

A Practical Guide to Casting

Focused Rigidity Casting (FRC)

Contents

- 4.1 Below Knee
- 4.2 Below Elbow
- 4.3 Cylinder
- 4.4 Sugar Tong



Focused Rigidity Casting (FRC)

Before applying any FRC cast, you must have a good understanding of anatomy, physiology and the injury, to determine where the cast should be rigid and where it can safely be flexible. You should practice this technique before undertaking it on a patient and discuss its use with the Orthopaedic Surgeon.

Focused Rigidity Casting (FRC) was developed by Axel A Wierzimok.

These casts are constructed using only polyester cast materials and vary in the number of layers. The polyester material used must be flexible enough. 2 or 3 layers allow the cast to be flexible and by adding layers in the form of slabs or extra turns of the bandage, this area becomes more rigid. The cast is constructed with only those areas stable where the fracture, and/or any joints, require to be rigid. The remainder of the cast is kept flexible by using only 2 or 3 layers of material.

The FRC cast can be kept as a complete cast or can be adjustable by cutting through on one side and the join held together with hook and loop straps, or a cohesive bandage.

Axel states on his Mokcast website that:

The philosophy of focused rigidity poses 2 questions of prominence which have to be asked and answered for each patient anew:

- What has to be stabilised to support the fracture healing process?
- What can stay flexible to minimise the consequences of the immobilisation?

http://www.mokcast.com/index_e.html

Anne Petty & Chris Wardman undertook the first research on FRC in the UK in 1998.

Anne C Petty RGN, RIM, PTechCert., Sister, Casting and Appliances. Chris Wardman RGN, PD DipHe, PTechCert., Staff Nurse, Bradford Hospitals NHS Trust, Bradford BD9 6RJ

Further Reading:

COHEN, A.P. & SHAW, D.L., 2001, Focused Rigidity Casting: a prospective randomised study, J R Coll Surg Edinb, 46 (5), pp.265-270

KHANDUJA V., LIM C.B., VEMULAPALLI K.K., LEE C.M., BANAN H., 2006. Detachable functional focused rigidity cast for metatarsal fractures, British Journal of Nursing, 15(5) pp.282-284 PubMed [citation] PM ID: 16607259

LARGE, P., 2001. A 'new focus' in casting – an introduction to the concepts of focus rigidity casting, Journal of Orthopaedic Nursing, 5 (4), pp.176

LEVY, J., EMAT, SONG, D., COOK, J., JUDD, D. & SHAHA, S., 2015. Outcomes of Long-arm casting versus double-Sugar-Tong splinting of acute, pediatric distal forearm fractures, Journal of Pediatric Orthopaedics, 35(1) pp.11-17

MUSHI, P., NEALE, G., & MACLELLAN, G., 2000. Detachable functional forearm focused rigidity cast A 'one-off' definitive for stable forearm greenstick fractures, Injury, 31 (4), pp.239-242

PETTY, A. & WARDMAN, C., 2011. Focused Rigidity Casting (FRC) part 1, Orthopaedic & Trauma Times, no. 14 pp.13-16

PETTY, A. & WARDMAN, C., 1998. A randomised controlled comparison of adjustable focus rigidity primary casting technique with standard plaster of Paris/synthetic casting technique in the management of fractures and other injuries, Journal of Orthopaedic Nursing, 2, pp. 95-102

WIERZIMOK, A.A., HOUBEN, F. & WILMAN, H.R., 1996. Definitive primary care of fractures, Dialog, 1, pp.26-28

4.1 Below Knee FRC

Below Knee

The position of the cast will depend on the injury being treated, but is most commonly applied with 90° flexion of the ankle with the foot in neutral inversion/eversion (plantigrade). The knee should be held at an angle of 10-15° with the aid of a padded support (e.g knee rest). This makes it easier to hold and maintain the foot in the correct position. It is very important not to let the ankle move during the application, it is all too easy make ridges around the ankle.

Proximally, the completed cast should extend from just below the knee allowing flexion there.

