Casting & Bracing Techniques Learning Lab

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Objectives

- Understanding the fundamentals of short/long arm and short leg cast application
- Identifying the appropriate forms of immobilization for corresponding diagnoses
- Troubleshooting common issues and complications with cast application
- Identifying alternate forms of immobilization when transitioning out of or electing against casting

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Casting Varieties

- Short arm cast
  - +/- Thumb spica
  - Ulnar gutter intrinsic plus
  - Mitten cast
- Long arm cast
- Short leg cast
  - In neutral
  - In plantar flexion

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Casting Goals

A cast is elected when 100% immobilization is needed of a joint/tendon to allow uninterrupted healing in the early stages of recovery

Some stable fractures/pathologies can be treated effectively with removable splints to allow for hygiene, home exercise program, and formal therapy

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Short Arm Cast Alternatives

- Prefab wrist splint +/- thumb spica
- EXOS splint
- Custom thermoplast wrist splint
- Orthoglass/plaster splints
- TKO ulnar gutter splints

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Long Arm Cast Alternatives

- Posterior orthoglass/plaster splint
- Sugar tong splint
- Munster splint

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Short Leg Cast Alternatives

- Posterior orthoglass/plaster splint +/- stirrups
- Short/tall boot
- Post-op shoe

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What's Are We Treating (not exclusively)

Short Arm

- Distal radius fracture
- ECU tendinitis
- Scaphoid fracture (thumb spica)
- Metacarpal fracture

Long Arm

- DRUJ instability
- Ulna fractures
- Distal humerus fracture

Short Leg

- Distal fibula fracture
- Achilles tendon rupture
- Metatarsal fracture

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Casting Supplies Needed

- **Stockinette**
  - 2”, 3”, or 4” depending on the size of the limb being casted
- **Cast padding**
  - 3” for upper extremity or 4” for lower extremity
- **Fiberglass**
  - 2” for short arm or 3” for long arm and short leg
- **Water**
- **Soap**

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Applying The Cast

1. Cut stockinette to cover above and below the joint being immobilized
   - Better to be long than short
2. Cover with appropriately sized padding
   - 1.5-2 layers
   - Less is generally more with the exception of some bony prominences
3. Cover with 2.5-3 layers of fiberglass
4. Fold stockinette down
5. Cover with 1-1.5 layers of colored fiberglass
6. Mold cast with soap

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Applying The Cast

Short Arm

- Cut 1” stockinette to extend from the tip of the thumb to the CMC joint
  - Angle the bottom cut to contour the webspace and CMC joint

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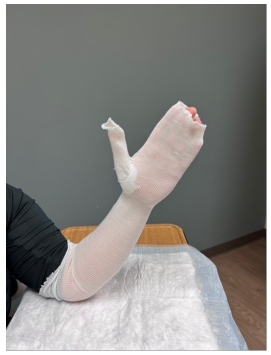
Applying The Cast

Short Arm

- Cut 2” stockinette to extend from the tip of the middle finger to the elbow flexion crease
  - Cut small hole for the thumb to poke through



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Applying The Cast

Short Arm

- Apply layer for 3” cast padding around thumb webspace and CMC joint

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Applying The Cast

Short Arm

- Apply layer for 3” cast padding around metacarpal heads

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Applying The Cast

Short Arm

- Apply 1-1.5 layers of 3” cast padding from the metacarpal heads up to the forearm muscle mass

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Applying The Cast

Short Arm

- Cut 2” fiberglass perpendicular to the roll, nearly all the way through, and apply in the webspace with the bridging fiberglass material on top
  - Fold cut edges underneath to cover frayed edges of fiberglass

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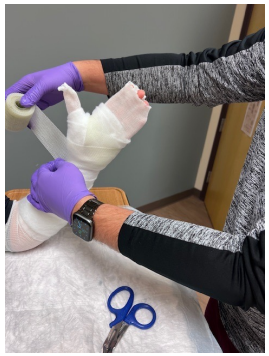
Applying The Cast

