

Removal of superglue from the external ear using acetone: case report and literature review

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Abstract

The ability of superglue preparations (cyanoacrylate) to bond instantly to skin as well as inanimate objects presents a special problem when instilled into the external ear canal. We present two cases of patients who had it successfully removed under the microscope with the help of acetone BP to debond it from the skin, without any damage to the meatus or the tympanic membrane. The third patient had the superglue removed without the help of acetone but sustained damage to the tympanic membrane. A literature review of similar cases is included.

Key words: Ear canal; Foreign body; Cyanoacrylates; Acetone.

Case 1

An 81-year-old man presented himself to the Accident and Emergency department at West Middlesex University Hospital in October 1994 with sudden deafness in his left ear after having inadvertently squeezed the contents of a superglue bottle into his left ear. His sister noticed that his ear was filled with a solid pink substance and took him to hospital. The casualty officer found that the left concha and external ear canal were completely occluded by the superglue which had bonded to his skin (Figure 1). He was referred to the otolaryngology department. On further questioning there was no past history of ear problems except wax in his ears. Examination confirmed complete occlusion of the left meatus with a solid mass of glue and the right ear contained wax. Since the glue had bonded firmly to his skin it was impossible to move it from side to side. The skin was not inflamed. On tuning-fork testing, Rinne test was positive on both sides but Weber test lateralised to the left affected ear.

The impacted wax was removed from the right ear under microscope to reveal a normal intact tympanic membrane. An assessment of the shape of his external meatus was noted. For the left ear, a cotton wool ball soaked in acetone BP was placed over the meatus for a few minutes after which it was found that the superglue mould could be moved from side to side. Since the acetone evaporated very quickly a second acetone-soaked cotton wool ball was applied for another five minutes. The superglue could then be peeled off the skin using Rosen's dissector. The patient found this slightly uncomfortable because the hairs of his external meatus were embedded in the glue (Figure 2). Eventually the mould of glue was removed in one piece without injury to the skin, which was partly covered with white flakes of dried acetone. Fortunately, deep in the meatus there was impacted wax which had protected the tympanic membrane and it remained intact. A pure-tone audiogram after removal showed a bilateral symmetrical high frequency sensorineural deafness consistent with presbycusis. The patient

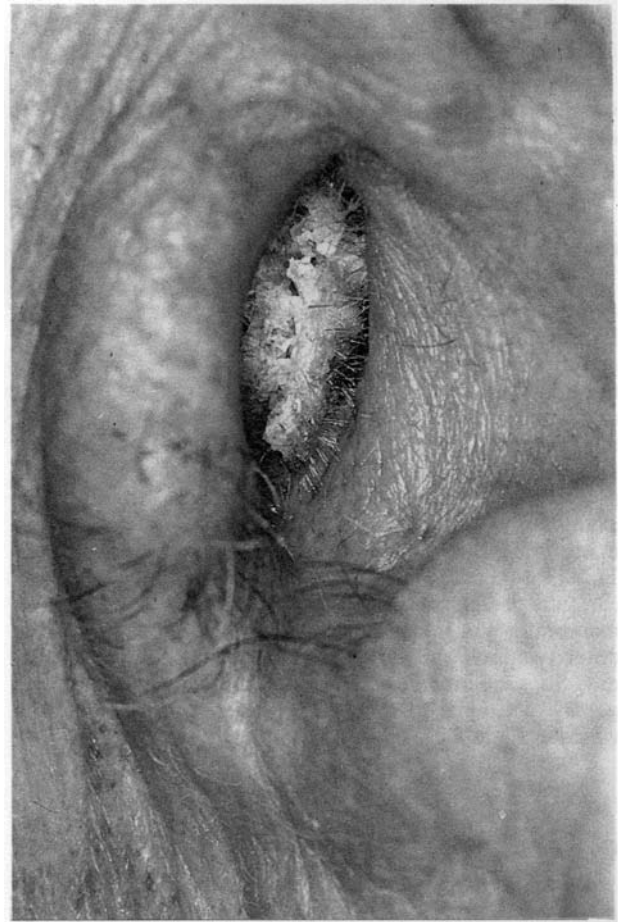


FIG. 1
Complete occlusion of left concha and meatus.

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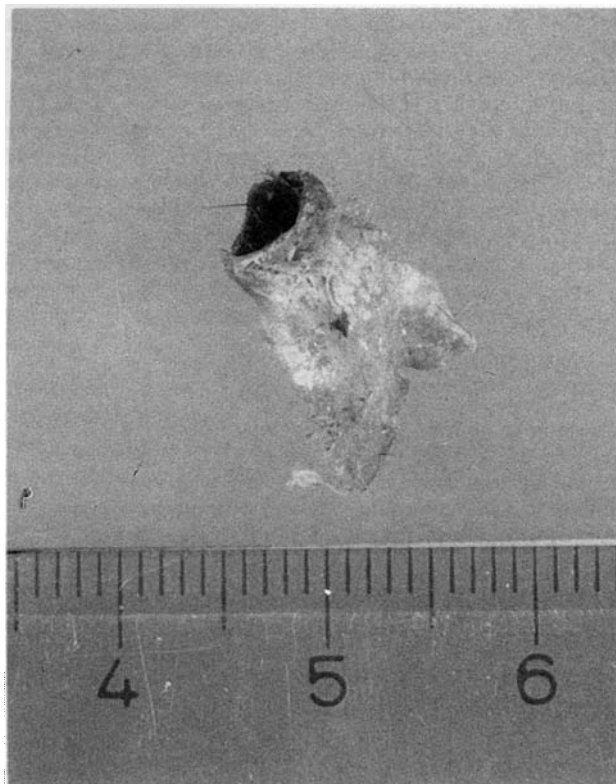


FIG. 2

Lump of solid superglue with meatal hairs and wax.

was pleased that his hearing had been restored in his left ear, and was discharged.

