Hand Infection

In general, 3 phases for Assessment & Intervention for Physiotherapist:
- Acute Phase – acute inflammation & infection
- Post-Acute Phase – resolving inflammation & infection
- Post-Infection Phase – infection under control

Acute Phase

Assessment
1. Acute Inflammation
   - Redness
   - Swelling
   - Temperature increase
   - Pain
   - Loss of function

2. Wound Condition
   - 3-colour concept – red, yellow & black wound
   - Any pus or abscess collection
Acute Phase

Intervention – Aims & Methods
1. To minimize exacerbation of inflammation & infection
   • Rest/immobilization (boxing glove bandaging)
   • Compression (boxing glove bandaging)
   • Elevation

2. To prevent joint contracture
   • Rest/immobilization in intrinsic plus position (position of immobilization)

3. To drain pus and clean wound
   • Hibitane bath

Boxing Glove Bandaging

• Compression
  – ↑ venous return & ↓ oedema
• Reduction of inflammatory changes
  – rest
  – ↓ pain
• Facilitation of wound drainage

Elevation with sling suspension
Acute Phase

**Intervention – Aims & Methods**
3. To drain pus and clean wound
   - Saline irrigation for deep wound
   - Whirlpool therapy (past)

Post-Acute Phase

**Assessment**
1. ↓ Inflammation
   - ↓ Redness
   - ↓ Swelling
   - ↓ Temperature increase
   - ↓ Pain

**Post-Acute Phase**

**Assessment**
2. Wound Condition
   - More healthy wound condition (with the use of antibiotics ± debridement)
   - ↓ Pus or abscess collection

3. Joint ROM & Soft Tissue Adhesions

**Intervention – Aims & Methods**
1. To prevent/improve finger joint stiffness & soft tissue contracture
   - Gentle active ± passive finger mobilization exercises
**Post-Acute Phase**

**Intervention – Aims & Methods**

2. To prevent tendon adhesions & improve tendon gliding
   - Tendon gliding exercises

**Post-Infection Phase**

**Assessment**

1. ↓ Joint ROM & Joint Stiffness
2. Soft Tissue Adhesions/Scars
3. Residual Swelling
4. ↓ Muscle Strength
5. Pain
6. ↓ Function

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**Intermittent Pneumatic Compression**

<table>
<thead>
<tr>
<th>Indications</th>
<th>Pressure (mm Hg)</th>
<th>Recommended Treatment Periods</th>
<th>Inflation Time (On)</th>
<th>Deflation Time (Off)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-mastectomy lymphedema</td>
<td>30-50</td>
<td>Two treatments per day for 3 hours</td>
<td>80-100 seconds</td>
<td>25-30 seconds</td>
</tr>
<tr>
<td>Edema of lower extremity</td>
<td>30-60</td>
<td>Two treatments per day for 3 hours</td>
<td>80-100 seconds</td>
<td>25-30 seconds</td>
</tr>
<tr>
<td>Peripherial edema and venous stasis ulceration</td>
<td>85</td>
<td>One treatment period of 2½ hours three times per week</td>
<td>80-100 seconds</td>
<td>30 seconds</td>
</tr>
<tr>
<td>Stump reduction</td>
<td>30-60</td>
<td>Three treatment periods per day for 4 hours</td>
<td>40-60 seconds</td>
<td>10-15 seconds</td>
</tr>
<tr>
<td>Hand edema</td>
<td>30-50</td>
<td>Two treatment periods a day of 30 minutes to 1 hour each</td>
<td>Extended position: 3-10 minutes</td>
<td>Flexed position: 5-10 minutes</td>
</tr>
</tbody>
</table>

*(Lowe et al, 2005)*
Post-Infection Phase

Intervention – Aims & Methods
1. To improve finger joint ROM, stiffness & soft tissue contracture
   • Active ± passive finger mobilization exercises
   • Stretching
2. To improve soft tissue adhesions/Scars
   • Massage
   • Ultrasound therapy
3. To improve tendon gliding
   • Tendon gliding exercises
4. To muscle strength
   • Muscle strengthening exercises
5. To improve functions
   • Dexterity training
   • Work conditioning/simulation programme

Common Infection Cases

- Paronychia – infection of space surrounding eponychial fold
Common Infection Cases

• Felon – infection of closed space of volar digital pulp

Common Infection Cases

• Felon

Treatment – Incision and drainage; appropriate antibiotics; open drainage of wound – saline gauze packing

Common Infection Cases

• Infective Tenosynovitis

(Tubiana et al, 1996) Incision & Continuous Drainage

Common Infection Cases

• Infective Tenosynovitis
Special Infection Cases

• Mycobacterial Infections
  – Typical: Mycobacterium Tuberculosis
  – Atypical:

