Metacarpal Fractures
Leave, Wires or Plate

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12th Southampton Hand Course for Therapists and Surgeons
May 2017

www.handsurgery.co.uk

Summary
- Principles of treatment
- Options available
- Metacarpal Neck Fractures
- Metacarpal Shaft fractures
- Informed Consent

- Covering
  - Neck
  - Shaft
- Not Covering
  - Base
  - Head
Principles of Treatment

- Reduce Pain
- Early mobilisation
  - Tendon glide
  - Maintain intrinsic function
- Promote Union
- Excellent long term function
- Avoid complications

Restore anatomy

- Metacarpal function
  - Stable platform connecting mobile wrist and fingers
  - MCP and CMC
  - Muscle attachment
    - Interossi
    - Adductor pollicis

Consequences of altered anatomy

- Reduced shaft length
  - Weakness
  - Extensor lag
  - Cosmesis
- Head Angulation
  - Weakness
  - Cosmesis
  - Dropped knuckle
  - Stone in Palm
  - Index MC head
  - Reduced grip
- Shaft angulation
  - Weakness
  - Hyperextension of MCP
  - Cosmesis
  - Angular deformity
  - Rotational deformity

Short metacarpal

*Extensor lag*
Short metacarpal
loss of flexion force

Angular shaft deformity
MCP hyperextension

Rotational Deformity

Dropped Knuckle
Does malunion really matter?

- 252 fractures
  - 218 non-op
  - 44 surgery
- MC Neck
  - No difference
  - operated (n=118)
  - conservative MC neck (n=105)
- MC shaft
  - Operated (n=26)
  - had worse DASH and worse cosmesis
  - non-operative (n=113)

Orthobullets

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Options
- Non-operative
  - early mobilisation
  - neighbour splint
  - solid splint
- Surgery
  - percutaneous wires
  - intramedullary wires
  - IM screws
  - plates and screws
  - Intraosseous loops
  - Ex fix

General Treatment
- Nonoperative
  - immobilisation
  - immobilisations
  - must be stable pattern
  - no malunion tolerance
  - acceptable angulation & shortening (see table)

<table>
<thead>
<tr>
<th>Available Soft Tissue</th>
<th>Available Soft Tissue</th>
<th>Available soft tissue</th>
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<tbody>
<tr>
<td>Inter- &amp; Long Finger</td>
<td>10.20</td>
<td>2.5</td>
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<tr>
<td>Ring Finger</td>
<td>10</td>
<td>2.5</td>
</tr>
<tr>
<td>Little Finger</td>
<td>40</td>
<td>2.5</td>
</tr>
</tbody>
</table>
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Indications

Metacarpal neck

- Index and middle
  - 10-15
  - Fixed CMCJ
- Ring
  - 30-40
- Little
  - 50-60
  - Mobile CMCJ
  - Hyperextensible MCPJ

Boxer’s Fracture

Neighbour strap or brace?

THE USE OF A MOULDED METACARPAL BRACE VERSUS NEIGHBOUR STRAPPING FOR FRACTURES OF THE LITTLE FINGER METACARPAL NECK

L. HADING, P. PARX and R. L. BARRINGTON

From the Department of Trauma and Orthopaedics, University Hospital, Rotterdam, UK

Ninety-one patients with fractures of the neck of the little finger metacarpal were randomized to treatment with a moulded metacarpal brace or neighbour strapping. Thirty of these patients were followed up to 6 weeks. Both treatment modalities permitted a treatment range of movement, but patients treated with the moulded brace had significantly more pain than those treated with neighbour strapping, and they felt less comfortable in each. The results of this study suggest that the moulded metacarpal brace is a suitable alternative to neighbour strapping and allows early return to work.

Non-operative

- Immediate mobilisation
- No splint
- Manipulation does not work

The Effect of Closed Reduction of Small Finger Metacarpal Neck Fractures on the Ultimate Angular Deformity

Non-operative for 5th MC neck

- 78 patients
  - Plaster and follow up
  - Neighbour strap, info sheet and discharge
    - RTW 5 weeks
    - RTW 2.7 week
    - Higher satisfaction
    - Equivalent DASH

I would not recommend distal plates transosseous wires.

