ABSTRACT: Limb casts are commonly employed in equine practice to immobilize the limb and provide mechanical support in a variety of clinical conditions. The successful application of a cast requires proper case selection, a team approach, and adequate preparation prior to the procedure. Careful postoperative monitoring is imperative to avoid serious cast-related complications.

The indications for cast application in horses are many and varied. Various types of casts are used, depending on the degree of immobilization required. Although most casts are applied while the patient is under general anesthesia, application of casts to standing sedated patients has been performed safely and successfully.1–3 This article describes some of the most common materials available for equine cast application in the United States, Europe, and Australia. The methods of cast application are also described.

CAST MATERIALS
An ideal cast material is easy to apply and should harden rapidly without shrinking or becoming excessively hot (Table 1).4,5 The material should also be nonirritating, water-resistant, radiolucent, inexpensive, and easy to remove.3,4 Although plaster of paris conforms well to the limb, it has a low strength:weight ratio, is messy to work with, and is heavy to wear.4,6,7 Despite these disadvantages, some surgeons find that plaster of paris is useful as a cast liner under a more modern cast material and may lessen the likelihood of cast-induced pressure sores. A resin-impregnated foam has been introduced as a cast liner that bonds to the casting tape to form a functional unit, greatly reducing the likelihood of pressure rubs (Table 1).8

Although many types of casting tapes are available, polyurethane resin-impregnated polypropylene or fiberglass tapes are most commonly used.7,9 The tapes are stored in sealed packages and “cure” after immersion in water. The

*A companion article appears on p. 701.
<table>
<thead>
<tr>
<th>Proprietary Name</th>
<th>Material Structure</th>
<th>Manufacturer</th>
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<tbody>
<tr>
<td><strong>Cast padding</strong></td>
<td></td>
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</tr>
<tr>
<td>Soffban</td>
<td>Nonwoven 100% cellulose fleece</td>
<td>BSN Medical Ltd, Healthcare House, Goulton Street, Hull, HU3 4DJ, England</td>
</tr>
<tr>
<td>Soffban Natural</td>
<td>Nonwoven 100% cellulose fleece</td>
<td>Smith and Nephew, 211 Wellington Road, Clayton, Victoria, 3168, Australia</td>
</tr>
<tr>
<td>Soffban Plus</td>
<td>Nonwoven 90% polyester, 10% Biotryl (including 0.5%–0.58% Triclosan) fleece</td>
<td>BSN Medical Ltd</td>
</tr>
<tr>
<td>Soffban Red</td>
<td>Nonwoven 90% polyester, 10% Biotryl (including 0.5%–0.28% Triclosan) fleece</td>
<td>Smith and Nephew</td>
</tr>
<tr>
<td>Stockinet</td>
<td>3–4–inch diameter tubular polyester</td>
<td>3M Healthcare, D-46325, Borken, Germany or 3M Center, Building 275-4E-01, St. Paul, MN 55144-1000</td>
</tr>
<tr>
<td>Flexigrip</td>
<td>3–4–inch–diameter tubular polyester</td>
<td>Edwards Medical, Narellan, New South Wales, 2567, Australia</td>
</tr>
<tr>
<td>Specialist Cast Padding</td>
<td>50% cotton, 50% acrylic</td>
<td>Johnson &amp; Johnson, Inc, 325 Paramount Drive, Raynham, MA 02767-0350</td>
</tr>
<tr>
<td>Adhesive foam</td>
<td>5-inch–diameter latex foam combined with 100% latex-free zinc oxide adhesive</td>
<td>Victor Sports, 4 Hercules Street, Surrey Hills, New South Wales, 2010, Australia</td>
</tr>
<tr>
<td>Swanfoam (7 mm)</td>
<td>Closed-cell latex foam bonded to cotton moleskin cover with zinc oxide adhesive</td>
<td>Cuxson Gerrard &amp; Co Ltd, 125 Broadwell Road, Oldbury, Warley, West Midlands B69 4BF, England</td>
</tr>
<tr>
<td><strong>Cast lining</strong></td>
<td></td>
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</tr>
<tr>
<td>Reston Foam Roll</td>
<td>Polyurethane-impregnated adhesive foam</td>
<td>3M Medical and Surgical Division, 9/15 Childers Road, Thornleigh, New South Wales, 2120, Australia</td>
</tr>
<tr>
<td><strong>Cast materials</strong></td>
<td></td>
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<tr>
<td>Dynacast Optima</td>
<td>3–4–inch diameter tubular polyester</td>
<td>BSN Medical Ltd</td>
</tr>
<tr>
<td>Gypsona</td>
<td>Plaster of paris</td>
<td>BSN Medical Ltd; Smith and Nephew</td>
</tr>
<tr>
<td>Vet Cast Plus</td>
<td>Fiberglass fabric impregnated with polyurethane</td>
<td>3M Healthcare, St. Paul, MN</td>
</tr>
<tr>
<td>Dynacast Extra</td>
<td>Fiberglass fabric impregnated with polyurethane</td>
<td>Smith and Nephew, Inc, 2500 Distribution Street, Charlotte, NC 28203 (also as above in Australia)</td>
</tr>
<tr>
<td><strong>Cast protection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technovit</td>
<td>Methacrylate monomer</td>
<td>Jorgensen Laboratories, Inc, 1450 Van Buren Avenue, Loveland, CO 80538</td>
</tr>
<tr>
<td>Technovit 6091</td>
<td>Acrylic resin (liquid methyl methacrylate and 3% NN-dimethyl toluidine)</td>
<td>Heraeus Kulzer, Philipp-Reis-Straße, 8/13, D-61273, Wehrheim/Ts, Germany; DLC, 17-19 Horne Street, Hoppers Crossing, Victoria, 3029, Australia</td>
</tr>
<tr>
<td>Vet-lite</td>
<td>Thermoplastic coated cotton flock</td>
<td>Runite SA Av. de la Cooperation, 9 B-4630 Micheroux, Belgium; Jorgen-Kruse, Unit 1, 4 Hudson Avenue, Castle Hill, New South Wales, 2154, Australia</td>
</tr>
</tbody>
</table>

