

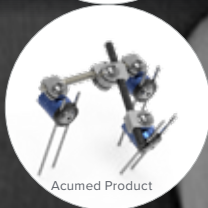
## Acumed Small Bone External Fixation System and OsteoMed Hand Fusion System

### Restoring Metacarpal Length and MCP Joint Arthrodesis

#### Case Study

##### Goselinus Joost Blok, MD

A 43-year-old man who sustained a low-velocity gunshot wound to his left thumb was treated with the OsteoMed Hand Fusion System after temporary stabilization with the Acumed Small Bone External Fixation System.



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## Restoring Metacarpal Length and MCP Joint Arthrodesis

### Patient History

A 43-year-old delivery driver was hijacked at the border between Zimbabwe and South Africa. He sustained a low-velocity gunshot wound to the left thumb, with a metacarpal fracture and bone loss to the diaphysis of the metacarpal bone (Figure 1). The dorsal compartment was affected with loss of extensor pollicis longus (EPL) integrity.

Following initial surgical debridement, an Acumed Small Bone Fixator was placed to stabilize the left thumb and keep the metacarpal fracture out at length (Figures 2 and 3).

After three months, removal of the external fixator showed a well-stabilized left thumb in a reasonable position with mild hyperextension of the metacarpophalangeal (MCP) joint. There was no need to replace the external fixator with an internal fixation device such as a plate and/or a bone graft.

Occupational hand therapy was initiated and the patient even achieved some extension over the MCP joint and interphalangeal (IP) joint.

The patient became unavailable for follow-up but returned a year later with a painful left thumb, which showed subluxation of the MCP joint with hyperextension of the proximal phalanx and decreased mobility (Figure 4).

Although renewed efforts to mobilize the thumb were encouraging, hyperextension over the MCP joint was not correctable, and remained painful enough to prevent the patient from performing his duties as a delivery driver. In consultation with the occupational therapist and the patient, it was decided to surgically reevaluate the previously damaged area, release skin and tendon contractures and, eventually, to fuse the MCP joint.



Figure 3

## Intraoperative Treatment

Intraoperatively, both flexion and extension were found to be extremely limited due to scarring and adhesions. It was concluded that it would not be possible to release all contractures and provide a well-mobilized plane for functional excursion and appropriate positioning of the MCP joint.

Arthrodesis was performed using the OsteoMed Hand Fusion System, using a plate and screw construct. The plate was placed with a 34 mm cannulated screw at a 20° angle (Figures 5 and 6).

## Postoperative Treatment

The two-week follow-up showed good position, with acceptable residual mobility of the carpometacarpal (CMC) and IP joint. The patient disappeared from OT guidance and follow-up but returned one year and three months later with a stable left thumb in a good position, and with acceptable mobility over the CMC and IP joint (0 to 30 degrees), with no pain (Figure 7).

## Discussion

Different ways to arthrodesis a finger joint have widely been described in literature.<sup>1,3,4,5,6</sup> The technical execution varies, but the aim in general is the same. A proper arthrodesis of a finger joint creates stability, is pain-free, corrects a deformity, and enhances residual function of the affected finger and hand.<sup>2</sup>

Surgical options relating to excision of the cartilage, or the remnant thereof, include osteotomy of the proximal and distal bony parts in an appropriate angle, placement of bone grafts, etc. There is a large range of surgical options for stabilizing the affected joint, including K-wires, tension band wiring, plating, cannulated screws, the use of an external fixator, or sometimes a combination of these approaches.<sup>4</sup>

Requirements for the strength of an arthrodesis have not been exhaustively evaluated, perhaps because the majority of arthrodeses are performed on elderly patients with a degenerative type of osteoarthritis.<sup>6</sup> It seems logical that younger patients with trauma-induced osteoarthritis can benefit from a strong arthrodesis that enables them to work with their hands without pain.

The use of a cannulated screw in conjunction with an angulated plate for the arthrodesis of a small finger joint has not been reported in the hand surgery literature to date. The HPS Fusion System combines the compression of a headless screw (1.6–2.0 mm diameter) with an angled locking plate that can accommodate variations from 20 to 55 degrees.

At the Union Hospital in the southern suburbs of Johannesburg, a cannulated screw with a variable angle plate has been used since 2016 in 16 patients to stabilize mainly traumatized small finger joints, where alternatives are less favorable in the young adult.

## References

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Figure 4



Figure 5



Figure 6



Figure 7



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