COMPLICATIONS RELATED TO USING ADHESIVE AGENTS FOR EAR FOREIGN BODY REMOVAL

Abstract

Objective: To reduce procedural complications from external auditory canal (EAC) foreign body (FB) removal outside the setting of an otolaryngology (Otol) office by providing educational in-services for pediatricians and emergency department (ED) providers.

Method: case series and survey study performed in a tertiary referral center in addition to literature review.

Result: The charts of three patients with complications resulting from adhesive ear FB removal in the ED were reviewed. Two patients were managed with medication prior to having ear canal access related to the adhesive usage. One patient had subtotal tympanic membrane (TM) perforation and ossicular chain disruption resulting in conductive hearing loss. Literature review showed difference between otolaryngology and pediatric/remote medicine journals in the recommended instruments for EAC FB removal and the success rate of FB removal. Fifty-two surveys were sent out to the ED providers regarding the approach for EAC FB removal with an 84% response rate (n=45). The result showed 70% (n=31) of the providers are familiar with the method while 53% (n=28) had tried it despite no supportive evidence and 87% of the providers reported learning this method through colleagues.

Conclusion: Adhesive agents are not a recommended method for ear FB removal due to high incidence of complications. Emergency medicine literature contains inconsistent recommendations for instruments and techniques for ear FB removal. The development of an evidence based, educational in-service curriculum for non-otolaryngologist providers will help reduce the procedural complication rate from EAC FB removal.

Introduction

EAC FB is a commonly encounter issue in pediatrics and the removal of the FB can sometimes be challenging. Children with EAC FB frequently present to their pediatrician or ED but occasionally are referred to the Otol office. Removal of EAC FB requires different methods and instruments which vary based on the FB. The FB can be classified as graspable or non-graspable, round or irregular and organic (e.g. pumpkin kernel) or non-organic (e.g. plastic bead). Difficult EAC FB usually have characteristics such as spherical shape, proximity to the TM, duration in the EAC for more than 24 hours, which causes caustic or proinflammatory in nature. Successful retrieval becomes more difficult with each attempt.1 Certain types of FB warrant more urgent removal than others, examples of these FB include button batteries, live insects, organic matters and penetrating FB (e.g. sharp objects).2,3 Multiple attempts at EAC FB removal are associated with increased risk of pain, bleeding, patient anxiety, loss of cooperation, and otologic complications (TM perforation, ossicular chain disruption, vertigo, facial nerve injury, conductive and/or sensorineural hearing loss). EAC abrasion or laceration is the most common complication of FB removal and it can occur in up to 50% of patients.4,5 Failed attempts at EAC FB removal can make subsequent retrieval more difficult after patients have had a traumatic experience, thus the ED provider should consider referral to an otolaryngologist when the initial attempt of ear FB removal is not successful.6 It was suggested that patients with spherical EAC FB should be referred to the otolaryngology clinic for removal as the ED had lower success rate of removal of these FBs.7

Methods

The study was approved by the Baylor College of Medicine/Texas Children’s Hospital Institutional Review Board. This is a study survey, retrospective case series review of patients presented for treatment in a tertiary referral center in addition to literature review. The survey was conducted via Survey Monkey and distributed by the Texas Children’s Hospital Emergency Department to the providers (MD, NP and PA). The survey was not validated as this was designed as a preliminary study to understand the practice pattern.

Cases

In our index case, an 8-year-old boy was seen in the ED with a popcorn kernel in the left EAC, multiple unsuccessful attempts were made to remove the FB including the use of an adhesive (Dermabond). Patient was sent home with ear drops and referred to the otolaryngology clinic for follow up. The patient was seen in the clinic and scheduled for the EAC FB removal in the operating room (OR) due to EAC edema. In the OR, it was noted after the FB removal that the FB had been pushed into the middle ear resulting in a large TM perforation in addition to ossicular chain disruption. Patient was later discharged with a moderate conductive hearing loss and underwent corrective surgery.

The other two cases involved patients who had EAC FB removed using adhesive agents in the ED. The FB was successfully removed but patients had EAC abrasion traumas which were managed with otic drops.

Results

1. Response rate of the survey was 82% (n=45).
2. The majority of the responding provider was 34 MD and 11 NP/PA (Figure 1).
3. Bimodal distribution of practice pattern: 42.2% (n=19) has been in practice for 1 year and another 42.2% (n=19) has been in practice for more than 10 years. (Figure 2).
4. 97.8% (n=44) responded that they had treated patient with ear FB and 70.5% (n=31) responded that they had heard of using adhesive to remove the FB. (Figure 3).
5. Success rate varies (Figure 6).
6. 11.4% (n=5) will use adhesive FB removal in the future. 11.4% (n=5) will use adhesive again in the future for FB removal.

Discussion

Karimnejad et al studied 1197 pediatric patients in 2017 with EAC FB and reported the results of FB removal in ED using otolaryngology clinic.8 The authors were otolaryngologists and the result was published in an otolaryngology journal. Patients seen in the ED required more attempts with lower success rate in comparison to clinic attempts at FB removal. Cotton, paper, solid objects, and anesthetics had higher rate of successful removal than round shaped objects. Another article published in an otolaryngology journal in 2002 showed that to grasp objects had a 64% success rate whereas FB that were pushed in with 34% complication rate while difficult to grasp objects had a success rate of only 45% with a complication rate of 70%.9 In the same year, Marcin documented an 80% successful EAC FB removal by emergency physicians and her study was published in an emergency medicine journal. She also reported a 12% complication rate related to ear FB removal. The success rate of non-otolaryngologist for EAC FB removal increased to 76% in an 85 children study in one year when an otolaryngologist was dedicated to ED use.4

Per emergency medicine literature, many nasal and ear FB can be removed in an ED or primary care physician (PCP) office using commonly available instruments as long as the FB is noted to be spherical.10 EAC FB removal is a complex process and requires modification of unconventional instruments for EAC FB removal. Mantoop et al listed modifying instruments for EAC FB removal such as forming a hook with a 25-gauge needle to remove an irregularly shaped soft FB such as an eraser or using an unfolded paper clip as a right-angle hook.11 However, not all the instruments are available in all emergency department. In our institution, the ED provides access to irrigation, alligator forceps, Katz extractor, plastic cannulae and Dermabond on an applicator tip using an otoscope for visualization.

Multiple authors reported using cyanoacrylate glue tipped probes for EAC FB removal but all the reports are limited to personal experience with no strong scientific evidence. Cyanoacrylate glue is an on an applicator tip recommended for removal of wedged, smooth, round FB and it required the child to stay still for approximately 25-60 seconds while the glue dries. The reason cyanoacrylate glue is not generally recommended in pediatric patients is that children generally will not be able to stay still for 60 seconds during the drying of the glue to the foreign body with high risk of the glue making contact with the TM.

Figures

Figure 1 – provider distribution
Figure 2 – years in practice
Figure 3 – have you heard of using adhesive for FB removal
Figure 4 – Source of learning for using adhesive technique
Figure 5 – tried adhesive for FB removal
Figure 6 – Success Rate

Conclusions

The available literatures from both emergency medicine and otolaryngology have been reviewed for this article with the goal of developing an educational in-service curriculum for non-otolaryngologist providers with the support of evidence-based medicine to help reduce the procedural complication rate from EAC FB removal.

References

9. No PMID assigned. Authors stated they have had personal experience with no strong scientific evidence.
10. No PMID assigned. Authors stated they have had personal experience with no strong scientific evidence.
11. No PMID assigned. Authors stated they have had personal experience with no strong scientific evidence.

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