Case 2

A 4-year-old Asian boy was referred from the Accident and Emergency department with superglue in his right ear. Earlier, the child had complained of right earache when his grandmother instilled the glue into his right ear by mistake thinking they were ear drops. There was no past history of ear problems. On examination the right ear was completely occluded with a solid mass of glue. The left ear showed signs of otitis media with effusion. Since the child would not tolerate further examination, he was admitted for examination under anaesthesia. A cotton wool ball soaked in acetone BP was placed over the meatus for ten minutes. This loosened the glue from the skin and the glue was carefully peeled off together with some wax. The tympanic membrane was intact apart from a slight abrasion of the outer tympanic membrane layer. He was discharged that day. Subsequent follow-up examination revealed a small patchy superficial opacity on the posterior part of the drum which was mobile. An audiogram was normal.

Case 3

Retrospective review of hospital records, found a case of a prisoner who was brought to the Otolaryngology department having intentionally instilled superglue into his right ear. The duty registrar attempted to remove it under general anaesthetic using the microscope. Unfortunately, part of the superglue was bonded to the tympanic membrane which was torn on removal. No acetone had been used.

Discussion

The availability of cyanoacrylate (superglue) for domestic use is widespread and it is found on many household shelves. As the size and shape of superglue bottles are similar to many ear and eye drops bottles, they can easily be confused especially by people with deficient eyesight.

A literature search revealed few reported cases of superglue as a foreign body in the ear.

A case reported by Wight and Bull (1987) of superglue in the external auditory meatus needed an endaural incision under a general anaesthetic to remove the superglue in fragments. This patient had had a previous post-aural incision for a mastoidectomy and thus had a narrowed meatus.

A second case reported by Pollock (1988) reported removal of superglue adherent to the tympanic membrane in fragments via a permeal approach under general anaesthetic. The most superficial layer of the tympanic membrane was removed but without creating a perforation.

No acetone was used in the above two cases. However, we came across one case reported by White and Broner (1994) where organic solvent acetone was used successfully to dissolve polystyrene (Styrofoam in USA) impacted in the external auditory meatus of a child. This was followed by irrigation with sterile water. Although it was slightly uncomfortable for the child without a general anaesthetic, no adverse effects of acetone were reported.

A review of 98 cases of various foreign bodies in the ear by Bressler and Shelton (1993) in Southern California, reported a diversity of foreign bodies of which cockroaches, beads, and cotton wool were the commonest, but they did not report on superglue as a foreign body.

The use of solvents such as acetone to loosen the superglue from the skin proved successful in our reported cases. The use of other solvents such as toluene, xylene, nitromethane and methylene chloride have been suggested to dissolve superglue (Picton-Robinson, 1977) in the case of superglue bonded to fingers. However, these substances are generally toxic and are irritant to the skin and mucous membranes.

Acetone has a low systemic toxicity. Dermal exposures are well tolerated in the short term but chronic skin exposure to acetone can lead to an irritant dermatitis. Although the toxic effects on the external ear canal may be local and minimal, the ototoxicity of pure acetone on the delicate structures of the middle and inner ear is unknown and has not been studied. When used to dissolve polystyrene, the ear canal should be irrigated immediately with sterile water to inactivate acetone's solvent properties. It is also mentioned that propylene glycol is chemically similar to acetone, but has ototoxic effects in experimental animals (White and Broner, 1994). However, acetone evaporates very rapidly leaving only white flakes on the skin and sterile water irrigation was not needed in the two cases we reported.

We consulted two companies who manufacture the superglue product for their advice. One company (Bostik Ltd.) actually produce an emergency skin release agent; this agent contains gammabutyrolacetone. The other company (Loctite UK Ltd.) recommended the use of warm soapy water or a slightly alkaline aqueous solution.

The authors decided to carry out their own small experiment to find which solvent worked best to detach superglue applied intentionally to a hair-bearing area of the author's skin. We noticed that the superglue bonded to the palm skin is stronger and more instant than the skin of the rest of the body. We found soapy or alkaline water ineffective. We tried four solvents in turn:

- (1) Bostik emergency skin release (gammabutyrolacetone).
- (2) Nail polish remover (contains acetone and 27 other substances) Cutex™ by Rimmel International Ltd.
- (3) Adhesive plaster remover (trichloroethane) Zoff™ by Smith & Nephew Ltd.
- (4) Pure acetone BP.

We found that acetone BP was the most effective, although the others also worked.

Conclusion

In the cases we reported we found that pure acetone BP was a simple, effective, cheap and relatively safe way of loosening superglue from the skin of the external auditory meatus and enabled subsequent removal without injury to structures. It is important to establish whether there is a previous history of ear disease and the patient should be warned of the possibility of a tympanic membrane tear on removal. The removal should be carried out by a trained otolaryngologist using a microscope. We also recommend that people keep their ear drops in a medicine cupboard well away from superglue bottles.

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