Distally, it should extend to either the metatarsal heads or to the tips of the toes. Trim as necessary to make sure the toes are free anteriorly.



Equipment Required

Basic trolley, see page 28 - plus:

- 2mm adhesive felt
- Stockinette 7.5cm, depending on the size of the leg
- Delta® Terry-Net Stockinette 7.5cm
- Delta-Cast® Conformable 7.5cm x 1 roll (have 2 rolls available)
- Delta-Cast® Conformable 10cm x 1 roll (have 2 rolls available)
- Knee rest

Padding

1 These casts require 2 layers of stockinette. Protection for cutting should be placed between these 2 layers; protection for bony prominences should be placed on top of the 2nd layer of stockinette. It is preferable for the second layer to be Terry stockinette

Apply 1 layer of 7.5 cm stockinette.

Place a strip of 2mm adhesive felt to protect, where the cast will be cut.

Apply 1 layer of Delta® Terry-Net Stockinette.

2 Both malleoli must be padded with circles of 2mm adhesive felt. The head of the fibula and any other bony areas should be assessed and padded with felt, as necessary.

Application

3 Measure a 3 layer, 10cm Slab from the metatarsal heads to 5cm below the edge of the cast at the knee. Taper the proximal ends to prevent a ridge in the cast.

Measure a 2 layer 7.5cm U-stirrup from the midcalf on the medial side, down under the heel; and up to midcalf on the lateral side.

Pre-cut the slabs quickly from the polyester material rolls.

4 Apply the 10cm slab and commence bandaging with the remainder of the 10cm bandage, from the proximal end, with a 50/50 overlap, for 2 turns.

5 Before you reach the mid-calf area halt and apply the 7.5cm U stirrup, and then continue the 10cm roll down the leg.

6 Finish the 10cm roll behind the ankle and avoid going over the flexor surface with excess material.

7 Take the rest of the 7.5cm roll and apply with a 50/50 overlap starting behind the ankle, being very careful not to exceed the correct layers over the flexor surface, as this may make the cast more difficult to remove.

Mould to make the cast fit and have no airgaps. Maintain the position of the ankle and foot throughout until the cast is set. The cast can be left as a full cast.

8 If the cast is to be adjustable/removable, use a lazy 'S' down the front of the cast.

If appropriate to do so, leave the cast intact around the heads of the metatarsals helps to keep the cast's integrity.

9 Use hook and loop straps or a cohesive bandage to hold the cast together securely.



4.2 Below Elbow FRC

Below Elbow

The position will depend on the injury and could be applied in slight dorsiflexion and mid ulnar/radial deviation of the wrist. For a true Colles fracture, it will usually be in slight palmar flexion and ulnar deviation of the wrist.

Proximally, the completed cast should extend from just below the elbow to allow full flexion there.



Distally, the palmar crease should be fully visible to allow full flexion of the metacarpophalangeal joints, and dorsally the cast should extend to the top of the knuckles of the hand. Trim around the thumb for comfort as the thumb should be completely free.

Equipment Required

Basic trolley, see page 28 - plus:

- Elbow rest
- Stockinette 5cm or 7.5cm
- Delta® Terry-Net Stockinette 5cm or 7.5cm
- Adhesive felt 2mm thick
- Delta-Cast® Conformable 5cm or 7.5cm x 1 roll (have 2 rolls available)

