Brief Notes

Removal of Corneal Foreign Bodies: An Instructional Model

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ABSTRACT
A simple method for inflicting corneal foreign body injuries on bovine eyes is described and illustrated. The subsequent use of these eyes for teaching corneal and rust-ring removal is demonstrated. This method is suitable for instruction of large numbers of students and could be included in an undergraduate curriculum.

Corneal foreign body injuries occur commonly, yet the primary-care physician is often poorly trained in their removal. This can result in delayed and/or suboptimal treatment and considerable inconvenience to the patient, particularly in remote places where ophthalmic resources are scarce.

The description of corneal foreign-body removal in standard undergraduate texts is rudimentary and is no substitute for practical experience. In many undergraduate teaching programs there is insufficient opportunity to gain experience in corneal foreign-body removal.

We describe a simple method for inflicting corneal foreign body injuries on bovine eyes and the subsequent use of these eyes for teaching corneal foreign-body and rust-ring removal.

MATERIALS AND METHODS
Freshly harvested bovine eyes are obtained from abattoirs, put on ice, and transported to the laboratory.

They can be kept in the refrigerator for 24 hours or longer using the methylcellulose preservation technique.1

The eyes are placed on a plastic tray (Fig 1), and brought close to an angle grinder to which a piece of metal is applied. (The operator should be wearing appropriate protective gear, including glasses.) Some experimentation is required to produce foreign bodies of an appropriate size and number, lodged at a range of corneal depths (Fig 2). We used a range of grinder blades and concrete-reinforcing steel. Excess debris was washed off under a running tap. In this way large numbers of eyes with corneal foreign bodies, suitable for class instruction, can be quickly prepared.

By leaving eyes with embedded foreign bodies in the refrigerator overnight, rust rings closely resembling those found in the human cornea can be produced.

The eyes are then mounted in specially designed perspex holders (Fig 3). These are made from clear plastic blocks, measuring 40 × 40 × 20 mm, with a central cup, 28 mm in diameter. A rubber suction bulb is attached to the back of the eye-holder via a tube. With

FIGURE 1: Angle-grinder-generated metallic foreign bodies directed at a bovine eye.

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application of suction, an eye can be securely held in place for long periods of time.

The eyes attached to the perspex holders are then secured to a slit lamp, using a series of metal rods and retort-stand clamps such as are readily available in many laboratories (Fig 4). Allowing students to position these eyes at the slit lamp provides valuable training for aligning human eyes.

Instruction in corneal foreign-body and rust-ring removal then proceeds. Our preferred technique is to use a small-gauge hypodermic needle secured to the end of a cotton bud, the latter functioning as a “handpiece” (Fig 5). By means of a video monitor, the instructor can watch the students’ attempts and provide immediate feedback. If insufficient slit lamps are available, loupes can be used.

FIGURE 4: Bovine eye mounted on an eye-holder and attached to a slit lamp.

FIGURE 5: Instructor demonstrating corneal foreign body removal.

DISCUSSION

Student response to this technique has been favorable, even enthusiastic. The skills of corneal foreign-body and rust-ring removal can be quickly acquired in this simulated setting. The fear of penetrating the eye is soon overcome when students discover, in fact, just how difficult this is to do. Some facility in the use of the slit lamp is also gained, since the slit lamp is used as a procedural tool, not just as a magnifier.

The eye-hand coordination gained may be beneficial in learning other skills such as evertting and observing the upper eyelid on the slit lamp. Finally, having watched the particles emanating from the angle grinder become lodged in the bovine corneas, students can readily appreciate the importance of appropriate eye protection as a public health issue.

Not surprisingly, instruction on corneal foreign-body removal ranks highly for inclusion in ophthalmic training in undergraduate medical curricula. Yet, despite the impracticalities of teaching this skill to large num-
bers of undergraduates, no satisfactory instructional model appears to have previously been developed.

In undergraduate textbooks and guides, foreign-body removal using cotton-tipped applicators is often advocated. This technique, however, can result in large corneal abrasions and invariably a rust-ring is left behind, requiring further treatment and usually referral to a specialist. Directions in standard textbooks are usually inadequate, and students usually do not have access to the more detailed instructions provided for nonmedical practitioners. The bovine eye model provides an inexpensive and convenient means of allowing students to develop the manual skills needed for the removal of corneal foreign bodies as well as providing some experience in the use of the slit lamp.

REFERENCES