

Fusion of First Metacarpal Base to Second Metacarpal Base

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ABSTRACT

We report a case of traumatic trapezio-metacarpal joint arthritis in a young man which was successfully treated by fusion of the first metacarpal base to the second metacarpal base

INTRODUCTION

We present a case of fusion of the base of the 1st metacarpal to the base of the 2nd metacarpal. This was done as there was no trapezium available for formal trapeziometacarpal fusion. Formal trapeziometacarpal¹ fusion is indicated in young patients who have sustained post traumatic arthritis of the joint and need the hand for heavy manual work.

Fusion of the base of the 1st metacarpal to the 2nd metacarpal base is a salvage procedure if the trapezium is not available. In this case, the trapezium had been removed by prior debridement of the open fracture dislocation.

CASE REPORT

The patient is a 22-year old Chinese male admitted after a motorcycle accident. He sustained an open grade C comminuted fracture of his left scaphoid and trapezium. There was an 8cm by 3cm wound over the thenar eminence with extensive soilage of the wound. The necrotic tissue, including majority of the trapezium was excised, the wound thoroughly irrigated and left open for daily dressings. The scaphoid fracture was left unfixed in view of the extensive soilage. (Figure 1)

A week after injury, a split skin graft was done to resurface the wound as there was no infection. One month after the second operation the wound was fully healed. Hand therapy then began for mobilization of the thumb and the wound healed.

Three months after injury, his left thumb was painful and stiff. There was proximal migration of the thumb base with apparent shortening of the thumb. X-rays showed non-union of the scaphoid and remnants of the trapezium. There was also arthritis of the base of the 1st metacarpal.

Nine months after injury there was progressive proxi-



Figure 1. Open fracture of scaphoid and trapezium



Figure 2. 10 months after injury, proximal migration of 1st metacarpal shaft

mal migration of the thumb base with pain and stiffness. (Figure 2). The scar over the wound had also contracted which contributed to the stiffness. The thumb could not oppose to the other fingers due to apparent shortening. A salvage procedure was performed. Intraoperative findings revealed a hypertrophic scar over the thenar muscles with compression of the median nerve. The scar was excised and extensive neurolysis of the median nerve was done. There was extensive destruction of the 1st carpometacarpal joint with complex fracture dislocation of the carpometacarpal joint. There was non-union of the scaphoid. The remnant trapezium fragments were small and not united. These were excised. After release of the soft tissue around the thumb base, fusion of the 1st metacarpal base to the 2nd metacarpal base was done with 2 K wires and augmented with autologous bone grafting. (Figures 3a and 3b). Formal trapeziometacarpal fusion could not be done as there was no trapezium available. The thumb was positioned to allow opposition to the other fingers and to preserve the thumb length. A posterior interosseous flap was harvested and used

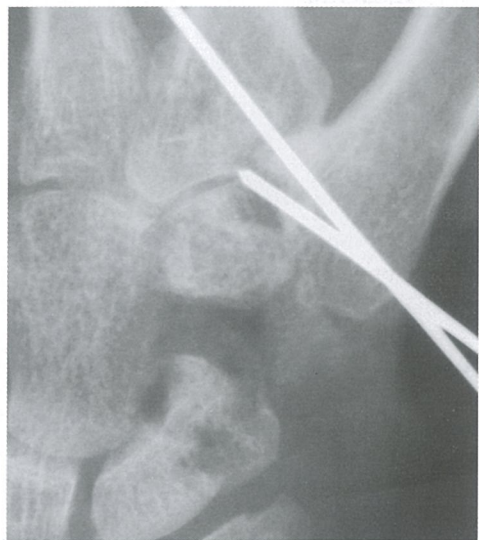
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to cover the thenar skin defect. Six weeks after surgery the flap was viable and intensive therapy was started. A year after surgery, the flap gave good cosmetic results to the hand. The thumb was able to oppose to the other fingers. The fused joint has no pain and was stable. He was able to use the hand for heavy manual work. (Figure 4).

DISCUSSION

Trapeziometacarpal arthritis causes significant disability of the thumb due to pain, loss of motion of the CMC joint, weakness of pinch and grip strength. The primary goal of treatment in a young patient is to relieve pain and restore stability and strength to the thumb.

In a review of 32 TM arthrodesis by Chamay,² there was



Figures 3a and 3b. Fusion of 1st metacarpal to 2nd metacarpal with K wires and autologous bone graft

significant pain relief after TM arthrodesis. Pre-fusion 29% had grade 3 pain (pain with activities of daily living) and 71% had grade 4 pain (constant pain). Post fusion, 50% had no pain and 40% had some pain with specific activities. Grip strength after arthrodesis was 26.5kg compared to 27.5kg on the contralateral normal side. Pinch strength after arthrodesis was 4.9kg compared to the 6kg on the contralateral side. Range of motion of the fused TM joint was 18 degrees of flexion/extension and 11 degrees of abduction/adduction compared to 49 degrees and 39 degrees of the contralateral joint. There was compensatory hypermobility of the metacarpal-phalangeal joint of the fused thumb.

However, if the trapezium is not available for a formal fusion of the first carpometacarpal joint, the salvage procedures available would be excision of the trapezium³ and tendon suspension arthroplasty^{4,5}. This procedure would not be suitable for a young man who needs the hand for heavy manual work. Replacement of the joint with prosthesis was also contraindicated in a young patient with concomitant scaphoid fracture. There was also a high risk of infection as it was a compound fracture.

In this patient, fusion of the base of the thumb to the base of the 2nd metacarpal was indicated in a young man who needs to have a painless and stable thumb for heavy manual work. As the trapezium was severely comminuted, excision of the trapezium was done. The 1st metacarpal was then fused by transfixing it to the 2nd metacarpal with 2 K wires and supplemented with autologous bone graft. A year after surgery, he was able to return to manual work.



Figure 4. 1 year post surgery, fusion between 1st and 2nd metacarpal base

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