Application of a Backslab or Cast to a Limb

Introduction
- Wash hands, Introduce self, Patients name & DOB & wrist band, Explain procedure and get consent
  - Risks: neurovascular compromise, joint stiffness after removal, infection, pressure sores, venous thromboembolism, failure of fracture union
  - Backslabs vs casts: for acute injuries, a ‘backslab’ (i.e. slab of plaster on one side of the limb) should be used to allow for swelling. This is then changed to a more secure full ‘cast’ (i.e. circumferential around limb) at ∼1 week post injury.
- Check cast prescription

Preparation part
- Wash hands
- Apply an apron, and also gloves if using fibreglass
- Gather equipment
  - Large pads and plastic sheets
  - Plastic covered pillows
  - Webril cotton wool roll for under padding – 5-10cm width for upper limb, 10-15cm width for lower limb
  - Plastic bowel filled with lukewarm water (the warmer the water the faster the cast will set)
  - Heavy duty scissors
  - For backslabs:
    - Plaster Of Paris sheets (usually come from a huge roll) – 15cm width for posterior backslabs, 10cm width for lateral/medial backslabs
    - Broad gauze bandage roll (outer layer)
  - For casts:
    - Fabric stockinette (1st inner layer) – 5cm width for upper limb, 7.5cm width for lower limb
    - 2x Fibreglass rolls (e.g. Benecast) or, less commonly, Plaster Of Paris rolls (small individually wrapped rolls) – 5cm width for upper limb casts, 10cm width for lower limb casts

Patient part
Positioning and exposure
- Expose limb and remove any jewellery
- Examine the injured extremity
  - Look for wounds and treat prior to applying cast
  - Examine neurovascular status
  - Reduce the fracture or dislocation if required
- Position patient
  - Below elbow cast: patient sitting with elbow resting on hard surface and hand slightly elevated
  - Above elbow cast: patient lying supine with arm off side of bed and assistant holding the patient’s hand to support the weight of the arm
  - Below knee cast: patient sit on edge of bed with lower legs dangling off side
  - Above knee cast: patient lying supine with leg rest/assistant holding leg in position
- Fully position limb in desired position – SEE TABLE BELOW
- Apply large pads and plastic sheets around patient and limb to collect spillage

Initial dressing
- Apply the fabric stockinette over the limb to cover the area below the plaster plus a couple of inches and cut to size – avoid wrinkles and cut hole for thumb if needed (omit this in acute injuries)
- Unroll the webril circumferentially around the limb to cover the area below the plaster plus a couple of inches (roll layers should overlap by 50%). Start with two initial rolls then progress distally/proximally. Use double thickness for both plaster ends and any bony prominences. Cut a hole/slit for the thumb if required. The end can be left loose.
- Apply extra squares of webril may be applied over any bony prominences to avoid pressure sores

Backslab application
- Using the correct width plaster sheet (unrolled), measure the length required longitudinally along the limb
- Fold the plaster sheet to the create required layers – layers required vary by type of backslab – see table below (generally, 8 layer slab for upper limb; three 4 layer slabs for lower limb backslabs)
- Cut plaster sheet to size
- Immerse the plaster into the lukewarm water and hold it under until the bubbles stop
- Drain the plaster until the drips stop (do not wring it out)
- Place the slab longitudinally in position over limb (fold any un-neat edges)

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- Mould by rubbing it smooth
- Turn the ends of the webril back over the ends of the plaster
- Unroll the broad gauze bandage circumferentially around the limb to secure the plaster and free ends of webril (roll layers should overlap by 50%). Start distally and wrap proximally. To tie off the bandage, you can tape it or split the end down the middle, wrap around in opposite directions and tie off.
- Hold the limb is in the correct position for approximately 5mins until the plaster hardens