Distal plate

- Impinges on head
- Prevents hyperextension

Faccia et al 2010 Fifth metacarpal neck fracture fixation: Locking plate versus K-wire Orthop Traumatol Surg Res. 96,506-12

- Patients
  - Non randomised
  - 18 locking plates vs 20 IM wires
- Outcomes
  - Flexion 59% plate vs 98 % wires
  - Extension 89% plate vs 99% wires

JHS 2007;32E: 69-73:
Trans-osseous wires
Metacarpal neck

- Impingement
  - Collateral ligaments
  - Interosseous tendon
    - 1st DI
    - 4th DI

Extensor tendon
Collateral ligament and capsule of the metacarpophalangeal joint
Collateral recess
Interosseous m.
Lumbrical m.
B and tendon

Intramedullary wires

- Recommended for neck fractures
- Percutaneous
- Stable
- Avoid impingement
  - Collateral ligaments
  - 1st and 4th Dorsal interosseous


Which is best
Leave or Bouquet IM wires or transverse pins?

- Non-operative
  - probably better or maybe equal to IM wires
- IM wires
  - probably better or maybe equal to transverse wires
- Plates
  - worse than wires
- 59 cases, non-randomised, 24 months review
- No difference in outcome

- N=36
- Better ROM for IM wires

- N=44
- 30 to 70 degree angulation
- Non-randomised
  - Splint or IM wires
  - Mobilised at 2 weeks
  - No difference in ROM at 2, 6, 12 weeks
  - Better aesthetics and satisfaction in surgical group

Splint or IM wires?

Isolated, extra-articular neck and shaft fractures of the 4th and 5th metacarpals: a comparison of transverse and bouquets (intra-medullary) pinning in 67 patients

L. M. Slotten
Department of Orthopaedics, Oslo University Hospital, Oslo, Norway

- Equivalent
  - ROM, qDASH, grip
- High complication rate
  - 12% superficial infection (all PQ wires)
  - 39% impaired skin sensation
My recommendation
metacarpal neck fractures

- **Index and middle finger**
  - less than 15 degrees
  - non-operative
- **Little finger**
  - Almost always leave alone
  - If surgery: Intramedullary wires
  - never transverse wires or plate
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Non-operative treatment

Do not use these Splints
Fulcrum!
Earliest return to function

- Athletes
  - Goalie vs Stryker
- Non operative or operative

Metacarpal fracture

- Case
  - 28 year old
  - Premiership and international Goalkeeper
  - Fall in training
  - Oblique 3rd metacarpal fracture
- Options
  - non-operative
  - operative
- Risk Avoidance
  - Informed MDU
  - Polled 5 colleagues (Bolam, Bolkho)
  - Discussed with patient all options and all risks (Montgomery)

Non-operative

- Advantage
  - can see callus
  - no risk of surgical complication
    - infection
    - metalwork impingement
    - non-union
- Early movement
- No splint
- Clickini gone by 3 ½ weeks
- Playing by 5 weeks

Lag screw
Plates and Screws

- Recommended for:
  - Shaft
  - Base

- Advantages:
  - Stable fixation
  - Early mobilisation

- AO Techniques:
  - Pre-bend
  - Axial compression
  - Lag screw

Multiple fractures

  - 19 patients, 43 fractures
  - Early ORIF plates
  - All had excellent outcome
  - Plates removed in 2
Plates and Screws

Soft tissue care

- Surgical Approach
  - Index and little
    - Hairy/glabrous border
  - Middle and Ring
    - Dorsum
    - 2 MCs via one incision

- Take Care
  - SRN
  - DBUN
  - Extra-synovial

- Preserve blood supply
  - Minimal periosteal stripping
  - Preserve muscle attachment

Complications of metacarpal plating

- Non-union
- Distraction
- Soft tissue stripping
  - Periosteum
  - Interossei

- plate impingement
Complications of metacarpal plating

- When has the fracture healed?
  - primary bone healing
  - no callus
- Pen-prosthetic fracture
  - Athletes

Trans-osseous wires

**Shaft**

- Protruding ends
- Infection
- Obstruction
- Wire necrosis
- 4 cortices minimum
- Not as stable as plates

IM wires for shaft fractures can work but.....

Fix it properly......
Bad IM Wire

IM wires vs plate


Plate fixation
- Similar DASH and ROM
- Longer to perform
- More expensive
- Better maintenance of position
- Less hardware removal

Intramedullary screws

Pinal et al JHS (Am) 2015 40:692-700

Intramedullary screws

Pinal et al JHS (Am) 2015 40:692-700
Summary - Metacarpal shaft

- Oblique-Spiral
  - early mobilisation
- Multiple
  - plate
  - im wires
- Displaced transverse border
  - plate
  - im wires

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Recent review article

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