Short Arm

- Apply fiberglass just proximal to the thumb CMC joint



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Applying The Cast

Short Arm

- Come up through the webspace again with another perpendicular cut
  - Fold cut edges underneath the fiberglass

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Applying The Cast

Short Arm

- Apply the fiberglass down to the proximal forearm overlapping the fiberglass by 1/3 to ½ of a roll

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Applying The Cast

Short Arm

- Apply the fiberglass up to the proximal wrist again overlapping the fiberglass by 1/3 to ½ of a roll
  - Cut the roll rather than using up all the fiberglass
- 2.5-3 layers of fiberglass in total

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Applying The Cast

Short Arm

- Fold over stockinette edges at the fingers, thumb, and forearm

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Applying The Cast

Short Arm

- Apply colored layer of 2” starting at the forearm and working towards the hand
  - 1-2 layers through the hand
- Should be close to 4 layers of fiberglass in total throughout the cast

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Applying The Cast

Short Arm

- Use soap to mold the cast
  - Through the palm
  - Anterior/posterior on wrist and forearm

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Applying The Cast

Long Arm

- Cut 1” stockinette to extend from the tip of the thumb to the CMC joint
  - Angle the bottom cut to contour the webspace and CMC joint

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Applying The Cast

Long Arm

- Cut 2” (3” if bigger arm) stockinette to extend from the tip of the middle finger to the axilla
  - Cut small hole for the thumb to poke through

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Applying The Cast

Long Arm

- Apply layer for 3” cast padding around thumb webspace and CMC joint

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Applying The Cast

Long Arm

- Apply layer for 3” cast padding around metacarpal heads

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Applying The Cast

Long Arm

- Apply 1-1.5 layers of 3” cast padding from the metacarpal heads up to the upper 2/3 of the humerus

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Applying The Cast

Long Arm

- Cut 2” fiberglass perpendicular to the roll, nearly all the way through, and apply in the webspace with the bridging fiberglass material on top
  - Fold cut edges underneath to cover frayed edges of fiberglass

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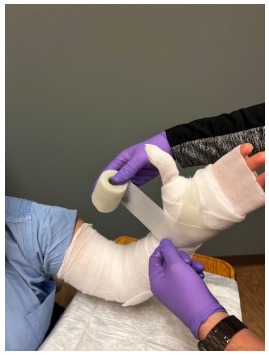
Applying The Cast

Long Arm

- Apply fiberglass just proximal to the thumb CMC joint



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Applying The Cast

Long Arm

- Come up through the webspace again with another perpendicular cut
  - Fold cut edges underneath the fiberglass

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Applying The Cast

Long Arm

- Apply the fiberglass down to the proximal forearm overlapping the fiberglass by 1/3 to ½ of a roll

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Applying The Cast

Long Arm

- When you get to the level of the elbow, figure-8 with the fiberglass up to the distal humerus
  - Be sure to cover gaps generally left along the olecranon
  - Open a new pack of fiberglass when the first roll ends (2" or 3")
  - Maintain 90° of elbow flexion
  - Maintain neutral forearm rotation unless indicated otherwise
- 2.5-3 layers of fiberglass in total

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Applying The Cast

Long Arm

- Apply the fiberglass up to the proximal wrist again overlapping the fiberglass by 1/3 to ½ of a roll
  - Cut the roll rather than using up all the fiberglass

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Applying The Cast

Long Arm

- Fold over stockinette edges at the fingers, thumb, and upper arm

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Applying The Cast

Long Arm

- Apply colored layer of 2” or 3” starting at the upper and working towards the hand
  - 1-2 layers through the hand
- Should be close to 4 layers of fiberglass in total throughout the cast

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Applying The Cast

Long Arm

- Use soap to mold the cast
  - Through the palm
  - Anterior/posterior on wrist and forearm
  - Medial/lateral upper arm above the epicondyles

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Applying The Cast

Short Leg

- Cut 3” stockinette to extend from the toes to the tibial tubercle
  - Cut a hole along anterior ankle to reduce wrinkles in stockinette