**Circumferential cast application**
- Immerse the first roll of fibreglass/plaster (still rolled) into the lukewarm water and hold it under until the bubbles stop
- Drain until the drips stop (do not wring it out)
- Apply the 1st layer by unrolling the fibreglass/plaster circumferentially around limb keeping the roll in contact with the arm at all times. Start distally and progress proximally (roll layers should overlap by 50%)
- Continue using the same roll to apply a 2nd layer starting proximally and progressing distally
- ‘Laminate’ plaster by rubbing the plaster smooth with flats of both palms and fingers in a circular motion in the direction it was placed on to make sure all the fabric lines are out
- Turn the ends of the stockinette and webril back over the ends of the plaster
- Now apply a 3rd layer (using the second fibreglass/plaster roll which again needs to be soaked and drained), starting proximally and progressing distally like the 2nd to secure the turned-over ends of the stockinette and webril and ensure even cast thickness
- ‘Laminate’ plaster further
- Hold the limb is in the correct position for approximately 5mins until the plaster hardens

**To Complete**
- Thank patient and cover them
- Bin all waste and clean area
- Furl upper limb casts, give the patient a resting triangular or high-arm sling
- Review patient
  - Once the backslab/cast is set check:
    - No sharp edges
    - Correct positioning
    - Comfortable for patient
    - Distal neurovascular assessment and tendon function
    - Post-cast X-ray
  - 24 hours cast check
  - If problems arise e.g.
    - Pressure sores – a ‘window’ can be cut in the cast
    - Infection – smelling the cast is a good indicator
- Give the patient a leaflet and give plaster advice (including advising them to seek urgent medical help if limb is numb/painful/cold/discoloured, POP must be kept dry and that, for weight bearing-lower limb plaster casts, they must not weight bear for 2 days)
- Fully document in notes and sign cast prescription
- Book follow up appointment

**Removing a Cast**
- Use plaster-cutting shears or an oscillating power saw
- Shears: only oscillate the handle furthest from the plaster (keep the other one still and parallel to the plaster). You should only cut the plaster layer (i.e. place the blade between the plaster and the lining below)
  - Start distally and work proximally
- Oscillating power saw: use one hand to hold the saw handle nearest the blade, and rest the other hand around the cast with the thumb on the top of the saw to guide it. DO NOT slide the saw along the cast, use it by pressing it down in one position until it ‘gives’ then lift it off and do the same again slightly further down the cast and so on (don’t worry, the saw does not cut skin!)
  - Start proximally and work distally
- Cuts should be over soft tissues and concavities (avoid bony prominences)

**Where to cut upper limb casts**
- Make one cut in a straight line along the anterior border of the forearm from the mid-antecubital fossa to the mid-palm
- Now use strength to split the cast to get it off

**Where to cut lower limb casts**
- Requires two cuts
- LATERAL CUT: from the little toe, along the lateral border of the foot, below and posterior to the lateral malleolus and up the lateral border of the lower leg
- MEDIAL CUT: along the corresponding line on the medial surface

