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Effective Casting Techniques



Casting is a commonly used technique for external coaptation or fixation in veterinary medicine and surgery. Casts are primarily used to provide rigid support of an injured limb and are typically molded around a fractured distal extremity to provide relatively motionless stability for bone fragments during the healing process. Healing occurs by secondary bony union and callus formation. As long as the joints above and below the fracture are included within the cast, bending and rotational forces are counteracted and adequate rigid stability is usually achieved. Compressive and distractive forces are not neutralized in most cases. Therefore, indications for casting include minimally displaced, closed, simple fractures of the radius, ulna, tibia, fibula, metacarpus, metatarsus, and phalanges.

Casting can be used successfully when a fracture depends on its intact paired bone to provide support (eg, fractured radius and intact ulna, isolated metacarpal/metatarsal fracture). Fracture ends should have at least 50% anatomic reduction in 2 orthogonal radiographic planes. Casting can also be used as adjunct support with internal fixation when necessary. Situations in which casts are not indicated include comminuted and significantly displaced fractures in which casting cannot neutralize forces present, fractures above the elbow or stifle, and distal radius/ulna fractures in toy or small-breed dogs.

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What You Will Need

- Scissors
- Adhesive tape (1 inch)
- Tongue depressor
- Primary, secondary, and tertiary layers for initial bandaging (cast padding, stretch bandages, flexible wrap)
- Toilet paper
- Fiberglass cast material
- Latex gloves (nonsterile)
- Cast saw

PROCEDURE PEARL

Because casting often requires manipulation of the fractured limb, anesthesia is strongly recommended. Superficial wounds should be clipped and cleaned and primarily covered with a nonadhesive dressing. Fractures with significant soft tissue trauma are generally not amenable to casting, unless frequent changes are done. Clip medium to long hair to ensure a snug fit of the cast.

STEP BY STEP APPLYING A CAST



1 Apply 2 tape stirrups (1/2- to 1-inch adhesive tape) to opposite sides of the distal limb. The stirrups should extend from a point at or above the carpus or tarsus and to approximately 6 inches below the digits. These will be laid over the bandage at a later time to prevent distal slipping of the cast. A tongue depressor can be placed between the stirrups to facilitate separation prior to application.

2 A minimum of 2 layers of snugly placed cast padding is applied next. Excessive use of padding, however, can lead to inadequate cast rigidity and cast loosening. With all layers of the bandage and cast, the nails of middle distal phalanges should be accessible to check for swelling. Begin at the distal-most aspect of the limb and allow for at least 50% overlap of the material. Padding over pressure points must be even to prevent casting pressure sores. If additional padding is desired over bony prominences (such as the elbow or calcaneus), foam or a padded donut is recommended.

3 Stretch bandage (Conform Stretch Bandages; Kendall, www.kendall-healthcare.com; or Kling; Johnson & Johnson, www.jnjfirstaid.com) is applied over the cast padding. This material should be applied evenly and compressively, but not pulled excessively tight. Two to 3 layers should be sufficient to hold the cast padding.

PROCEDURE PEARL
A tongue depressor can be placed between the stirrups to facilitate separation prior to application.

6 Gloves should be worn during wetting and application of the fiberglass material. The material is rolled onto the most distal portion of the desired area. A small amount of bandaging material should be visible distally, but the cast should encompass the distal paw, leaving only the distal portion of the middle 2 toenails exposed. At least 2 to 3 rotations should be done to anchor the material. The material should overlap itself no less than 50% and wrinkles in the material should be avoided. Additional wraps can be done at the level of the joint to provide additional support. Use at least 2 layers of cast material in small- to medium-sized animals and a minimum of 3 to 4 layers in large animals.





4 Toilet paper or other nonadherent material can be used to provide a layer that does not stick to the casting material. Toilet paper has an advantage because it does not require removal after cast application. When reapplication of the original cast is desired, this layer makes it possible to remove the cast easily from the stretch bandages beneath it.

