Phenol matrixectomy is commonly used to treat onychocryptosis. The podiatric medical community has been progressively improving the technique of phenol application to avoid cases of burns. We describe a modification that uses gauze to provide a safe way for the phenol to be applied and prevents skin lesions due to phenol burns. (J Am Podiatr Med Assoc 98(5): 418-421, 2008)

Phenol was discovered in 1834 by the German chemist Friedlieb Runge, who isolated it from coal tar distillate and named it carbolic acid.1 Boll,2 in 1945, was the first to document its use to treat ingrown toenails. In 1969, Ross3 refined the technique by using phenol to ablate the matrix. A review of the literature4 found numerous articles that report the safety and effectiveness of phenol matrixectomy, with success rates of 80% to 100%,5-11 even in diabetic patients.12 Variations in how the phenol is applied to the proximal matrix have been described. For example, Kominsky and Daniels13 used a syringe to drip approximately 1 mL of liquid phenol onto the exposed area of the nail matrix as an alternative to using a cotton swab. The method of application is still the object of improvement by the podiatric medical community to avoid cases of burning, such as that reported by Sugden et al14 in 2001, which resulted in amputation of the left hallux due to burns after phenol application. We herein describe a modified approach to applying phenol that offers improved safety.

**The Modified Procedure**

The initial part of the surgical procedure is performed as usual. After disinfection of the hallux with antiseptics, a local anesthetic is injected, a digital tourniquet is applied, the eponychium and hyponychium are released from the nail plate, a nail splitter is used to cut the offending border of the nail plate, and the nail spicule is removed with a straight Kelly hemostat.

Once the spicule has been removed, there is often residual blood that must first be cleaned off before applying phenol to prevent coagulation of the blood proteins. Therefore, before the phenol is applied, the tip of a rolled-up dry sterile gauze bandage is introduced into the wound to absorb any residual blood, leaving the nail matrix and nail bed dry and free of blood (Fig. 1).

Once the nail matrix is exposed and there is no residual blood, a sterile gauze bandage is completely unfolded and then rolled up at one end to form a pointed tip. This tip is dipped in phenol and, to reduce the risk of excess phenol dripping onto the patient’s skin, is placed pointing upward so that the phenol soaks into the zone of dry gauze.

The tip of the sterile gauze is inserted through the exposed area down to the proximal matrix with the aid of a 2-mm-wide mini-osteotome until the entire zone of the matrix and the nail bed that was left exposed has been completely covered (Fig. 2). If during the application of the tip of the gauze some phenol spills over onto skin or healthy tissue, it is wiped off with the dry part of the same gauze or another piece of gauze.

Three such applications of 1 minute each are performed. One observes that the nail bed and the periungual tissue are left white as a result of the phenol coagulating the tissue proteins. The tourniquet is then released, and the phenol-soaked gauze is left in place for another 30 sec to coagulate any vessel that might otherwise subsequently lead to bleeding (Fig. 3).
With the tourniquet removed, one can see the effectiveness of the phenol gauze application technique, with complete coagulation of the matrix and vessels of the nail bed and no bleeding (Fig. 4). The hallux is wrapped in sterile gauze, and for postoperative follow-up the physician may use any medication. In the management of phenol matrixectomy, silver sulfadiazine\textsuperscript{15} and 10\% povidone iodine\textsuperscript{16} have been used, as described in the literature. Patients are seen regularly.

**Discussion**

There are several reasons to use gauze to apply phenol to the proximal matrix. First, the anatomy of the nail is difficult to reach with a cotton swab. The lateral and medial zones of the nail plate present what are commonly called the “horns of the matrix” (Figs. 5 and 6). The conical shape of the proximal matrix makes it difficult for the tip of a cotton swab to reach the region correctly. We insert the phenol-soaked tip of the gauze down to the proximal matrix with the aid of a mini-osteotome (Fig. 2), thus reaching more matrix tissue than is possible with the tip of a cotton swab.

It is not necessary to cut the large amount of nail plate that would be necessary for a cotton swab to reach the proximal matrix. With gauze, one can make a very fine tip so that the amount of nail border that has to be cut is far less because the gauze can be in-

**Figure 1.** The tip of a dry gauze bandage is used to clean the zone of blood.

**Figure 2.** The tip of the gauze, after being dipped in phenol, is inserted down to the proximal matrix with the aid of a mini-osteotome.

**Figure 3.** Dorsal view of the positioning of the gauze.

**Figure 4.** Note that less of the sides of the nail was removed than if the application had been performed with two cotton swabs.
than what would have to be removed to insert two cotton swabs.

Before applying the phenol, we first insert the tip of a dry sterile gauze bandage to wipe up any residual blood in the area of the matrix and the nail bed and to avoid the phenol coagulation of the blood proteins, because that would act as a physical barrier that would make the application of phenol less effective. For this purpose, the corner of a gauze bandage is rolled up to form a sufficiently narrow tip to reach the bottom of the horns of the matrix and absorb any residual blood.

Another advantage observed in our experience is that the gauze can be inserted with sufficient pressure to reach the proximal matrix without detaching the eponychium that still adheres to the healthy nail plate. It has been our experience that when introducing a cotton swab, it is sometimes necessary to apply excessive pressure so as to reach the proximal matrix. The result is that the eponychium is lifted up or detached so that phenol penetrates between the nail plate and the healthy eponychium, causing the new nail to grow striated or dystrophic on the side where the phenol was applied with the cotton swab.

Some professionals, on being unable to insert the cotton swab, opt to trim it to make it narrower and, hence, easier to insert. This technique, however, is time consuming, and prolonging the procedure is an important factor to consider if a tourniquet is being used, and it entails more manipulation of the material. The use of gauze has the further advantage that the risk of phenol spillage is lower because surplus phenol is absorbed by the dry part of the gauze due simply to capillarity, and any phenol that does spill can be wiped up with another piece of dry gauze.

Figure 6. Surgical extraction of the medial (A) and lateral (B) borders of the nail, showing the conical shape of the “horns of the matrix.”
We also concur with Kominsky and Daniels\textsuperscript{13} that not using cotton eliminates the possibility of leaving small amounts of cotton in the wound.

**Conclusion**

The traditional procedure of phenol and alcohol matrixectomy has been used successfully for many years, but the physician needs to look for safe ways to apply phenol to prevent the risk of lesions due to phenol burns. The gauze phenol method of application constitutes a safe alternative that avoids the risk of burns or other skin lesions during the application of phenol to the matrix.

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**References**