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Emergency Department Management of Foreign Bodies of the External Auditory Canal in Children

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Objective: To evaluate the management of foreign bodies in the external auditory canal (EAC) in pediatric patients by emergency department personnel.
Setting: Tertiary care pediatric hospital emergency department.
Study Design: A retrospective chart review of children with foreign bodies of the EAC over a 12-month period. Age, foreign body type, rate of successful removal, and complication rates were recorded. Foreign bodies were categorized into two groups: objects with smooth surfaces and not easily grasped (nongraspable) and objects with irregularly shaped surfaces and easily grasped (graspable).
Results: Thirty-six patients were brought to the emergency department over a 12-month period with foreign bodies of the EAC. Their mean age was 6.5 years (range, 1–16 yr). Numerous foreign bodies were noted; beads were the most common. Successful removal was achieved in 53% of cases, and one or more complications were recorded in 47%. When the foreign bodies were grouped into nongraspable and graspable objects, the success rate for the nongraspable group was 45%, with a complication rate of 70%, whereas for graspable objects the successful removal rate was 64%, with a complication rate of only 14%. The difference in complication rates was statistically significant ($p < 0.001$.)

Conclusion: This study demonstrates that certain foreign bodies (graspable type) of the EAC in pediatric patients can be successfully managed by skilled emergency department personnel with low complication rates, whereas other foreign bodies (nongraspable types) may be better managed by early referral to an otolaryngologist. **Key Words:** Foreign body—External auditory canal—Pediatrics.

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A foreign body of the external auditory canal (EAC) in a child is commonly seen in the emergency department and the pediatrician's office. Although numerous case studies populate the literature with fascinating foreign bodies and novel means of removal, few case series exist. Cautious attempts at removal are usually recommended, with referral to an otolaryngologist for failures or complications (1–7). The recommendation for referral is emphasized in the otolaryngology literature because of the high complication rate that occurs when attempts are made to retrieve these objects in less than optimal conditions. It is financially and practically impossible to mandate that all foreign bodies in the EAC in children be removed by specialty-trained physicians. Yet, the development of practical triage criteria that could be readily used by primary caregivers to select which children are likely to tolerate removal with an acceptable complication rate in the primary setting would be valuable. This study evaluated successful removal rates of foreign bodies in the EAC in children and the associated complication rates achieved by personnel not trained in otolaryngology in a tertiary care pediatric emergency department. Unlike previous studies, this study divided the foreign bodies into two types: graspable and nongraspable. The successful removal rates and complication rates of the two groups were analyzed.

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PATIENTS AND METHODS

A retrospective chart review was completed to evaluate the cases of all children with foreign bodies of the EAC over a 12-month period at an inner-city tertiary care children's hospital. The removal methods included irrigation and direct removal with otoscopic visualization. Foreign body types, rates of successful removal, and complication rates were recorded. The foreign bodies were categorized into two groups: objects with smooth surfaces and not easily grasped (nongraspable) and objects with irregularly shaped surfaces and easily grasped (graspable). Assessment of statistical significance was completed by use of χ^2 analysis.

Thirty-six patients, 26 boys and 10 girls, were brought to the emergency department with a foreign body of the EAC over a 12-month period. Their mean age was 6.2 years (range, 1–16 yr). The majority (27) of the children were 8 years and under,

and 9 children were over the age of 8. Numerous types of foreign bodies (e.g., insects, seeds, candy, erasers, crayons, paper, foil) were noted; beads were the most common. Two patients had foreign bodies that could not be identified and were excluded from further analysis.

RESULTS

Overall, complications were recorded in 16 cases (47%). The complications included traumatized or perforated tympanic membranes, maceration of the EAC, and hematoma of the EAC. Successful removal was achieved in 18 cases (53%). When the groups were divided into nongraspable (20) and graspable types (14), the success rate for the nongraspable group was 45% (9 patients), with a complication rate of 70% (14 patients), whereas for the graspable group the success rate was 64% (9 patients), with the complication rate falling to 14% (2 patients) (Fig. 1). There were 5 failures (36%) in the graspable group without any complications. The nongraspable group had 11 failures (55%) with 10 complications (91%). The trend toward more successful removal in the graspable group did not reach statistical significance (64 vs. 45%, $p = 0.2$). Yet, the lower complication rate noted in the graspable group was statistically significant (14 vs. 70%, $p < 0.001$).

DISCUSSION

Children with foreign bodies in the EAC pose a fairly common and challenging problem for the pediatrician, emergency department, and otolaryngologist (1,2). These patients may present in a variety of ways. Pain and otorrhea are common. Other children will confess to having placed the object in their own ear. While some children have the incident witnessed, often the foreign body will be discovered incidentally on routine examination. Various other manifestations of foreign bodies in the EAC have been described. Case reports exist of cough and intractable hiccups secondary to foreign bodies of the EAC (3,4). Ansley and Cunningham (5) reported a case of a child with a persistent cough that was not relieved until a dime-shaped toy was removed from the EAC. An interesting report by Bressler and Shelton (6) described three incarcerated patients with syringe plungers in the EAC that apparently became dislodged when placed in the EAC to lubricate the plunger with cerumen. Why children place foreign bodies in their ears is speculative. Theories include irritation by preexisting otologic conditions such as cerumen impaction, otitis media, and otitis externa. Other factors such as mental retardation and curiosity were found to be less important than one would expect (1).