PROCEDURE PEARL
Other nonadherent materials, such as polyethylene film (food wrap), can be used in this step, but materials that do not breathe should be removed after the cast is bivalved and prior to applying the final bandaging layer.



5 Commonly used fiberglass casting materials are made of a polyurethane-resin-impregnated fiberglass tape that is packaged in roll form (Vetcast Plus Veterinary Casting Tape, 3M, www.3m.com; Delta-Lite S, BSN Medical, www.bsnmedical.com). The material is strong, lightweight, and easy to apply. Widths typically vary from 2 to 4 inches. Wider material generally improves the strength of the cast, but the material must be appropriate to the animal's size. The fiberglass is porous and stretches to conform to the shape of the limb. The polyurethane resin is activated after the tape is immersed in room temperature water. The material typically sets up in 5 to 7 minutes. During all steps of bandage and cast application, the limb should be maintained in a neutral standing position. Fiberglass casting materials are usually radiolucent, so postcasting radiographs are recommended.

PROCEDURE PEARL
To optimize the ability of a cast to neutralize fracture forces, the cast should cover the joint above and the joint below the fracture site.



PROCEDURE PEARL
Gloves should be worn during wetting and application of the fiberglass material.



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7 Once the cast has hardened (at least 5 minutes after application), a cast cutter is used to cut the cast longitudinally into 2 halves (sagittal plane). These halves facilitate quick removal during emergency or routine cast changes.



8 Stretch bandaging material should be applied tightly enough to keep the cast in place. Strips of adhesive tape can be used to keep the halves together. One layer of material should be adequate to keep the cast securely together.



9 Stirrups should be removed from the tongue depressor and directed proximally onto the cast.



10 Bandaging tape (Vetrap; 3M, www.3m.com) should be applied last. Anchor the material with at least 2 layers distally and continue proximally. The material should overlap by at least 50% and should fit snugly over the cast to help keep it in place. As long as the toenails remain accessible, a layer of cotton elastic cloth tape (Elastikon; Johnson & Johnson, www.jnj.com) can be used to preserve the distal portion of the cast material.



PROCEDURE PEARL

During bandage and cast changes, do not remove the stirrups from the hair coat. Simply cut the stirrups flush with the distal extremity and replace the adhesive tape stirrup on top of the existing tape.

Postapplication Care

The cast should be evaluated within 24 to 48 hours of placement. Weekly rechecks are recommended and radiographic reevaluation is typically recommended after 4 to 6 weeks. The cast can be left in place (without changing) for a maximum of 4 weeks for adult animals, as long as owners are able to keep the cast clean and dry and the animal is comfortable and using the limb well. Cast changes may be needed more frequently in young, rapidly growing animals. Logically, leaving the cast in place for as long as possible without change is best for rigid stabilization and prevention of excessive movement. If superficial abrasions or wounds were present at the time of cast placement, the first cast change should not exceed 5 to 7 days.

Potential Complications

Warn owners about complications such as dermatitis and recommend frequent (weekly) evaluations. Owners should be instructed to evaluate for abrasions created by the cast ends and for toe swelling. If any confusion exists, a card can be marked or a measurement taken to document the original distance between toenails. The owners should understand that any abrasions or increase in distance between toes requires immediate evaluation by a veterinarian.

To protect the distal portion of the cast, an empty IV bag or plastic household bag can be placed over the foot when the animal is taken outside. The bag should be removed immediately once the animal returns inside. If the cast becomes damp, a hair dryer can be used to dry the area.

If acute reluctance to bear weight, foul odor, loosening of the cast, or licking and chewing at the cast is noted, immediate (same day) evaluation is crucial. When replacing the cast, the original cast halves may be used, but particular attention to fit and integrity of the material is important. When in doubt, replace the casting material. General anesthesia is recommended for the first 2 to 4 weeks if a cast change is necessary (especially if a new cast is required). ■

See Aids & Resources, back page, for references, contacts, and appendices.

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