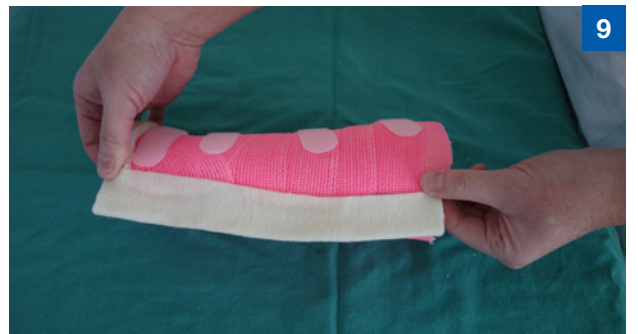
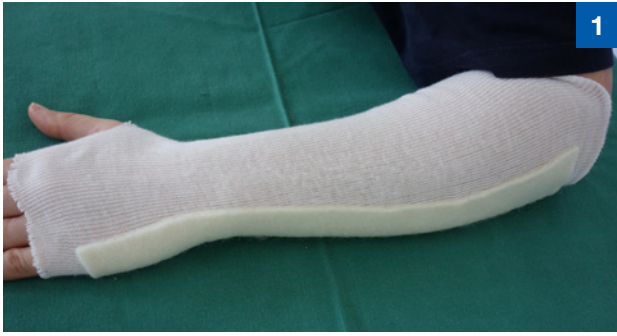


Padding

- 1 These casts require 2 layers of stockinette, with protection for cutting placed between these 2 layers, i.e. a strip of 2mm adhesive felt.
- 2 Protection for bony prominences should be placed on top of the 2nd layer of stockinette (preferably Delta® Terry-Net).

Application

- 3 The position of the slab will depend on the nature of the injury.
- Commence by applying a 2 layer slab, cut from the roll of polyester material, and place over the area of the cast that needs the rigidity (usually the injury site and/or joint).
- 4 Complete the cast with a careful 50/50 coverage, creating 2 layers.
- 5 Commence at the proximal end, rolling from within out so that the bandage is brought up through the grip, thereby spreading the heads of the metacarpals.
- 6 Pass through the grip twice and cut off any excess bandage. The cast can be left as a full cast.
- 7 **If the cast is to be adjustable/removable, the split should be as far away from the injury as possible. If it is suitable to split to the thumb hole only then do so.**
- 8 & 9 Create a tongue of thin felt and insert into the split, then line the other cast edges where/if required.
- 10 Use hook and loop straps, or a cohesive bandage, to hold the cast together securely.



4.3 Cylinder FRC

Cylinder

The knee is usually held in about 5°-10° flexion for comfort. If the patella is fractured or there is damage/repair to the extensor mechanism, the knee is held in extension. Support the limb fully throughout the application. Hold the foot against the chest and use the hands to support the knee.

Proximally, the cast should extend from as high up towards the groin as possible, allowing for comfort.

Distally, it should be extended down to 3cm above the malleoli (see below).



Equipment Required

Basic trolley, see page 28 - plus:

- Stockinette 10cm
- Delta® Terry-Net Stockinette 10cm
- Adhesive felt 5mm
- Adhesive felt 2mm
- Delta-Cast® Conformable 10cm or 12.5 cm x 3 rolls

Padding

1 These casts require 2 layers of stockinette. Protection for cutting should be placed between these 2 layers; protection for bony prominences should be placed on top of the 2nd layer of stockinette (preferably Delta® Terry-Net).

2 Place a strip 2mm adhesive felt between the layers to protect, where the cast will be cut.

A 7.5cm strip of 5mm adhesive felt should be placed around the leg, 3cm above the malleoli. A circle of 2mm adhesive felt will be needed to protect the patella and, if required, the head of fibula.

Application

Measure for the 12.5cm slab (10cm if small leg/child) from the middle of the distal adhesive felt to two thirds of the way up the thigh posteriorly.

Pre-cut the 2 layer, 12.5cm slab quickly from the rolls of polyester material.

3 Apply a single layer of polyester material distally to proximally.

4 Then position the posterior slab and commence bandaging the second layer, with edge to edge coverage from the distal end.

5 Change to 50/50 coverage from mid-calf to mid-thigh, for extra support of the knee joint.

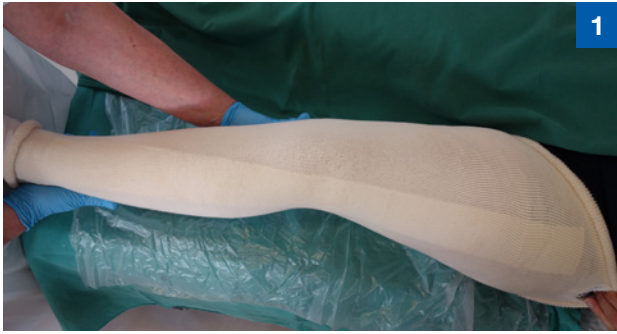
6 Return to single layer coverage once past this point.

