



**EVALUATION AND MANAGEMENT OF THE CLINICAL CHARACTERISTICS OF
EXTERNAL AUDITORY CANAL FOREIGN BODIES IN CHILDREN AND
ADOLESCENTS**

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ABSTRACT

Foreign bodies (FBs) in external auditory canal (EAC) can occur at any age but are especially common in children and adolescents. This study aimed to evaluate the clinical characteristics of EAC FBs in children and adolescents and to discuss their proper management. This retrospective medical chart review was performed on patients who were treated for EAC FBs in Haditha general hospital from January 2009 to December 2019. The parameters of age, sex, type of FB, sedation method, complications and removal strategy were investigated. Results in the current study showed that of 200 patients, 120 (60.0%) were males. Peak incidences were noted at the ages of 3 to 6 years and 17 to 18 years. The frequently observed FBs were insects, followed by air-gun pellets, cotton balls, marbles, and earrings. Removal of 36 (18.0%) EAC FBs was performed by the naked eye, while 164 (82.0%) were removed under microscope in the otolaryngology department. Of these patients, 16 (8.0%) were administered sedatives and 8 (4.0%) needed general anesthesia. During or after the removal procedure, patients had complications of EAC abrasion or laceration 36 (18.0%), and tympanic membrane perforation 2 (1.0%). It can be concluded from this study that external auditory canal FB showed a distinct characteristic of incidence regarding age, related to removal strategies, and that characteristics of FB must be considered for safe removal.

KEYWORDS: Foreign bodies, External auditory canal, Children, Adolescents.

INTRODUCTION

Foreign bodies (FBs) in the external auditory canal (EAC) are frequently encountered in pediatric and otolaryngology practice.^[1] External auditory canal FBs present with diverse symptoms including unilateral aural discharge, otalgia, ear bleeding, hearing loss, tinnitus, cough, dizziness and facial palsy, while some EAC FBs are non-symptomatic and are identified incidentally during routine otoscopic examination.^[2,3] The symptoms of EAC FBs are closely related to the characteristics of the foreign materials involved, which can be categorized as organic versus inorganic, animate versus inanimate, metallic versus nonmetallic, hygroscopic versus non-hygroscopic and so on.^[4] Although many FBs can be easily removed, the removal procedure can be a source of substantial morbidity of the external ear and middle ear structures. Physicians can have difficulty removing FBs in the EAC, especially with narrow EACs and limited cooperation on the part of children and adolescents.^[5,6] Otolaryngologists can remove EAC FBs using many kinds of instruments, either with the naked eye or under a microscope and sedatives or general anesthesia are needed in some cases to immobilize

children.^[5,7] Indeed, struggling during attempted removal can lead to complications such as perforation of the tympanic membrane and abrasion of EAC skin.^[8,9]

MATERIALS AND METHODS

The current retrospective medical chart review was performed on patients younger than 20 years with EAC FBs, who were managed in the emergency department or otolaryngology/ pediatric outpatient department at Haditha general hospital/Iraq from January 2009 to December 2019. The study population was selected by searching an electronic medical database with the diagnostic code "Foreign body in EAR" (T17, International Classification of Diseases, Tenth Revision) or the procedure codes for EAC FB removal.

Medical data regarding previous medical history, age, sex, initial symptoms, type of FB, management strategy/method and complications were thoroughly reviewed. This investigation was approved by the local ethics review board and performed in accordance with the Declaration of Helsinki and good clinical practice guidelines.

RESULTS

A total of (200) patients with EAC FBs were reviewed in the present study. Of these, 120 (60.0%) were males. There were various types of FB: insects, which were the most frequent (19.5%), followed by air-gun pellets (16.5%), cotton balls (15.0%), marbles (11.5%) and earrings (5.0%). Removal of 36 (18.0%) of EAC FBs was done with the naked eye in the emergency department or otolaryngology department, but 164 (82.0%) required a microscope for removal, of which 16

(8.0%) required sedation and 8 (4.0%) needed general anesthesia. Most patients with EAC FBs 162 (81.0%) had no complications, but 38 (19.0%) had complications including EAC abrasions and lacerations 36 (18.0%) cases and perforation of the tympanic membrane 2 (1.0%). 182 (91.0%) patients initially visited the emergency department; in 39 (19.5%) cases, the FB was successfully removed in the emergency room by a non-otolaryngologist, but 161 (80.5%) were referred to otolaryngologists as shown in table (1).

Table (1): Demographic and clinical characteristics of patients with EAC foreign bodies.

