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Original article

Simplified internal fixation of fifth metacarpal neck fractures

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ARTICLE INFO

Article history:

Received 13 June 2016

Accepted 1st December 2017

Keywords:

Fifth metacarpal neck fracture

Hand injuries

Boxer's fracture

ABSTRACT

Background: Fifth metacarpal neck fractures (boxer's fractures) are common injuries that contribute 20% of all hand fractures. Divergent percutaneous pinning (bouquet fixation) as described by Foucher has gained popularity but is challenging and at times arduous, as it requires the insertion of several slender K-wires into a narrow medullary canal. Here, we report on a simplified technique in which a single thick K-wire is inserted.

Technique: An 18/10 K-wire is bent at one end then mounted on a drill chuck. The incision is performed and the entry hole created using the K-wire, which is then advanced along the medullary canal. After reduction of the metacarpal head using the Jahss manoeuvre, the K-wire is inserted across the fracture site into the subchondral bone. Any persistent rotational malalignment is corrected by rotating the metacarpal around the K-wire. Immobilisation is by buddy taping covered by a resin guard.

Methods: We collected follow-up data for 30 patients treated using our technique, at a mean age of 32 years.

Results: 90 days after surgery, the fracture was healed in all patients. No patients had rotational malalignment. Mean operative time was 14 minutes. No complications were recorded.

Discussion: The use of a single thick K-wire proved simple, effective, reproducible, and rapid. No rotational malalignment occurred. This technique is faster and easier to perform than divergent pinning with multiple K-wires.

Conclusion: This technique can be used to treat fifth metacarpal neck fractures.

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1. Introduction

Fifth metacarpal neck fractures (FMNFs) or boxer's fractures are common injuries that contribute nearly 20% of all hand fractures [1]. The main cause is a direct impact on the closed fist [2]. When displaced, FMNFs can result in loss of strength, loss of extension range, rotational malalignment, and cosmetic disfigurement due to loss of the prominence of the fifth metacarpal head at the dorsal aspect of the hand [3,4]. No consensus exists about the indications of surgery, and non-operative treatment has been reported to provide excellent outcomes [5,6]. However, many internal fixation techniques have been described. Among them, the reference standard [7] is divergent intramedullary pinning (bouquet pinning) as described by Foucher in 1976 [8,9]. This technique consists in using an awl to create a hole in the ulnar cortex of the fifth metacarpal (M5) then inserting three blunt-tipped slender (8 or 10/10) K-wires

into the medullary canal. It has been proven effective [10] but is challenging and tedious to perform, because the slender K-wires have limited rigidity and are therefore difficult to advance along the medullary canal, as they tend to bend or to follow inappropriate trajectories. The resulting need for repeating the manoeuvres increases the operative time and the risk of injury to the extensor apparatus or dorsal cutaneous branch of the ulnar nerve [11].

These difficulties have prompted the development of alternative surgical techniques such as double L-shaped pinning [12,13], transverse pinning alone [14] or with external connection of the pins [15], retrograde pinning [16], or intramedullary nailing [17]. However, these techniques are as complex as divergent pinning, and some of them require specific equipment. There is general agreement that surgery is in order when the angulation exceeds 30–40° or rotational displacement exists [18,19]. In contrast, the optimal technique remains debated [14,18,20]. We therefore suggest a simple intramedullary pinning technique that uses a single thick K-wire.

The objective of this study was to assess the outcomes of this original technique in a prospective cohort of 30 patients.

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Fig. 1. The end of the 18/10 K-wire is bent.



Fig. 4. Postoperative immobilisation.



Fig. 2. Fluoroscopy is used to identify the entry point at the base of the fifth metacarpal.

2. Material and methods

2.1. Patients

Consecutive patients presenting with an isolated FMNF with more than 30 [20] angulation on the true lateral radiograph or with physical signs of rotational displacement were included in this prospective study between May 2014 and May 2016. Exclusion criteria were compound fracture, fractures in addition to the FMNF, and a history of fracture of the same hand. Of the 30 included patients, 13 (42%) were operated on by a surgery resident and 17 by a senior surgeon.

2.2. Operative technique

The patient was supine on a table with an arm rest. A pneumatic tourniquet was placed at the root of the upper limb. An image intensifier (Orthoscan FD OR) was used. One end of an 18/10 K-wire was bent at a 10–20° angle (Fig. 1). The K-wire was then inserted into a drill chuck. An incision was performed along the ulnar edge of the hand, over the base of M5. The blood vessels and nerves were retracted using Halstead's forceps, with special attention to the sensory branch of the ulnar nerve. The tip of the K-wire was placed at the base of M5 under fluoroscopy guidance (Fig. 2). Gentle oscillating movements were used to insert the K-wire into the medullary canal of M5. The classical step of using an awl to create an entry hole was not performed. The K-wire was then advanced along the medullary canal under fluoroscopic guidance to the fracture site. Before crossing the fracture site, the head was reduced using the Jahss manoeuvre [21]: the head was first released from the shaft by gentle traction along the axis of the finger, the metacarpo-phalangeal (MCP) and proximal inter-phalangeal (PIP) joints were then flexed at 90°, and pressure was applied along the axis of the proximal phalanx concomitantly with counter pressure on the metacarpal to correct the anterior tilt of the metacarpal head. Once the head was reduced and any rotational displacement was corrected by flexing and extending the fifth finger, the K-wire was advanced across the fracture site to the subchondral bone. Any persistent rotational displacement was corrected by using the drill chuck to rotate the K-wire. The base of the K-wire was bent at 160° then cut using cutting pliers (Fig. 3). The skin incision was closed. Postoperative immobilisation was achieved by buddy taping M4 and M5 then covering the site with a resin guard that allowed full motion of the wrist and MCP joint (Fig. 4). After 2 weeks, the guard was removed and buddy taping alone was continued for



Fig. 3. Postoperative radiograph.

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