7 Mould medially and laterally above the femoral condyles, to help prevent the cast from slipping. Laminate to eliminate air gaps. Maintain the position of the knee throughout until the cast is set. The cast can be left as a full cast.

8 If the cast is to be adjustable/removable, cut through all layers using a lazy 'S'; avoid cutting over the patella.

9 If the cast is to be split, use hook and loop straps, or a cohesive bandage, to hold it together securely.





4.4 Sugar Tong FRC

Sugar Tong

The position is usually with the elbow at 90° of flexion, mid pronation-supination of the forearm and no deviation of the wrist.

Proximally, the completed cast should extend from just above the epicondyles of the humerus posteriorly and covering the superior radio-ulnar joint anteriorly, whilst still allowing some flexion of the elbow (see below).



Distally, the palmar crease should be fully visible to allow full flexion of the metacarpophalangeal joints and dorsally, the cast should extend to the top of the knuckles of the hand. Trim around the thumb for comfort, as the thumb should be completely free.

Equipment Required

Basic trolley see page 28 - plus:

- Stockinette 5cm or 7.5cm
- Stockinette or Delta® Terry-net Stockinette 5cm or 7.5cm
- Adhesive felt 2mm thick
- Delta-Cast® Conformable 7.5cm or 10cm x 1 roll (have 2 rolls available)
- Cast edge liner



Padding

1 These casts require 2 layers of stockinette. Protection for cutting should be placed between these 2 layers, i.e a strip of 2mm adhesive felt.

2 Protection for bony prominences should be placed on top of the 2nd layer of stockinette, (Terry towelling stockinette should only be used if it very close fitting around the epicondyles of the humerus, otherwise opt for a 2nd layer of stockinette). 2mm adhesive felt is placed around the elbow posteriorly, covering both the medial and lateral epicondyles of the humerus and the olecranon process of the ulna. Place another strip of 2mm adhesive felt across the flexor surface of the elbow, and as usual, a circle on the ulna styloid.

Application

3 Quickly prepare and cut a 2 layer slab of the polyester material, reaching from just proximal to the palmar crease to cover the epicondyles of the humerus. The slab will need to be fanned out at the proximal end to achieve this.

4 Commence by applying this 2 layer slab, along the ulna side of the forearm (as described above). Using the remainder of the casting bandage, create a further 2 layer slab and apply it posteriorly from the lateral epicondyle to the medial epicondyle, taking a further turn of the bandage around the distal humerus to ensure the slab is firmly held.

5 Complete the cast with a careful 50/50 coverage, rolling from within out, creating 2 layers.

6 The bandage is brought up through the grip, thereby spreading the heads of the metacarpals. Pass through the grip twice and cut off any excess bandage.

7 It is essential to do a firm interosseous mould, as well as moulding into the palm and around the distal humerus, above the epicondyles. These are key to preventing supination and pronation of the forearm within the cast and must be held until the cast material has completely set. These moulds, along with the close fitting nature of the cast, are what makes it so efficient at stopping pronation and supination.

Trim the cast as described above and secure the stockinette.

In the unlikely event of this cast being used as an adjustable/removable cast, the split should be along the radius from the flexor surface of the elbow to the thumb hole.

Create a tongue of thin felt and insert into the split, then line the other cast edges where/if required.

Use hook and loop straps, or a cohesive bandage, to hold the cast together securely.



Delta-Cast® Conformable



Non-Fibreglass Cast Tape

Delta-Cast® Conformable has set a benchmark in standard and removable, non-fibreglass cast tapes. Delta-Cast® Conformable responds to the daily challenges of fracture management - it's distinctive construction provides rigid and semi-rigid casting options for primary and secondary casting applications where patient fit, comfort and compliance are critical.