*The listing provided here is not exhaustive.*
Figure 1A—Prior to cast application, the shoe is removed and the hoof is cleaned and pared.

Figure 1C—Double-layered tubular stockinet is placed (without disturbing the initial dressing) and is threaded over the wires.

Figure 1E—Casting tape is applied over the cast liner.

Figure 1B—Two holes are drilled in a similar orientation to horseshoe nails.

Figure 1D—The cast liner is moistened and applied over the stockinet.

Figure 1F—Wires are cut prior to completion of the distal extremity of the cast.
resin is tacky when fresh and binds adjacent layers of tape as they are applied. The cast is then formed by lamination of compounded layers.3

Polypropylene cast tape is strong but not very durable; therefore, the weight-bearing surface of the cast is usually protected with additional materials.3 Cotton flock coated with thermoplastic polymer is very tough and, when heated, can be easily applied over the casting material at the sole. Acrylic resin may be used over this to further protect the cast from abrasion at its weight-bearing surface.

CAST APPLICATION
All equipment and materials for the procedure should be prepared in advance to avoid any delay in placing cast layers, which may result in poor lamination. Although there are several reports of applying a limb cast to a standing sedated horse, clinicians must be aware that movement or weight bearing before the cast material “cures” may result in stretched, misfitting casts. This may cause cast-related complications that necessitate early removal of the cast.2 In most cases, general anesthesia can be used to minimize movement; anesthesia also is often required for an associated surgical procedure.

Before application of the cast, the horse’s shoe must be removed and the foot should be cleaned and pared, either with a hoof knife or mechanical instrument (S-B...
An oscillating saw is used to make the initial superficial saw cuts. A distinct decrease in resistance is felt as the saw penetrates the full thickness of the cast from proximal to distal. Manual separation of the two halves completes cast removal.

Power Tool, Dremel, Chicago, IL; Figure 1A). A topical antiinfective agent, such as povidone iodine, may be sprayed onto the sole and hoof, avoiding the coronet. The limb should be clean and dry in order to avoid focal pressure points. Surgical wounds should be dressed appropriately followed by an optional double layer of synthetic orthopedic padding (Table 1). Two holes are drilled in between the sole and the wall with the orientation similar to the placement of a horseshoe nail, either at the toe or the heel, depending on the surgeon's preference (Figure 1B). A wire is placed through both holes from the solar surface of the hoof.

A rolled, double layer of 7.6-cm–diameter tubular polyester (Table 1) should then be applied over the wires and orthopedic padding without folding or wrinkling the underlying orthopedic padding (Figure 1C). Thicker cast padding material is placed at the top of the cast. The wire is then attached to a rope through which tension is applied to pull the hoof into the desired position for casting. Alternatively, a large screwdriver or similar instrument may be placed through the wire to act as a lever on the distal limb. The cast liner is
moistened and applied over the stockinet (Figure 1D). Casting tape is then applied before the cast liner cures and may commence at either the top or base of the cast (Figure 1E). The first layer should be applied evenly with little tension. Like the underlying padding, the cast material should be applied evenly without folding or wrinkling. Each “spiral” of tape should overlap the previous one by half its width and subsequent layers should be applied with increasing tension. Normally, a minimum of five to six layers of casting tape are required to complete a cast that will be strong enough to avoid failure. Wires placed in the hoof are then cut and incorporated into the cast prior to completion of the distal extremity of the cast (Figure 1F). Prior to applying the final roll of casting tape, the stockinet is pulled over the previously applied and hardening cast tape to create a smooth “rim” to the top of the cast (Figure 1G). The final roll of cast material should incorporate the stockinet (Figure 1H).