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<table>
<thead>
<tr>
<th>Type</th>
<th>Commonest indications</th>
<th>Position</th>
<th>Backslab (additional specific detail)</th>
<th>Cast (additional specific detail)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upper limb</strong></td>
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<tr>
<td>Below elbow (short leg)</td>
<td>• Isolated distal radius fracture</td>
<td>• Extends from 5cm below the olecranon to just proximal to the knuckles on the dorsum of the hand and the distal crease on the palmar aspect</td>
<td>• Cut a groove for the thumb before wetting the plaster</td>
<td>• After the stockinette, apply 2 wraps of webril padding around the wrist, partially tear the webril to go over the thumb, and then go proximally up arm to 2cm below the antecubital fossa</td>
</tr>
<tr>
<td>backslab/cast</td>
<td>• Carpal fractures</td>
<td>• Wrist is normally neutral but can be flexed and ulnar deviated (Colles cast variation for Colles' fracture) extended (or Smith's fracture)</td>
<td>• Apply the plaster (15cm wide, 8 layers) to the dorsal aspect of the forearm and the dorsolateral aspect of the wrist</td>
<td>• For the first fibreglass/plaster layer, start by rolling the plaster around the wrist, then through the first webspace (cut a slit in the fibreglass/plaster to do this) and then work up the arm proximally</td>
</tr>
<tr>
<td>Above elbow (long arm)</td>
<td>• All radius/ulna fractures (except isolated distal radius fractures)</td>
<td>• Extends from middle of upper arm to just proximal to the knuckles on the dorsum of the hand and the distal crease on the palmar aspect</td>
<td>• Apply extra layer of soft cotton wool around elbow</td>
<td>• When applying webril, ensure the sides do not dig into the elbow crease</td>
</tr>
<tr>
<td>backslab/cast</td>
<td>• Distal humerus/humeral olecranon/epicondyle fracture</td>
<td>• Elbow at 90°</td>
<td>• Apply the plaster slab (15cm wide, 8 layers) along posterior aspect of arm, elbow and ulnar aspect of the forearm down to knockles</td>
<td>• Apply 3 extra layers of webril over the elbow – one over the area above the elbow, on over the olecranon and one over the humeral cordyles</td>
</tr>
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<td>• Forearm usually mid prone but should be in supination for proximal third radius fractures, and in pronation for distal third radius fractures</td>
<td>• Make 5cm slits either side of the elbow crease and overlap cut edges and smooth them out</td>
<td>• For the first fibreglass/plaster layer, start by rolling around the wrist, then through the first webspace (cut a slit in the fibreglass/plaster to do this) and then work up the arm proximally</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wrist is usually neutral</td>
<td>• Apply further plaster slabs (25cm long, 10cm wide, 4 layers) to the medial and lateral sides of the elbow and then smooth the edges</td>
<td>• Make sure the edge does not dig into the elbow crease</td>
</tr>
<tr>
<td>Thumb spica splint/cast</td>
<td>• Scaphoid fracture</td>
<td>• Similar to below elbow cast but with thumb also covered</td>
<td>• Apply 2 wraps of webril padding around the wrist continuing around the thumb twice. Wrap 2 layers over the hand, partially tearing the webril to go over the thumb, and then go proximally up arm</td>
<td>• After the stockinette, apply 2 wraps of webril padding around the wrist continuing around the thumb twice. Wrap 2 layers over the hand, partially tearing the webril to go over the thumb, and then go proximally up arm</td>
</tr>
<tr>
<td>Volar/dorsal forearm slab</td>
<td>• Carpal fractures (except scaphoid)</td>
<td>• Extends along the volar/dorsal aspect of the forearm from the metacarpal heads to just proximal to radial head</td>
<td>• Apply 2 wraps of webril padding around the wrist, making a hole to hook it over the thumb, then progress proximally up the arm</td>
<td>• After the stockinette, apply 2 wraps of webril padding around the wrist continuing around the thumb twice. Wrap 2 layers over the hand, partially tearing the webril to go over the thumb, and then go proximally up arm</td>
</tr>
<tr>
<td></td>
<td>• Lunate dislocation</td>
<td>• Position of safe immobilisation (POS)/&quot;Edinburgh position&quot;</td>
<td>• Apply the plaster slab (15cm wide, 8 layers) around the radial aspect of forearm and around the thumb</td>
