

A Case Report: Simple and Effective External Fixator for Finger Fractures

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Abstract

A case report on a very simple and very effective technique of achieving finger fracture fixation. This cost effective and yet simple tool and technique of immobilization is cheap and can be readily used in the South Pacific. This procedure provides us with an alternative to amputation of the digit. It is also a very reliable and cost effective procedure which could be easily taught to junior surgical registrars. (PHD 2011; Vol. 16(2): p89-92).

Key words: phalanx fracture, external fixation, cost effective, amputation

Case Report

This case report is of a 24 year old male who presented to Colonial War Memorial Hospital (CWMH), Suva, Fiji with a circular saw injury to his left non-dominant hand. He had extensive but superficial lacerations to all 4 fingers. There was an open fracture of the middle phalanx of the index finger with intact neurovascular status.

Initial X-ray of the left hand (figure 1) showed comminuted intra-articular fractures to the middle and proximal phalanx of the index finger. On admission, he was commenced on Cloxacillin and had surgical debridement twice prior to definitive treatment. Whilst awaiting surgery, he developed wound infection and the pus swab grew *Klebsiella pneumonia* and *Enterobacter agglomerans*, both of which were sensitive to Cloxacillin

Figure 1: X-ray of left hand on admission



Figure 2: Immediate post-op picture showing the materials used: 4 Kirschner-wire (K-wire)



The external fixation technique as shown in figure 2, involved insertion of 2 K-wires on either side of the fracture in the proximal and middle phalanxes. These K-wires were initially drilled through the plastic cover of IV cannulas before drilling through bone. The radial side of the index finger was chosen for the of K-wire insertion as it was away from the wound and the protruding end of the wires would be free from the other fingers. These K-wires were placed slightly oblique to each other to prevent the plastic cannula cover from slipping. This was then made more rigid post-operatively with glue from a hardware store, which was inserted into the plastic cannula cover.

The wounds as shown in figure 2 were left to heal by secondary intention with daily dressings. He was discharged 4 days later on Flucloxacillin, and daily wound care with hand physiotherapy which consisted of flexion/extension of the metacarpophalangeal (MCP) joint. After 5 weeks, the wounds had healed as shown in figure 3 and at 7 weeks the fractures had consolidated, hence the removal of the external fixators. Unfortunately, he developed flexion contracture to his left little finger which will require surgical release of the contractures with full thickness graft sometime later.

Figure 3: showing the left hand 5 weeks after surgery pins, plastic cover of IV cannula, plastic stoppers, glue from hardware store]



Figure 4: showing the postoperative x-ray picture at 7 weeks stoppers, glue from hardware store]



Discussion

Hand lacerations and crush injuries of fingers as a result of work related accidents are on the rise in developing countries like Fiji. Management of open fractures to the phalanges in our institution are challenging due to the complexity of the injuries and lack of appropriate consumables. Colonial War Memorial Hospital (CWMH) is in the capital city of Fiji called Suva, and is also the main training institution for some of the regional countries in the South Pacific.

The number and type of open fractures involving hands and fingers in our male population are increasing and are partly due to the increasing number of industrial companies employing unskilled labourers. Industrial workers are now presenting to us with more complex, multiple and open fractures, such as this case. This would mean a much dirtier wound contaminated with bony or metal fragments, grease or other foreign bodies. These skilled and unskilled workers rely on their occupations despite the hazards that surround it to provide financial support for their families. It is very important that they get treated correctly so that they may resume work with minimal or no functional

hand loss. Trying to find solutions on how to manage these open fractures in Fiji can be quite difficult.

McCulley and Hasting from South Africa with the Royal College of Surgeons of Edinburgh, described an easy and cheap way of treating open fractures of the hand with the use of everyday items.¹ This technique of external fixation was also described by Thomas et al, where simple tools were used.² This technique was discussed with other colleagues and was performed with a visiting Hand Surgeon from the United States, who supervised the operation. The technique was reasonably straight forward with the use of readily available items such as K-wires, plastic cannulas and glue that one would find in any developing countries. This technique was carried out on our patient and at 7 weeks after surgery the fracture had healed. Most importantly, he was able to begin mobilization of his metacarpophalangeal (MCP) joints a day after surgery. In the past, an injury similar to this would be treated with daily dressings with the hand immobilised in a splint or amputation of the hand if needed.

Apart from fracture immobilisation with this technique, wound care and movement at the MCP was maintained. As anticipated, he later developed ankylosis of his Proximal Interphalangeal Joint (PIP) as a result of the intra-articular comminuted fracture. He was however able to flex his index finger past the functional position of 30 degrees. Cosmetically acceptable, other options such as fusing the PIP joint with functional flexion 40 degrees and DIP joint at 20 degrees would be considered to improve the hand function.

Open fractures of the index and little finger, can be easily treated using this technique of external fixation. The radial side of the index finger and the ulna side of the little finger are easy because the wires will not interfere with the other fingers. The middle and ring fingers with open fractures would be a challenge. A report on cadavers by Halliwell in 1998

described the pin placement and tethering of the extensor hood.³ He described the positions of K-wire placement along the finger will result in the least disruption to function.³ He went on to explain that on the proximal phalanx, a dorsal pin placement just lateral to the central slip and in the middle phalanx a true dorsal midline pin placement allows adequate flexion and extension of the finger.³ Halliwell also described that the oedema and viable tissue in living persons would give more resistance to the sliding or movement of the K-wires,³ this has not been supported in any other study. Other challenges would be to rigidly fix fractures but maintain joint movement at the same time. This was later described by Rosenburg et al. in 2004, with the use of joints of LEGO combined with plastic IV cannula coverings to represent the action of a joint, thus maintaining rigid fixation but allowing joint movement simultaneously.⁴ This technique has not been widely accepted in other centres. These techniques of external fixation provide alternatives to amputation of a finger in a society where loss of limb is not easily accepted.

Conclusion

This easy technique of external fixation using readily available and cheap items in treating open fractures of the fingers could easily be adopted in the South Pacific and in other developing countries. It will decrease hospital stay and the patients will retain his/her finger for cosmesis while maintaining some degree of hand function. A prospective study should be conducted to assess the long-term outcome and patient satisfaction of this procedure.

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