	Variable	N (%)
Sex	Male	120 (60.0)
	Female	80 (40.0)
Age	Mean±SD	10.1±3.2
Age group	0-4	58 (29.0)
	5-9	78 (39.0)
	10-14	25 (12.5)
	15-19	39 (19.5)
Type of foreign body	Insect	39 (19.5)
	Air-gun pellet	33 (16.5)
	Cotton ball	30 (15.0)
	Marble	23 (11.5)
	Earrings	10 (5.0)
	Others	65 (32.5)
Removal method	With naked eye	36 (18.0)
	Under microscope	164 (82.0)
	Using sedatives	16 (8.0)
	Under general anesthesia	8 (4.0)
Complications	None	162 (81.0)
	EAC abrasion or laceration	36 (18.0)
	Perforation of tympanic membrane	2 (1.0)
Departments	Visit ED and emergency doctor	39 (19.5)
	Visit ED and otolaryngology doctor	143 (71.5)
	Visit OL and otolaryngology doctor	18 (9.0)

Abbreviations: EAC, external auditory canal, ED, emergency department, OL, otolaryngology department.

External auditory canal FBs were most frequently encountered at ages of (5-9) years 78 (39.0%), followed by (0-4) years (29.0%), then (15-19) years, 39 (19.5%) and (10-14) years (12.5%).

There were 2 peak incidences: at ages (3-6) years and (17-18), and proportion of male patients was higher at most ages as shown in figure (1).

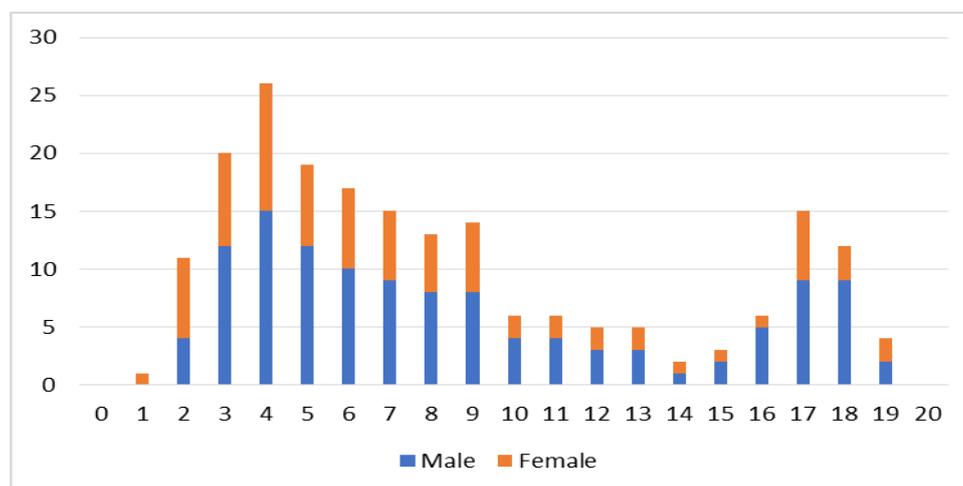


Figure 1: Age and gender distribution.

Various kinds of materials, and insects were identified as EAC FBs. Among the (15-19) years group, insects (46.2%), cotton balls (28.2%), and earring parts (12.8%) were more common than air-gun pellets (0.0%) and

marbles (2.6%). In contrast, a high proportion of air-gun pellets (20.4%) and marbles (27.8%) were encountered in (0-4) year group as illustrated in table (2).

Table (2): Types of foreign bodies by age groups.

Type		0-4	5-9	10-14	15-19
Biotic FB	Unknown insect	3	6	6	16
	Moth		2	2	2
	Cockroach	1			
	Bee			1	
	Total	4	8	9	18
Abiotic FB	Air-gun pellet	11	20	2	
	Cotton ball	7	6	6	11
	Marble	15	8		1
	Earrings	1	2	2	5
	Rubber	1			1
	Grain or fruit seed	2	8	1	
	Snack	3	2		
	Metal	2	2		1
	Stone	1	2		
	Lego	2	4		1
	Hair	1		1	
	Sand	1	1		
	Piece of pencil	1	3		
	Piece of paper	2	2	1	
	Piece of eraser		2	1	
	Clay	2	2		
	Plastic material	1	3	1	
	Others		1		
	Unknown	1	2	1	1
	Total	54	70	16	21

Abbreviations: FB foreign bodies

Patients who needed sedatives during the removal procedure ranged between (3-13) years of age, and those needing general anesthesia ranged from (5-11) years. No infants younger than 3 years, or adolescent older than 13 years, needed sedation.