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Applying The Cast

Short Leg

- Apply 1-2 layers of 4” cast padding around the heel and malleoli

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Applying The Cast

Short Leg

- Apply an additional 1-1.5 layers of 4” cast padding from the toes up to the proximal calf

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Applying The Cast

Short Leg

- Apply 3” fiberglass starting at the toes and working up to the ankle overlapping by 1/3 to ½ of a role

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Applying The Cast

Short Leg

- When you get to the level of the ankle, figure-8 with the fiberglass up to the shin
  - Be sure to cover gaps generally left along the Achilles
  - Open a new pack of fiberglass when the first roll ends
  - Maintain desired foot position
    - Neutral, plantar flexion, etc.
- 2.5-3 layers of fiberglass in total

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Applying The Cast

Short Leg

- Fold over stockinette edges at the toes and calf

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Applying The Cast

Short Leg

- Apply colored layer of 3” starting at the toes and working towards the calf
- Should be close to 4 layers of fiberglass in total throughout the cast

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Applying The Cast

Short Leg

- Use soap to mold the cast
  - Medial/lateral supramalleolar

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Removing The Cast

- Educate patient on how you plan to use and remove the cast to ease any feelings or apprehension or anxiety

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Removing The Cast

- Turn on vacuum

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Removing The Cast

- Turn on the blade on (high or low)

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Removing The Cast

- Score the cast along the long axis
  - Removing one layer of fiberglass

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Removing The Cast

- You should feel resistance as the blade cuts through the cast material. When the blade fully penetrates the cast, this resistance ends, and you should withdraw the blade.

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Removing The Cast

- Continue linear motion to cut cast ensuring all fiberglass layers are breached
  - Avoid holding blade in one position near the skin for longer than 1 second

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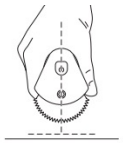
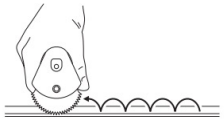
Removing The Cast

- Alternatively, gently push the blade through all layers of fiberglass
- Withdraw and advance the blade in the direction repeating for the entire length of the cast





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Removing The Cast

- Cut two opposite sides of the cast to allow for ease of removal

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Removing The Cast

- Use cast spreader to split any remaining intact pieces of fiberglass

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Removing The Cast

- Cut the underlying cast padding and stockinette with a blunt tipped scissors

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Keep In Mind

Keep tension on fiberglass when applying
- There is such thing as too tight however it is hard to achieve
- Tension helps reduce wrinkles in the cast

Short arm casts
- Pad high (metacarpal heads), cast low (distal palmer flexion crease)

Be consistent with how you hold/unroll the fiberglass on the cast
- This will help with hitting landmark and reduce how much fiberglass is used

Extra padding does not equal extra comfort with the exception of bony prominences
- This will compromise the fit of the cast causing it to be loose and allowing more room for a fracture to displace

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Keep In Mind

Extra padding for bony prominences

- Arthritic thumb CMC joints
- Ulnar head (if the complain previously)
- Malleoli
- Humeral epicondyles
- Olecranon

Fiberglass hardens faster with warm water

- Use cold if you want to buy a little more time

When removing the cast, the blade can burn skin

- Reassure patient on cast removal process and what they should feel
- Be cognizant of when blade cuts through all layers of fiberglass
- Avoid holding the blade on one spot for too long

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Cast Cares

- Casts are not waterproof unless the appropriate liner and padding is used
  - These materials sacrifice a good mold of the fracture and thus are rarely used
- Cutting the fiberglass causes sharp edges once hardened
  - If these are not folded over, educate patient to file down or cover with moleskin if needed
- Casts are meant to immobilize
  - If patients are fighting against the cast and doing too much, they can cause an increase in pain
- Casts can cause discomfort by displacing swelling in acute fractures
  - Recommend patients be diligent with elevation 48-72 hours after immobilization

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Let's Practice

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Thank you.

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