

FABRICATION of CUSTOM-MADE EAR PLUGS for SWIMMING

Reprinted from the Archives of Otolaryngology

July 1974, Volume 100

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Custom-made ear molds for swimming have been made of a new high-viscosity silicone polymer.

Many children are seen each year in our office with fluid in the middle ear (secretory otitis). On numerous occasions, paracentesis with the insertion of a stainless steel equalizing tube is the treatment of choice. The major problem produced by this procedure is the contraindication to swimming, as water entering the middle ear through the tube may initiate an otitis media. Although the avoidance of swimming may be a minor inconvenience to some, to the patient involved, particularly children, it often is of major importance. The ban on swimming that this procedure causes is often influential in postponing the tube insertion until the swimming season is over. However, with the increase in winter swimming in indoor swimming pools and introduction of swimming programs in school curricula, postponement has become undesirable.

Methods

A solution has been provided by the advent of new ear mold materials that provide a much tighter fit than previously possible. Because these new materials provide a realistically snug fit, they are being used extensively for custom-made sound defenders. If an ear mold can effectively shut out sound, then it theoretically should do the same for water. After trying several of these materials we found the most suitable to be a composite of high-viscosity silicone polymers (*Insta-Mold**) that produces a mold of the ear canal that is nontoxic, nonallergenic, nonshrinkable, and very soft. These "swim molds" are now custom-

made for each child who has had a tube inserted following myringotomy, as well as patients with chronic disease of the ears. The parents and patients are carefully instructed in the use and care of the molds.

Procedure

The ear mold is made by taking 4 ml of the polymer and adding a few drops of hardener solution. The solution is worked into the polymer by kneading with the fingers for one minute. The polymer can then be formed into a small cone to take the ear mold impression. The ear is pulled backward and upward, and the polymer is gently inserted and firmly forced into the canal. The remaining polymer is then tightly pressed to fill the concha and helix. While the polymer is still soft, the material is smoothed with the finger. The mold is allowed to cure for 15 minutes.

After the hardened impression is removed from the ear, the patient is taught how to insert the new mold. The swim mold is finally coated with a liquid silicone sealer (Fig 1). The patient takes the mold with him and can use it in eight hours. No additional protective device (eg, bathing cap) is necessary when swimming (Fig 2).

Results and Complications

This procedure was utilized on 135 children, and they used the swim mold for a period of at least one year. In this group, only three infections resulted from swimming while using the molds (2%). Although the statistics indicate that our swim mold program has been very successful, caution must be used in any program of this type. Second only to the ear mold itself is the importance of parental guidance when a child is using the swim mold. There have been instances where the child has lost his mold and continued to swim. There were four such cases where the mold

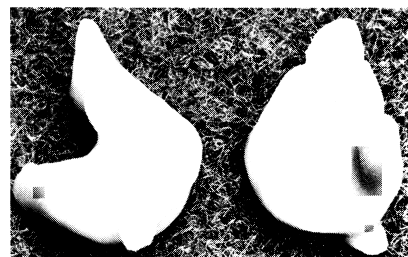


Fig 1.—Finished swim molds.

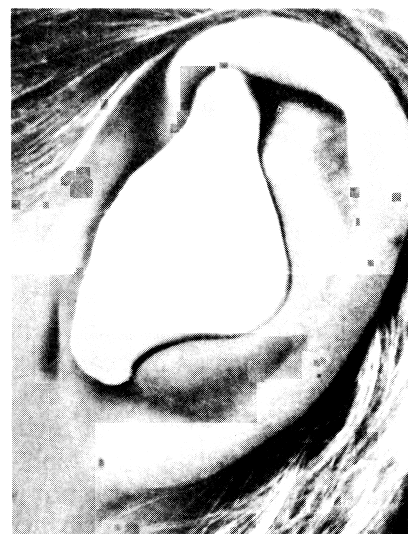


Fig 2.—Finished swim mold in patient's ear.

was not used during swimming and infection resulted.

All infections (seven cases) were treated successfully with systemic antibiotics and topically applied steroid antibiotic ear drops.

In summary, the new materials now available for the fabrication of ear molds make it feasible for the otologist to permit his patients with tubes or chronic disease of the ears to swim safely and avoid the hazard of water entering the ear canal and contaminating the middle ear.

The silicone polymer material used in this study was supplied by Insta-Mold Prosthetics, Inc., Philadelphia.

Accepted for publication July 10, 1973.
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*This is a highly specialized silicone, reinforced and treated with the highest level of organo-silicone groups to create greater water repellency and water resistance. This unique phenomenon is termed hydrophobia.