Thermoplastic cotton flock (Table 1) may then be applied over the distal aspect of the cast to increase abrasion resistance (Figure 1). This material may also be used as a “heel” wedge, if deemed necessary. Finally, polymethylmethacrylate acrylic is applied to the distal limb of the cast as well as to the flock to further improve abrasion resistance (Figure 1J).

**COMPLICATIONS**

Cast application is not entirely without risk. The most common complication associated with casts is the formation of pressure or rub sores. If these sores are detected early (usually by virtue of a decrease in level of comfort of the horse), they generally heal by second intention and pose little long-term consequence.

Rupture of the peroneus tertius and avulsion of its origin at the distolateral femur are well-recognized complications of full limb hindlimb casts. Changes to articular cartilage matrix associated with cast application have been documented but are generally accepted to be of little clinical consequence.10 Biaxial sesamoid bone fracture, secondary to cast-induced osteopenia, has been reported in two horses.11 Coxofemoral luxation is an uncommon complication that has been documented in two foals following hindlimb cast application.12

**CAST REMOVAL**

Although the use of preplaced fetotomy wire to facilitate cast removal has been reported,7 most clinicians use an oscillating saw to remove casts. First, superficial “score” cuts are made on the medial and lateral aspects of the cast with the cast saw (Figure 2A). These act as a guide for the subsequent full-thickness cuts necessary to “bivalve” the cast prior to removal. Casts are cut from proximal to distal and a distinct “give” is felt as the cast saw is moved progressively down the leg, indicating that the full thickness has been penetrated (Figure 2B).3 Care must be taken not to incise the skin or deeper structures with the cast saw, particularly over joints and the coronary band where cast saw–related injuries tend to occur. Finally, a cut along the solar surface of the cast is made and the two halves formed are manually pulled apart (Figure 2C). Cast spreaders may be useful in facilitating division of the two halves.

**CONCLUSION**

The application of casts to the equine limb should be properly planned. Modern synthetic materials are currently available; however, careful application is the key to giving the best chance of achieving adequate and complication-free rigid immobilization of the limb.

**REFERENCES**

10. Richardson DW, Clark CC: Effects of short-term cast immobi-


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**ARTICLE #6 CE TEST**

The article you have read qualifies for 1.5 contact hours of Continuing Education Credit from the Auburn University College of Veterinary Medicine. Choose the best answer to each of the following questions; then mark your answers on the postage-paid envelope inserted in *Compendium*.

1. Plaster of paris
   a. is no longer used as a cast material.
   b. has a high strength:weight ratio.
   c. is sometimes used as a cast liner.
   d. is the ideal cast material.

2. Resin-impregnated foam
   a. is commonly used as a cast liner.
   b. increases the risk of pressure sores.
   c. is difficult and messy to work with.
   d. does not bond to any casting tape.

3. Wires are placed in the hoof to
   a. increase abrasion resistance.
   b. help position the limb correctly and stabilize the limb during cast application.
   c. improve the curing of cast materials.
   d. reduce the expense associated with casts.

4. Cast application is
   a. impossible in the standing horse.
   b. easy to accomplish without assistance.
   c. best performed when materials and equipment have been prepared in advance.
   d. best performed at night.

5. Cast materials commonly used in equine practice
   a. are difficult to apply.
   b. require ultraviolet light in order to harden them.
   c. are not economical.
   d. achieve a high strength:weight ratio in a short time.

6. Methylmethacrylate is applied to casts in order to
   a. decrease the incidence of pressure sores.
   b. decrease the likelihood of infection.
   c. decrease the costs incurred in casting.
   d. increase wear resistance of the cast’s distal extremity.

7. The most common complication of casting the equine limb is
   a. damage to articular cartilage matrix.
   b. the development of pressure sores.
   c. proximal sesamoid bone fracture.
   d. limb fracture on recovery from general anesthesia.

8. Which of the following is not an indicator that the cast should be removed?
   a. cast fracture or creasing
   b. abnormal or excessive discharge from the cast
   c. decrease in comfort
   d. increased appetite of the patient

9. If in doubt regarding the necessity for cast removal, the clinician should
   a. administer a broad-spectrum antibiotic.
   b. administer an NSAID.
   c. remove the cast.
   d. increase the level of exercise.

10. Cast removal is
    a. difficult to accomplish in the standing horse.
    b. without risk of injury when performed using an oscillating saw.
    c. easy to accomplish with fetotomy wire that has not been preplaced.
    d. mostly performed using an oscillating saw.