A Simple and Low-Cost External Fixator for Infected Hand Injuries

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Received: 14 February 2012 / Accepted: 27 April 2012 / Published online: 15 May 2012
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Keywords External fixator · Septic non-union · Cheap · Osteomyelitis

Introduction

Septic arthritis of finger joints is rare and best treatment is still a matter of debate. [1, 2] Current treatment is based on the simultaneous application of an external fixator with antibiotic-loaded bone cement which has a synergistic effect both mechanically and biologically [3].

External fixation is an effective treatment option for severely contaminated open fractures or luxations, septic non-unions and advanced septic arthritis of the hand. [4]. There are several expensive external fixators available on the market but various simple techniques have been described as a quick, cheap and effective alternative to expensive external fixators [5, 6]. This is particularly important in less developed countries where

complex and expensive sets are not so readily available [6]. We describe a technique which is still commonly used in Europe but less frequently in the UK. It involves the use of simple Kirschner wires and cement to create a stable construct across the infected joint.

Case Example

A 55 year old healthy right-hand dominant gentleman sustained an open dislocation at the interphalangeal joint (IPJ) of the right thumb following a trip on a staircase (Fig. 1). This was reduced in Accident & Emergency, and the wound thoroughly irrigated and closed primarily.

A few days later the wound was thought to be infected and antibiotics commenced. Despite completing the course the infection progressed and the wound broke down discharging pus. The patient presented again to Accident & Emergency and examination revealed a patient without systemic problems but with a local fusiform swelling of the right thumb with erythema, loss of function and pus discharging wounds.

Radiographs confirmed the presence of early osteomyelitis at the IPJ, and the patient underwent an exploration and washout of both dorsal and palmar wounds and partial closure (Fig. 2). Stabilisation of the joint was achieved using an external fixation device as described below. Microbiology confirmed the presence of streptococcus and oral clindamycin was continued postoperatively for 6 weeks.

Operative Technique

Under regional anaesthesia and arm tourniquet, the IP joint of the thumb was explored and debrided of necrotic tissue. A formal excision of the joint surfaces was performed to

No sources of support, including pharmaceutical and industry support, are reported.

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Fig. 1 AP and Lateral radiographs demonstrating dislocation at the IPJ

healthy cancellous bone edges. The space was packed with gentamycin beads following thorough irrigation. Following this an external fixation stabilisation device using a construct made up of simple Kirschner wires and cement blocks were used (Fig. 3). Two bicortical Kirschner wires were placed perpendicular to the bone on either side of the joint. These four wires were held together as a stable construct by another four wires placed horizontally between the vertical wires and held by cement blocks as demonstrated in the photos.

Rehabilitation

The patient was immobilised with a thumb spica thermoplastic splint and discharged on the same day with oral antibiotics. After 6 weeks the gentamycin beads and frame

Fig. 2 Radiographs showing signs of early osteomyelitis at the IPJ. Note the loss of joint space indicative of osteomyelitis

Fig. 3 Oblique view of the joint stabilized by a frame consisting of four horizontal Kirschner wires held to the vertical wires by cement

were removed under regional anaesthesia. At final follow-up of 6 months the wound was fully healed without any sign of infection. The patient was painfree and asymptomatic and radiographs showed complete fusion of the IPJ.

Discussion

This paper presents a simple but effective external fixator which can be used in septic arthritis in a finger joint.

External fixation has an adjunctive role in the treatment of hand infections, especially in infected fractures. Also it can be very effective as a salvage procedure. Results of simple external fixation in finger fractures is promising [7, 8] as in septic arthritis [9, 10]. The results of external fixation in septic arthritis must be seen in the light of prevention of amputation.

Advantages of external fixation are numerous. Application is less invasive than other operative stabilization methods and the soft tissues are not further injured. Furthermore patient satisfaction after treatment of finger fractures using external fixation is high [11].

Complications specific for external fixation are pin loosening and pintract infections. To our knowledge no data are available on these complications in specific cases of septic arthritis. However, since antibiotic therapy is one of the cornerstones of treatment of septic arthritis pintract infections may be prevented. Prevention of pin loosening can be achieved using threaded k-wires to penetrate the bone, resulting in improved stability. As a result of improved stability non-union occurs less frequently in all finger fractures, so in our opinion this may be expected in joint excisions for arthrodesis as well. [12]

Specific for the presented case is the low cost of the applied device. The cost of two k-wires in combination with cement blocks may be less than \$50. Sophisticated miniature external fixators, adapted to the complex anatomy of the hand exceed in several cases \$1000. This makes the

application of this simple external fixator feasible in developing countries.

From our presented case we conclude that a simple and low-cost external fixator is useful in the treatment of septic arthritis in addition to antibiotics and surgical debridement. Because of the low cost and easy application this device can be effective in less developed countries or times of austerity.

References

1. Dubost JJ, Soubrier M, Sauvzie B (2000) Pyogenic arthritis in adults. *J Bone Spine* 67:11–21
2. Gupta MN, Sturrock RD, Field M (2003) Prospective comparative study of patients with culture proven and high suspicion of adult onset septic arthritis. *Ann Rheum Dis* 62:327–331
3. Cziffer E, Farkas J, Turchanyi B (1991) Management of potentially infected complex hand injuries. *J Hand Surg Am* 16:832–834
4. Allieu Y, Chammas M, Hixson ML (1993) External fixation for treatment of hand infections. *Hand Clin* 9:675–682
5. Schneider P (1993) A simple external fixator of Kirschner wires and electric clips for use on fingers. *Handchir Mikrochir Plast Chir* 25:262–269
6. McCulley SJ, Hasting C (1999) External fixator for the hand: a quick, cheap and effective method. *J R Coll Surg Edinb* 44:99–102
7. Sochart DH, Paul AS (1995) A simple external fixator for use in metacarpal and phalangeal fractures: a technique paper. *J Orthop Trauma* 9:333–335
8. Watson JA (1993) A simple external fixator for metacarpal and phalangeal fractures. *Injury* 24:635–636
9. Bishop AT (1993) Small joint arthrodesis. *Hand Clin* 9:683–689
10. Angly B, Steiger R, Zimmerli W (2007) *Handchir Mikrochir Plast Chir* 39:118–123
11. Dailiana Z, Agorastakis D, Varitimidis S et al (2009) Use of a mini-external fixator for the treatment of hand fractures. *J Hand Surg* 34A:630–636
12. Schuind F, Cooney WP, Burny F et al (1993) Small external fixation devices for the hand and the wrist. *Clin Orthop* 293:77–82