



# Preserved Thumb Function After First MCP Joint Arthrodesis with Pins for Degenerative Arthritis Secondary to Chronic Dorsal Thumb Dislocation in Resource-Limited Settings – A Case Report

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**Background:** Chronic dislocation of the dorsal surface of the thumb metacarpophalangeal (MCP) joint is uncommon and often is accompanied by soft tissue interposition with degenerative changes, especially in delayed presentations, which are common in low resource settings.

**Case Presentation:** We present the case of a 21-year-old right-handed male that developed a dorsal MCP dislocation of the thumb 11 years ago with initial traditional bone setter management. He presented with pain, deformity and poor grip function. The chronic dislocation was confirmed on radiographs with secondary degenerative arthritis.

**Intervention:** Open reduction through combined dorsal and volar approach was done. Due to severe articular degeneration, MCP arthrodesis was performed without fluoroscopic guidance by using two crossed Kirschner wires.

**Outcome:** At the 6-month follow-up, the patient achieved pain relief, stable fusion and satisfactory functional recovery, including the preservation of the grip and pinch, with acceptable cosmetic outcome.

**Conclusion:** In resource limited settings, MCP arthrodesis with K-wires without advanced intraoperative imaging may be a cost-effective and functionally acceptable way of treating neglected thumb dislocations with degenerative arthritis.

**Keywords:** thumb MCP joint, chronic dislocation, arthrodesis, Kirschner wire resource, limited settings, global surgery

## Background

Metacarpophalangeal (MCP) joint dislocations of the thumb are rare in comparison with other digits.<sup>1,2</sup> Dorsal dislocations are usually the products of hyperextension injuries and are categorized as simple or complex based on their reducibility.<sup>1-3</sup> Complex dislocations often consist of interposition of the volar plate, sesamoid bones, and the soft tissues, requiring open reduction.<sup>4-6</sup>

In low- and middle-income countries (LMICs) delayed presentation is often seen because of initial management by traditional bone setters and is often associated with chronic dislocation, soft tissue contracture and secondary degenerative arthritis. These neglected injuries pose significant reconstructive challenges, as restoration of joint congruity is frequently impossible owing to chronic soft-tissue contracture and secondary degenerative changes, thereby necessitating salvage procedures such as arthrodesis.<sup>1</sup>

The MCP joint of the thumb is very important for pinch and grip stability.<sup>7</sup> While arthrodesis removes any movement in the joint, it can give relief from pain and a certain degree of stability in the joint if performed in correct alignment.<sup>7,8</sup> However, there is scant literature describing outcomes of such procedures in resource-constrained settings, especially when performed without fluoroscopic guidance and modern fixation implants. This case illustrates an economical surgical approach with good functional results within a resource limited setting.

## Case Presentation

A 21-year-old right-handed male presented with longstanding pain and deformity of the right thumb. The condition was preceded by a fall 11 years earlier, from which he was treated by a traditional bone setter.

He complained of gradual impairment of function such as a weak grip and pinch strength and difficulty in performing manual tasks. Cosmetic concerns were apparent shortening and deformity of the thumb.

On examination, the thumb showed (Figure 1):

- Fixed supination deformity, this is a hyperextension deformity of the MCP joint.
- Compensatory flexion, interphalangeal joint.
- Voluntary: Palpable prominence of metacarpal head on the volar aspect.
- Markedly reduced MCP joint mobility.
- No neurovascular deficit.

## Investigations

Radiographs (plain) of the thumb (Figure 2) showed:



**Figure 1** Posterior displacement of the proximal phalanx and palmar visibility of metacarpal head with callosity, hyperextended thumb at MCP joint.



**Figure 2** X-ray posterior dislocation of the thumb.

- Dorsal dislocation of the MCP joint complete.
- Degenerative changes involving the metacarpal head and the base of the proximal phalanx.
- Joint incongruity consistent with chronic injury.

## Treatment

Surgery was done under regional (wrist block) anaesthesia.

- A combined dorsal and volar approach was used to treat the complex pathology.
- The extensor mechanism and MCP joint capsule were exposed via the dorsal approach.
- Reduction hindered by soft tissue interposition including volar plate displacement.
- Volar incision enabled direct visualization of the head, volar plate and sesamoid structures of metacarpal.

Given the huge deterioration of articular surfaces, it was not possible to preserve the joint.

The procedure of arthrodesis was therefore carried out:

- Articular cartilage was excised.
- Joint was in about 15 degrees flexion. In the absence of fluoroscopic guidance, alignment was assessed through direct visualization of the arthrodesis surfaces and comparison with the native thumb axis. The fusion position was selected to achieve approximately 15 degrees of MCP flexion while maintaining a functional posture for pinch and grip activities. Intraoperative clinical assessment confirmed satisfactory thumb alignment relative to the first metacarpal and adjacent digits prior to definitive Kirschner wires fixation.
- Stabilization was provided by using two crossed Kirschner wires.