<table>
<thead>
<tr>
<th>Group I</th>
<th>Photochromogens</th>
<th>Yellow pigment</th>
<th>M. marinum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>M. kansasii</td>
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<tr>
<td></td>
<td></td>
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<td>M. simiae</td>
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<tr>
<td>Group II</td>
<td>Scotochromogens</td>
<td>Yellow-orange pigment</td>
<td>M. scrofulaceum</td>
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<td></td>
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<td>M. szulgai</td>
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<tr>
<td>Group III</td>
<td>Nonchromogens</td>
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<td>M. avium-intracellulare</td>
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<td></td>
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<td>M. fortuitum</td>
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<td></td>
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<td></td>
<td>M. chelonel</td>
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<tr>
<td>Group IV</td>
<td>Rapid growing</td>
<td></td>
<td>M. marinum</td>
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<tr>
<td></td>
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<td></td>
<td>M. abscessus</td>
</tr>
</tbody>
</table>

Table 1 Classification of atypical mycobacteria (Bhambri et al, 2009)

Fig. 1. Erythematous nodules located on the dorsal aspect of finger. “Fish tank finger” caused by M. marinum. (Bhambri et al, 2009)

M. Marinum

Postoperative immobilization in boxing glove bandaging for 3 weeks

Fig. 3. Extensor synovectomy. (Cheung et al, 2010)

Fig. 5. After subcutal flexor synovectomy. (Cheung et al, 2010)
M. Marinum

Drug Treatment (QMH)
(1) Standard regimen for previously untreated patient.
• Ethambutol and rifampicin
(2) For patient with relapse after treatment
• Clarithromycin and minocycline and ethambutol
Duration of treatment
• 6 month in total or at least 2 more months after definite clinical improvement
Dosage
• Ethambutol 15mg/kg QD daily
• Rifampicin 450mg (for BW ≤ 50kg) or 600mg (for BW > 50kg) QD daily
• Clarithromycin 500mg BD daily
• Minocycline 100mg BD daily

Other Mycobacterial Infections
• Drug Treatment – multi-drug therapy, e.g.:
  – Isoniazid
  – Pyrazinamide
  – Rifampicin
  – Ethambutol (risk of blurred vision, red / green colour blindness)
  – Clarithromycin
  – Minocycline (risk of pigmentation)
  – Amikacin (risk of vestibular & auditory damage)
• Monitoring of drug compliance and side effects by physiotherapist

Mycobacterial Infections
• Monitoring of liver and renal functions, haematological status (platelet, WBC, RBC counts)

Special Infection Cases
• Fungal Infections
• Necrotising Fasciitis
Fungal Infection

- Scedosporium apiospermum infection

Management
- Multiple surgical debridements + bone graft + percutaneous K-wire fixation
- Prolonged drug treatment – Itraconazole
- Physiotherapy & Occupational Therapy

Fungal Infection

Necrotising Fasciitis

- Type I – anaerobic bacteria and streptococci other than serogroup A
- Type II – group A Streptococci
- Usually occurred in patients with chronic debilitating diseases – diabetes, alcohol abuse, or renal insufficiency

(Cheung et al, 2009)
Necrotising Fasciitis

Management
- Prompt diagnosis with radical debridement ± amputation
- Appropriate antibiotics
- Rehabilitation – management of sequelae

Case 1

History
- 88 year-old man
- Slip & fell with sprained (R) Index Finger
- Consulted bonesetter
- Developed swelling & pain for 3-4 days before admission
Case – I & D - Postop D4

C/ST: E. Coli, Streptococci; Bacteroides

Case - Physiotherapy

Case – Postop D7

(Osteolytic change at tuft of distal phalanx)

Case – Post-Amputation D1
Case – Post-Amputation D20

Case – Post-Amputation D29

AROM: (R) IF MPJ: 0°-80°; PIPJ: 0°-50° (70°)
Hand Grip: (R) 5kgf; (L) 9kgf

Case 2

- Infection in an immunocompromised patient

Case 2

- Infection in an immunocompromised patient
Case 2
• Infection in an immunocompromised patient

Application of Boxing Glove Bandaging

Position of Immobilization
• Wrist in neutral or slight extension
• MPJ ~ 90°
• IPJ ~ 0°
• Thumb in palmar abduction

Position of Immobilization

Because the metacarpal head is narrow dorsally and because of the projection of the condyle anteriorly, the collateral ligaments are taut in flexion and relaxed in extension. The most proximal fibers of the accessory collateral ligament, which is a proximal prolongation of the collateral ligament and is inserted into the volar plate, are stuck in full flexion. (1) Metacarpal head; (2) proximal phalanx; (3) collateral ligament; (4) accessory collateral ligament; (5) volar plate.

MPJs
– Collateral ligaments taut in flexion
- Joint capsule & volar plate loose
Position of Immobilization

IPJs – Joint capsule & volar plate are tight

(Tubiana et al, 1996)

Video on Boxing Glove Bandaging

Re-assessment after Application

• Check any subjective discomfort, e.g. too tight, throbbing sensation
• Observe capillary refill of nail bed or pulp
• Feel the resilience of bandaging for even pressure

Re-assessment when Boxing Glove Bandaging is removed

• Revise boxing glove bandaging when it is loosened
• Check any local pressure points (especially at PIPJs, wrist)
• Check any reduction in swelling or oedema – Wrinkles or creases
• Check position of finger joints

Figure 1.74. Lateral view of the proximal interphalangeal joint showing the lateral ligaments—the tension of these is equal in extension and flexion.
References