The EAC can be divided into two regions: the lateral one third, which is the cartilaginous portion, and the medial two thirds, which is bony. The bony portion is narrower and is lined with a very vascular and highly sensitive thin layer of skin. The slightest trauma to this portion will cause bleeding and pain. Many methods are used to extricate various types of foreign bodies, which have been well described (5,6). Whatever method is used, the operator usually has one or maybe two attempts before the patient loses his or her patience and becomes uncooperative. Further attempts with an uncooperative patient will inevitably lead to an otherwise avoidable complication.

Bressler and Shelton (6) described a series of 98 foreign bodies in the EAC, evaluated in the emergency room or upon referral. The majority of the patients were adults. Because management by an otolaryngologist was, all foreign bodies were eventually removed. Fifty-two patients had undergone previous attempts at removal, and complications occurred in 62%. The complication rate in otolaryngologist-managed foreign bodies was 5%. Ansley (5) reviewed 191 foreign bodies in the EAC in pediatric patients treated by otolaryngologists with a 13% complication rate. Thirty percent of foreign bodies required removal in the operating room. Both studies discuss the management of small alkaline batteries in specific detail. Because of the risk of liquefactive necrosis, irrigation should not be done. Removal attempts, which could result in bleeding and failure to remove the battery, are likewise discouraged. Expedient specialty referral is warranted (5,6). Dubois et al. (7) likewise re-

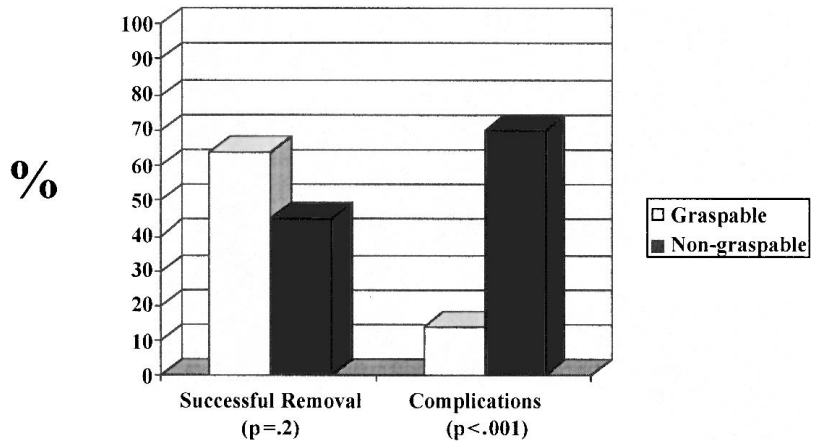

FIG. 1. Results of foreign body removal from the external auditory canal in 34 children: graspable versus nongraspable objects.

viewed 35 children who were treated by otolaryngologists for removal of foreign bodies in the EAC with a 31% complication rate.

The current study focused on management of foreign bodies in the EAC by nonotolaryngologists in the primary setting, with the objective of developing a means of predicting which patients could be treated successfully by the pediatrician or emergency physician, and which patients should be sent directly to the otolaryngologist.

When the total number of patients with foreign bodies of the EAC was reviewed, several variables were analyzed. Age, gender, and foreign body type were recorded. The range of foreign bodies was similar to that in previous studies (5,6). Age and gender had no significant bearing on outcome. However, when foreign body type was evaluated, an interesting trend emerged. The complication rates for smooth-surfaced objects were considerably higher than for those of irregularly shaped objects: 70% versus 14% ($p < 0.001$). This finding is understandable, considering that these objects cannot be readily grasped. Removal of smooth-surfaced objects requires a greater amount of depth perception and finer instruments than those commonly used in the emergency department or the primary care office. Critical to successful removal without complication is patient compliance, which can be limited to nonexistent in the pediatric population.

As indicated in this study, nongraspable foreign bodies in the EAC that were managed in the emergency room setting had a lower rate of successful removal, although it was not statistically significant ($p = 0.2$), and a markedly high complication rate, which was statistically significant ($p < 0.001$). Yet, when the foreign body was of a graspable type, the successful removal rate improved. Likewise, the complication rate became acceptably low at only 14%.

CONCLUSIONS

To have all foreign bodies of the EAC in children directly referred to otolaryngologists for management is not economically or practically feasible. This study indicates that foreign bodies of the EAC can be triaged by foreign body type to allow successful removal with low complication rates, while avoiding unnecessary referrals. Graspable foreign bodies may be successfully managed in an emergency department setting by appropriate personnel and referred to an otolaryngologist if removal is not achieved or if a complication occurs. Nongraspable objects would be better referred to a specialist upon diagnosis, because the successful removal rate in the primary setting is relatively low and the complication rate is high. The added cost of specialty referral will undoubtedly be well offset by the decreased rate of complications and treatments related to them.

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