A thumb splint was used after surgery.

## Outcome and Follow-Up

- 2 Weeks: Commencement of active interphalangeal joint mobilisation.
- 4 weeks: Removal of K-wires.
- 3 months: Radiographic confirmation of successful fusion.
- 6 months: The patient demonstrated (Figure 3):
  - Complete pain relief.
  - Stable thumb with no problem of functional use.
  - Grip and pinch strength is preserved.
  - High functional satisfaction was achieved, with a QuickDASH score of 13 at the 6-month follow-up, indicating minimal upper-limb disability and good functional recovery.
  - Acceptable cosmetic appearance.
  - The patient returned to normal daily and manual activities without limitation.



**Figure 3** Post-operative image after 6 months.

## Discussion

Chronic MCP dislocation of the thumb is a rare but functionally debilitating condition, especially when related to late presentation.<sup>1</sup> In such cases, anatomical reduction is often prevented by soft tissue contracture, fibrosis, and degenerative changes of the joints.<sup>9</sup> The volar plate is the most common obstruction to reduction in acute cases; however, in chronic presentations, additional structures including sesamoid bones and scar tissue further impede reduction.<sup>1–6,10</sup> This requires open surgical approaches, where dorsal, volar or a combined approach is described in the literature.<sup>11–16</sup> The dual approach that was performed in this case made it possible to perform extensive exposure and safe handling of both the dorsal and volar structures.<sup>5,14,16</sup> Importantly, it allowed proper preparation for arthrodesis after recognition of non-viable joint surfaces.

Similar findings have been reported in previous case reports of chronic or complex MCP joint dislocations, where soft-tissue interposition and long-standing joint incongruity necessitated open surgical management. Seo et al and Zhu et al described successful treatment of complex MCP dislocations using open approaches that provided adequate visualization of obstructing structures and facilitated restoration of joint alignment.<sup>5,14</sup> However, unlike many reported cases that involved acute presentations with preserved articular surfaces, the present patient had an 11-year neglected dislocation with advanced degenerative changes, making joint preservation impractical and necessitating arthrodesis. The favorable functional outcome observed in this case is consistent with reports demonstrating that thumb MCP arthrodesis can provide reliable pain relief and functional stability when reconstruction is not feasible.<sup>7,8</sup>

Although arthrodesis is a sacrifice of MCP joint motion, it is a reliable salvage procedure for painful, unstable, or degenerative joints.<sup>7,8,11</sup> In the present case, despite the patient's relatively young age, joint-preserving reconstruction was not considered a viable option because of the prolonged duration of dislocation, advanced degenerative arthritis, chronic joint incongruity, and extensive articular surface destruction observed intraoperatively. Under these circumstances, arthrodesis represented the most predictable means of restoring thumb stability, relieving pain, and preserving functional pinch and grip mechanics. Optimal positioning is very important, with its effects on function being obvious, especially in pinch and grip tasks.<sup>7,8</sup> In this patient fusion in slight flexion allowed functional biomechanics to be preserved.

A notable aspect in this case is the use of crossed Kirschner wires without fluoroscopic guidance, reflective of adaptation in terms of resource limitations.<sup>1,9</sup> Despite these limitations, great clinical and functional results were obtained. This provides evidence for the feasibility of low-cost surgical measures in LMIC settings provided that the principles of good anatomy are followed. As well, this case highlights the public health burden of delayed musculoskeletal healthcare and the persistence of traditional bone setters in many parts of the world. The access to appropriate orthopedic care at a very early stage could prevent the development of such a high advanced pathology.<sup>1,9</sup>

## Conclusion

Thumb MCP arthrodesis using Kirschner wires could offer success with a safe, cost-effective, and functionally adequate treatment for chronic dislocation with degenerative arthritis in the resource-limited setting.<sup>7,8</sup> When performed with appropriate alignment and stable fixation, even in the absence of advanced imaging or specialized implants.<sup>7–9,11</sup>

## Ethical Approval

Ethical approval was waived for this study by the Department of Orthopedic Surgery, College of Health Sciences, Debre Berhan University, as this report describes a single clinical case with no identifiable patient information and does not involve experimental intervention or human subject research as defined by institutional guidelines.

Written informed consent was obtained from the patient for publication of the clinical details, radiographic findings, and accompanying images presented in this case report.

## Disclosure

The authors declare that there is no conflict of interest regarding the publication of this paper.

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