Delta-Cast® Conformable is the only UK cast tape with clinical evidence¹ to support its use for focused rigidity casting.

Code	Size	Colour	Pack Qty	NHS SC Code
72280-00	2.5cm x 1.80m	○ White	1 x 10	EAJ2659
72280-01	5cm x 3.6m	○ White	1 x 10	EAJ308
72280-02	7.5cm x 3.6m	○ White	1 x 10	EAJ401
72280-03	10cm x 3.6m	○ White	1 x 10	EAJ402
72280-04	12.5cm x 3.6m	○ White	1 x 10	EAJ403
72281-00	5cm x 3.6m	● Pink	1 x 10	EAJ495
72281-01	7.5cm x 3.6m	● Pink	1 x 10	EAJ510
72281-02	10cm x 3.6m	● Pink	1 x 10	EAJ521
72282-00	5cm x 3.6m	● Dark blue	1 x 10	EAJ492
72282-01	7.5cm x 3.6m	● Dark blue	1 x 10	EAJ504
72282-02	10cm x 3.6m	● Dark blue	1 x 10	EAJ516
72283-00	5cm x 3.6m	● Yellow	1 x 10	EAJ498
72283-01	7.5cm x 3.6m	● Yellow	1 x 10	EAJ513
72283-02	10cm x 3.6m	● Yellow	1 x 10	EAJ525
72284-00	5cm x 3.6m	● Orange	1 x 10	EAJ494
72284-01	7.5cm x 3.6m	● Orange	1 x 10	EAJ508
72284-02	10cm x 3.6m	● Orange	1 x 10	EAJ518
72285-00	5cm x 3.6m	● Red	1 x 10	EAJ497
72285-01	7.5cm x 3.6m	● Red	1 x 10	EAJ512
72285-02	10cm x 3.6m	● Red	1 x 10	EAJ524
72286-00	5cm x 3.6m	● Purple	1 x 10	EAJ496
72286-01	7.5cm x 3.6m	● Purple	1 x 10	EAJ511
72286-02	10cm x 3.6m	● Purple	1 x 10	EAJ523
72287-00	5cm x 3.6m	● Green	1 x 10	EAJ493
72287-01	7.5cm x 3.6m	● Green	1 x 10	EAJ506
72287-02	10cm x 3.6m	● Green	1 x 10	EAJ517
72288-00	5cm x 3.6m	● Black	1 x 10	EAJ491
72288-01	7.5cm x 3.6m	● Black	1 x 10	EAJ502
72288-02	10cm x 3.6m	● Black	1 x 10	EAJ515
72289-10	5cm x 3.6m	Mixed†	1 x 10	EAJ490
72289-11	7.5cm x 3.6m	Mixed†	1 x 10	EAJ665
72289-12	10cm x 3.6m	Mixed†	1 x 10	EAJ514

†Mixed packs contain two rolls each of dark blue, black, red, purple and pink

High performance 3-D stretch polyester bandage

- Outstanding conformability allows uninterrupted application without the need to tuck and fold, and without creasing
- 3-D stretch helps to cover even difficult body contours in one go to help produce wrinkle-free casts, without pressure points
- Long-lasting durability and resiliency for minimal cast breakdown

Patented resin formula

- Silicone and latex-free resin is designed to support ease of application and to ensure strong, long lasting lamination, offering:
 - Consistent and reliable set times
 - High lamination of layers and end lay down for optimum stability, strength and reliability
 - A smooth sensation during moulding which results in a smooth finish to the cast
 - Application with any standard examination gloves

Countless options

- Versatile rigidity enables the practitioner to generate either traditional total contact casts (TCC) or focused rigidity casts (FRC) with just one product
- Removable casts can be made and re-applied for greater control of the healing process



1. Petty, A. C., Wardman, C., (1998). A randomized, controlled comparison of adjustable focused rigidity primary casting technique with standard plaster of Paris/synthetic casting technique in the management of fractures and other injuries. Journal of Orthopaedic Nursing. 2. 95 - 102