitalised proximal phalanx. The main body and proximal epiphysis.

Figure 4. Appearance of the thumb at the end of the surgery. It is shown the two longitudinal K-wires to achieve the fusion of distal phalanx and metacarpus and the Z-plasty at the first web space.

Figure 5. Late postoperative result is showing opposability against the second finger.

Figure 6. Final pinch function allowed the patient to grab cleaning and farming devices, which was a satisfactory result according to her expectations.

Rifampicin and trimethoprim-sulfamethoxazole were prescribed empirically for four months.

This study was approved by the Institutional Review Board of our Institution. It was in accordance with the ethical standards of the responsible committee on human experimentation (H. General Universitario Gregorio Marañón, Madrid, Spain) and with the Helsinki Declaration. Informed consent was obtained from the patient and her parents to be included in the study.

Results

At six months the patient was pain-free. She presented no swelling and wounds were completely healed. Complete arthrodesis of the distal phalanx and first metacarpal was confirmed in both clinical and radiological assessment. The thumb was slightly pronated, and it permitted good opposability against second, third and fourth fingers. The sensitivity of the thumb tip kept intact. The overall function was rather good, with a QuickDASH score of 21. By that follow-up visit, we offered her to undergo a second surgery to lengthen the reconstructed thumb using an external fixator. However, she declined the procedure. The patient considered the shortening and appearance to be acceptable and she emphatically refused such an extended treatment period and the fact of wearing an external device again. At two years follow-up QuickDASH scores was18. She was satisfied with final pinch ability and had returned to her normal activities (Figures 5,6).

Discussion

Chronic osteomyelitis is a debilitating disease endemic in many African peasantry communities, due to pricks during their daily activities and the delay in seeking medical treatment. Ibingira reported that the phalanges were the bone most frequently involved and the thumb most commonly affected digit [4].

The treatment is mainly based on appropriate an-

tibiotic therapy and the surgical debridement of the diseased bone and devitalised tissues, which may lead to extensive defects [4]. To the best of our knowledge, this is the first reported case of a massive defect of the thumb proximal phalanx due to chronic osteomyelitis. A defect of the thumb may be such a disabling condition that a customized treatment plan is mandatory for these patients. This plan depends on the age, sex, remnant, affected area of the digit, health, occupation, environment and functional demands [5].

For losses in the middle third of the thumb, restoration of length is one of the main priorities to achieve gripping and pinching. It can be addressed through metacarpal lengthening, osteoplastic reconstruction, toe transfer or using phalangization of the thumb [2]. In the presented case, since the defect was secondary to a chronic infection, the use of free autologous iliac crest bone graft was rejected. Graft survival with minimal resorption appears to be achieved when an excellent vascular bed and remnant periosteum are present [6], and this could not be guaranteed after the surgical debridement. Moreover, a non-vascularised bone graft could be a perfect culture medium for persistent bacteria and become a sequestrum. The performance of any microsurgical reconstruction was also ruled out due to the lack of technical support and the need of long-term cares.

Replantation is considered to be the first choice treatment for traumatic amputations of the thumb because it achieves the best function and cosmetic appearance [1]. Bone shortening is a common procedure during replantation, 2cm is thought to be the maximum shortening permitted, although it has also been reported a replantation in a patient with an extreme shortening of 4cm, associated to a metacarpal lengthening procedure in which 2.5cm were regained [3]. In our patient, the proximal phalanx and two adjacent joints were lacking, which corresponds to a shortening of approximately 4cm. As we were aware of the impairment in thumb function that it may cause, our patient was offered to undergo a secondary metacarpal lengthening procedure, but she declined the proposal because she was satisfied with the functional and cosmetic result.

The effective length of the thumb may be increased through the first web space deepening, which improves thumb's motion [2]. In the presented case it was performed through a Z-plasty, for local tissue rearrangement, and a partial release of the adductor muscle [2]. The resultant motion was very satisfactory, even though the arthrodesis of the metacarpophalangeal joint, because of the undisturbed carpometacarpal joint permitted opposability. The patient was able to return to her normal activities with some adaptations to perform tasks.

Our results evidence that in a disadvantaged rural environment, metacarpophalangeal arthrodesis associated to first web space deepening may be a reliable treatment for a massive defect of the proximal phalanx of the thumb due to chronic osteomyelitis achieving a satisfactory hand function that allows patients to return to social and daily activities.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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