The occasional corneal rust ring removal

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A rust ring may form within 3–4 hours of a small piece of iron-containing metal landing on the cornea. This typically occurs during operation of a grinding, filing or drilling machine. The iron itself is not soluble in the corneal tissue, but oxidation occurs and iron leaches into the surrounding cornea. This provokes an immune reaction, which is visible as a "rust ring."[1,2]

Rust rings are not in and of themselves harmful and will usually resorb gradually. If a rust ring is seen shortly after the injury, routine removal is usually not recommended because of potential damage to the eye. Removal is often easier 24–48 hours after the injury when the surrounding cornea will "soften."[2,3] If the rust ring is still noticeable 2–3 days after the injury, or ophthalmologic consultation is not easily available, débridement of a rust ring can be done. This is usually performed with the use of a bur, which has been reported to be the "quickest, safest, and most precise form of treatment for corneal rust."[4]

The instrument required is an Alger Brush II Corneal Rust Ring Remover, a low-torque bur powered by a single AA battery. This instrument is available from medical supply houses at a cost of about Can$75 (Fig. 1).

PROCEDURE

1. Lay out the materials you will need (Fig. 2):
   - loupe, magnifier or slit lamp
   - ophthalmic anesthetic drops
   - ophthalmic homatropine drops
   - Alger Brush II Corneal Rust Ring Remover
   - fluorescein drops
2. Calmly explain the procedure to the patient; this is the best anxiolytic (Fig. 3). Position the patient lying down comfortably, because the procedure is anxiety-provoking for



Fig. 1. The Alger Brush ll Corneal Rust Ring Remover.



Fig. 2. Equipment for corneal rust ring removal.

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many patients. Ensure adequate lighting. If the work that produced the injury involved a potential high-velocity injury (e.g., high-speed drilling), rule out penetration of the globe by clinical examination and radiography of the globe.

3. Anesthetize the cornea with anesthetic drops, either instilled directly onto the cornea (Fig. 4) or into a pocket of the lower conjunctiva while the patient looks downward. If there is ciliary spasm, you may wish to use homatropine to relieve the spasm.
4. Ask the patient to direct his or her eyes to a position that best exposes the rust ring (e.g., if the rust ring is in the inferior part of the cornea, have the patient look up).
5. Turn on the Alger instrument by twisting the base cap in the direction of the arrow on the cap. The sound of the drill may be frightening for patients, so you may choose to demonstrate the turned-on instrument to the patient before starting the procedure and explain that it will automatically shut off if the bur goes below the surface of the cornea.
6. Make yourself as comfortable as you can; reposition the gurney or bed if necessary.
7. Slowly approach the patient's eye with the drill of the Alger instrument, from laterally outside of the patient's visual field (Fig. 5).
8. As the instrument reaches the cornea, keep the



Fig. 3. A calm explanation of the procedure is the best anxiolytic.



Fig. 4. Anesthetize the cornea.



Fig. 5. Approach the patient's eye with the drill of the Alger instrument.



Fig. 6. Keep the bur tangential to the cornea, and slowly brush away the rust.



Fig. 7. You may want to use magnification, if available.

bur tangential to the cornea (i.e., in a horizontal position), and slowly use the instrument to "brush away" the rust. Imagine that you are brushing the rust ring away, not drilling it away. It is often helpful to brace yourself against the bed, wall or patient's forehead, and for an assistant to lightly stabilize the patient's head, if the patient consents (Fig. 6). Move the tip of the bur around the rust ring to remove as much of the rust as possible.

9. It is also helpful to then change position to the other side of the patient's head to check the rust ring from another angle, and remove as much as possible any rust remaining from the first attempt. A very small amount of brownish discoloration may be allowed to remain, especially if it is at the periphery of the visual axis and doesn't bother the patient; otherwise, it can be removed the next day when the patient returns for follow-up.[2,3] Turn off the instrument when finished.
10. You may wish to use a magnifier, such as a loupe or slit lamp, for the procedure. The magnification changes the perspective and takes some practice (Fig. 7).
11. Apply fluorescein staining to the eye to check the size of the subsequent abrasion. Note this in the chart for subsequent follow-up visits.
12. Traditionally, an eye patch was recommended. However, recent controlled studies have shown that patients who received treatment for corneal injuries without an eye patch had faster healing, less pain and less blurred vision.[3] A patch might now be considered only for very large corneal injuries occupying more than half of the corneal surface.[3]
13. A topical antibiotic ointment (e.g., erythromycin) may be prescribed for 3–5 days. For pain control, options include oral analgesia (e.g., acetaminophen, codeine, tramadol), topical ketorolac and/or homatropine for cycloplegia.[3]
14. Ask the patient to return the next day for a follow-up examination. Most often, the cornea will heal within a day or so. Complications include corneal ulceration (visible as a whitish discoloration around the ring), corneal stromal damage and scarring.[2] The authors have not seen any such complications in 30 years of practice.

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