<td>• Start wrapping the first layer of fibreglass/plaster around the wrist followed by 2 wraps around the thumb (leaving half of the distal phalynx free)</td>
</tr>
<tr>
<td></td>
<td>• 2nd-5th metacarpal fractures</td>
<td>• Wrist 30-50° extension</td>
<td>• Apply the plaster slab (15cm wide, 8 layers) to the volar/dorsal aspect of the arm</td>
<td>• Continue with several layers around wrist and base of thumb, ‘pinching’ or cutting a slit in the fibreglass/plaster to go through the first webspace, then work up the arm proximally.</td>
</tr>
<tr>
<td>Radial gutter splint</td>
<td>• 2nd/3rd metacarpal fracture</td>
<td>• Wrist in 20° extension</td>
<td>• Apply the plaster slab (10cm wide, 8 layers) in the radial aspect of arm – hook it over the thumb</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>• 2nd/3rd proximal/medial phalanx fracture</td>
<td>• MCPs 80-90° flexion</td>
<td>• Include the index and middle fingers in the final layer of bandage</td>
<td>N/A</td>
</tr>
<tr>
<td>Ulnar gutter splint</td>
<td>• 4th/5th metacarpal fracture</td>
<td>• Wrist in 20° extension</td>
<td>• Before applying webril, place a small piece of padding between the index and middle fingers</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>• 4th/5th proximal/medial phalanx fracture</td>
<td>• MCP joints flexed to 50-70’</td>
<td>• Before wetting the plaster, cut a hole for the thumb • Apply the plaster slab (10cm wide, 8 layers) around the radial aspect of arm – hook it over the thumb</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PIPs in slight flexion</td>
<td>• Include the index and middle fingers in the final layer of bandage</td>
<td>N/A</td>
</tr>
<tr>
<td>Below knee (short leg)</td>
<td>• Calcaneus/talus fracture</td>
<td>• Extends from the tibial tubercle to the base of the toes</td>
<td>• Before applying webril, place a small piece of padding between little and ring fingers</td>
<td>• Make a slit in the stockinette over the anterior ankle and overlap the layers</td>
</tr>
<tr>
<td>backslab/cast</td>
<td>• Ankle fractures</td>
<td>• Ankle neutral (90°)</td>
<td>• Apply the plaster slab (15cm wide, 4 layers) along posterior aspect of leg from 5cm below popliteal crease to the toes (fold over a corner of plaster to expose little toe and neatly fold excess plaster around ankles)</td>
<td>• Start webril distally (5-6 layers over heel), malleoli and head of fibula</td>
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<td></td>
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<td>• Apply further plaster slabs (10cm shorter than main slab, 10cm wide, 4 layers) to the medial and lateral sides – they should both cover the heel</td>
<td>• Start webril/plaster layer at base of toes. Wrap around the ankle in figure 8. Work proximally to 2cm below below Tibial tubercle. Then continue with other 2 layers.</td>
</tr>
<tr>
<td>Above knee (long leg)</td>
<td>• Distal humerus/patella fracture</td>
<td>• Extends from the middle of the thigh to the base of the toes</td>
<td>• Ensure fibular head is well padded with webril</td>
<td>• Make a slit in the stockinette over the anterior ankle and overlap the layers</td>
</tr>
<tr>
<td>backslab/cast</td>
<td>• Tibia and fibula fracture</td>
<td>• Knee in 5-20° flexion</td>
<td>• Apply the plaster slab (15cm wide, 4 layers) along posterior aspect of leg from middle of the thigh to the toes (fold over a corner of plaster to expose little toe and neatly fold excess plaster around ankles)</td>
<td>• Lower half (done first): start webril distally (5-6 layers over heel, malleoli and head of fibula)</td>
</tr>
<tr>
<td></td>
<td>• Tibia fracture</td>
<td>• Ankle neutral</td>
<td>• Mud by rubbing and smoothing it</td>
<td>• Start first fibreglass/plaster layer at base of toes. Wrap around the ankle in figure 8. Work proximally to 2cm below below Tibial tubercle. Then continue with other 2 layers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cylinder cast variation = ends before ankle</td>
<td>• Apply further plaster slabs (10cm shorter than main slab, 10cm wide, 4 layers) to the medial and lateral sides – they should both cover the heel</td>
<td>• Start applying plaster distally – overlap old fibreglass/plaster with width of a roll, then work proximally. Then continue with other 2 layers.</td>
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