

# Compartment Syndrome Following Metacarpal Neck Fractures

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## Abstract

## INTRODUCTION

Metacarpal fractures are a common injury with an incidence of 2.5% in men aged 10-29 and account for 36% of all hand fractures.<sup>1,2</sup> Dependant on clinical examination and radiological findings management can be either non-operative or operative. Significant problems are not commonly encountered in the management of these injuries. We highlight a case of compartment syndrome following metacarpal neck fractures caused by a low energy impact.

## CASE REPORT

A 16-year-old male with a recent history of alcohol abuse sustained an injury to his right hand after punching a wall. He attended the accident and emergency department within 24 hours of the injury.

Examination showed mild swelling to the dorsum of the hand and distal tenderness over the 4<sup>th</sup> and 5<sup>th</sup> metacarpals. The active range of movement was reduced but not absent and there was no evidence of malrotation.

Radiological examination demonstrated fractures to the 4<sup>th</sup> and 5<sup>th</sup> metacarpal necks with angulations of 40 and 48 degrees respectively. The hand was immobilised in a plaster slab and a sling provided. He was advised to keep the hand elevated. He was referred to the regional hand surgery department for further assessment and management.

The patient re-attended the accident and emergency 26 hours later with severe pain in the hand. Clinical examination of the right hand revealed a markedly swollen hand with reduced sensation in the ulnar nerve distribution and decreased capillary refill in the middle, ring and little fingers. He was unable to perform any active movements with the fingers and experienced intense pain on passive movement of fingers and wrist. The patient stated that he

had not complied with instructions to elevate the hand and had removed his splint.

Radiological examination showed no change in position of the fractures. A diagnosis of compartment syndrome was made and the patient was admitted for emergency fasciotomies of the hand in the operating theatre.

Intra operative pressure measurements prior to fasciotomies are shown in Table 1.

## Figure 1

Table 1: Pressure readings (in mmHg)

Hypothenar	4th	3rd	2nd	1st
42	52	60	18	15

Decompression of the hypothenar compartment as well as the 4<sup>th</sup> 3<sup>rd</sup> and 2<sup>nd</sup> palmar and dorsal interosseous muscles was performed using dorsal incisions. The fractures were reduced by closed manipulation and stabilised with longitudinal K wires.

He returned to theatre 4 days following decompression in order to skin graft the resultant defects.

## DISCUSSION

Acute compartment syndrome is less common in the upper limb than the lower limb. Increased pressure within the compartments may result from:

- External compression (e.g., an unconscious patient lying on his or her arm for a prolonged time) 4
- Circumferential pressure (e.g., a cast or burn eschar), 3
- Significant crush injuries resulting in increased volume within the compartment secondary to

oedema or haematoma. 4

- Inflammatory reactions e.g. toxic effect from snake bites, allergic reaction to intravenous contrast 4,6

Pain is the most reliable indicator of compartment syndrome. Pain disproportionate to the injury or increasing levels of pain following treatment are initial indicators that should alert the practitioner to the possibility of compartment syndrome.

The “6 Ps” (i.e., pain, pressure, paresthesia, paresis, pallor, and pulselessness) should be assessed.

Pressure refers to increased tension on palpation of the extremity. Paresthesia is an important early sensitive sign but lacks specificity. Paresis and pallor appear very late, and pulselessness, usually the last sign to appear, may be present early in patients with injury to major arteries.<sup>6</sup>

In the hand a swollen hand which is tense on palpation, in an intrinsic minus position (i.e., extension of the metacarpophalangeal [MCP] joints and flexion of the IP joints) strongly indicates compartment syndrome.

Compartment pressure measurements do aid diagnosis in equivocal cases, but fasciotomies should be performed without delay in established cases.

Metacarpal neck fractures are a common injury seen regularly in Accident and Emergency departments and the mechanism is low energy impact usually involving the

injured party either punching a third party or punching a wall. Compartment syndrome of the hand is usually associated with high energy injury or crushing of the hand. The development of the compartment syndrome in this case may have been related to the poor patient compliance with the splintage, rest and elevation. Practitioners should be aware of the risk of developing compartment syndrome as a result of a low energy impact especially when poor compliance is suspected.

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