



## Abstract

**Objectives:** To evaluate pediatric external auditory canal foreign (EAC) body extraction outcomes and identify factors predictive of successful removal.  
**Methods:** Retrospective review of pediatric patients with EAC foreign bodies in a single institution emergency department (ED) and otolaryngology clinic. Patient characteristics, foreign body type, removal attempts, success rates, and complications were evaluated with respect to clinical setting.  
**Results:** 1197 patients with EAC foreign bodies were identified, 759 (63%) of whom presented to the ED. The foreign object was successfully removed in 68% of patients presenting primarily to the ED and 93% of patients presenting primarily to the otolaryngology clinic ( $p < 0.05$ ). 78% of patients underwent successful removal in the otolaryngology clinic after unsuccessful attempts in the ED. Beads and rocks had the overall lowest odds of successful removal. Likelihood of removal decreased significantly after one attempt. Complications were reported in 35.7% of patients undergoing removal in the ED and 5.0% of patients undergoing removal in the otolaryngology clinic.  
**Conclusions:** The majority of EAC foreign bodies present to the emergency department and are successfully removed. However, direct referral to an otolaryngologist is recommended if the object is a bead/rock or after one unsuccessful attempt at removal.

## Introduction

External auditory canal foreign bodies are a common problem in the pediatric population and many children present primarily to the emergency department (ED) for treatment<sup>1,2</sup>. Previous studies revealed the majority of items can be successfully removed in the ED setting. However, an unsuccessful procedure may increase patient anxiety and decrease tolerance of subsequent attempts at removal necessitating the use of general anesthesia. We aim to describe characteristics of children with ear canal foreign bodies, identify factors predictive of successful foreign body removal, and generate recommendations to guide practitioners in the management of ear canal foreign bodies.

## Methods

A retrospective review of medical records was performed on patients presenting with an external auditory canal foreign body to the emergency department and otolaryngology clinic at Cardinal Glennon Children's Hospital from January, 2010 to April, 2015. Patient characteristics, foreign body type, and method of extraction were recorded. Odds ratio for successful removal were calculated and complication rate was tabulated by clinical setting.

## Results

Medical records of 1197 pediatric patients with foreign bodies in the EAC were reviewed. Patient characteristics are presented in Table 1. Removal was successful in 68% of patients in the emergency department and 93% of patients in the otolaryngology clinic (Table 2). 78% of children underwent successful removal in the otolaryngology clinic after attempts in the emergency department. A higher number of attempts to remove the foreign body was associated with a significantly lower odds of successful removal for all patients. Complication rate was significantly higher in the emergency department. There was no statistically significant association between successful removal and patient age, sex, body mass index, or duration of object in the ear canal. The success rate by object type and clinical setting is presented in table 3. Cotton/paper had the highest rates of successful removal. Beads and rocks had the lowest rates of successful removal although success rate was significantly higher (89%) in the otolaryngology clinic.

	ED (n=759) N (%)	OTO (n=438) N (%)
<b>PATIENT CHARACTERISTICS</b>		
<b>Age, years, mean (sd)</b>	6.67 (3.60)	6.70 (3.41)
<b>BMI, kg/m<sup>2</sup>, mean (sd)</b>	20.73 (7.97)	18.37 (4.89)
<b>Gender</b>		
Male	403 (53.1)	256 (58.4)
Female	356 (46.9)	182 (41.6)
<b>Type of object</b>		
Beads	188 (24.8)	107 (24.4)
Cotton/paper	140 (18.5)	89 (20.3)
Rocks	82 (10.8)	71 (16.2)
Popcorn seeds	36 (4.8)	27 (6.2)
Irregular Solids	174 (23.0)	67 (15.3)
Amorphous	88 (11.6)	56 (15.8)
Insects	49 (6.5)	21 (4.8)
<b>Multiple objects</b>		
Yes	33 (4.4)	26 (5.9)
No	724 (95.6)	412 (94.1)
<b>Duration in ear canal</b>		
<=24 hours	561 (74.3)	49 (11.2)
>24 hours	194 (25.7)	387 (88.8)

ED= emergency department; OTO=otolaryngology clinic; BMI=body mass index (kg/m<sup>2</sup>)

Table 1. Patient characteristics by treatment setting

	ED (n=759) N (%)	OTO (n=438) N (%)	p-value
<b>Removal attempts, mean (sd)</b>	1.52 (0.81)	1.22 (0.49)	<0.0001
<b>Removal outcome</b>			
Successful	515 (67.9)	407 (92.9)	<0.0001
Unsuccessful	197 (32.1)	31 (7.1)	
<b>Complications</b>			
Yes	252 (35.7)	22 (5)	<0.0001
No	454 (64.3)	416 (95)	

Table 2. Removal and complication rates by treatment setting. ED= emergency department; OTO=otolaryngology clinic.

Table 3

	ED % Success	OTO % Success	p-value
<b>Beads</b>	57	89	<0.05
<b>Cotton/Paper</b>	86	99	<0.05
<b>Rocks</b>	55	89	<0.05
<b>Popcorn</b>	61	96	<0.05
<b>Irregular solids</b>	78	96	<0.05
<b>Amorphous</b>	86	91	0.37
<b>Insects</b>	78	95	0.08

Table 3. percentage of successful removal by object. ED= emergency department; OTO=otolaryngology clinic.

## Discussion

This study represents the largest to investigate the effectiveness of EAC foreign body practices by point of care and data are consistent with previously reported success rates for foreign body removal<sup>3</sup>. The study is limited by the information available in the medical record and does not account for the level of training of the provider.

## Conclusions

Where available, primary referral to an otolaryngologist is recommended for beads or rocks in the external auditory canal. For other objects, referral to an otolaryngologist should be considered after one unsuccessful removal attempt.

## Contact

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