Complications developed in 38 patients after their procedure. External auditory canal abrasions and lacerations were most common among (5-9) years group (32.8%) followed by (0-4) years group (13.6%). There were 2 instances of tympanic membrane perforation: a 6-year-old boy with an insect FB and a 8-year old girl with a kernel of corn in the EAC as seen in tables (3 and 4).

Table (3): Incidence of complications according to age groups.

Age	0-4	5-9	10-14	15-19
No complications	38 (86.4)	45 (64.3)	31 (91.2)	48 (92.3)
EAC abrasion or laceration	6 (13.6)	23 (32.8)	3 (8.8)	4 (7.7)
TM perforation	0 (0.0)	2 (2.9)	0 (0.0)	0 (0.0)
Total	44(100.0)	70 (100.0)	34 (100.0)	52 (100.0)

Abbreviations: EAC, external auditory canal; TM, tympanic membrane.

Table (4): Incidence of complications according to FB type.

Type	Insect	Air-Gun Pellet	Cotton Ball	Marble	Earring
No complication	24 (85.7)	34 (82.9)	19 (86.3)	22 (88.0)	3 (60.0)
EAC abrasion or laceration	3 (10.7)	7 (17.1)	3 (13.7)	3 (12.0)	2 (40.0)
TM perforation	1 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	28 (100.0)	41(100.0)	22 (100.0)	25(100.0)	5 (100.0)

Abbreviations: EAC, external auditory canal; TM, tympanic membrane.

DISCUSSION

In this study, we reviewed the clinical characteristics of EAC FBs. The core findings can be summarized as follows: (1) There were 2 peaks of EAC FBs, at ages 3 to 6 years and 17 to 18 years. (2) Complications during FB removal were frequent in the patients with EAC FBs aged 5 to 9 years. (3) The frequency of EAC FBs was higher in male than in female children, but more adolescents were female than male.

Foreign bodies in the EAC are very common and sufferers tend to visit hospital promptly because the effects are really annoying and sometimes painful.^[10,11] A previous study showed that 85.9% of all aural FBs occurred in children, and the majority of the latter were aged 5 to 9 years.^[7] The authors suggested that EAC FBs are more frequent in younger children because they are curious and careless.

The results of the present study were consonant with those of the previous studies, but we observed 2 peaks of incidence, at 3 to 6 years and 17 to 18 years. Our study also showed that the types of FB varied according to the age of patients, as others observed.^[12,13] Children younger than 10 years tend to have FBs related to toys such as air gun pellets and marbles.^[14] With age, the proportion of toys decreased, while cotton balls, insects and earring materials increased.^[14] The increase of cotton balls may result from more frequent “self-picking” and the increase in insects from the fact that adolescents are more often involved in outdoor activities and have wider EAC diameters than younger children.

It is usually not difficult to remove FBs under a microscope, especially in adults. In younger children or adolescents, however, one must be more careful because they find it difficult to stay still,^[15] especially when the FB is sharp or impacted, one needs to think about the appropriate removal method and instrument to minimize complications.^[6,16,17] In the present study, complications during FB removal were most frequent in 5- to 9-year-olds, who are less cooperative than other age-groups. Moreover, younger patients received sedation or general anesthesia more frequently. In the present study, sedatives were used step by step according to the sedation protocol of the children. Chloral hydrate was used firstly, and ketamine or midazolam were used when chloral hydrate did not affect. If none of these sedatives worked, EAC FBs were removed under general anesthesia. Regarding injuries during FB removal, earrings were the most frequent cause, and cotton balls were less often the cause, suggesting that the characteristics of FB's affect the complication rate. In this regard, animate FBs tend to cause complications more frequently than inanimate ones.^[14,18] However, in the present study, insects did not cause many complications. Complication rates depend on many factors including patient age, nature of FB, the instrument used and the skill of the practitioner. However, the most important factors influencing the

complication rate seem to be the patient's age and the degree of cooperation.^[2,19] Various instruments can be used to remove aural FBs, including alligator forceps, cerumen loops, right-angle ball hooks and so on. After making sure that the tympanic membrane is intact, aural irrigation can be useful for removing friable FBs like insects and tissue paper. However, batteries or hygroscopic objects should never be irrigated; aural irrigation can expand the volume of hygroscopic objects such as vegetables, beans or other food materials, and cause them to be impacted in the EAC, making them more difficult to remove.^[5,17]

In this study, 18.0% of EAC FBs were removed without microscope. Cotton balls or FBs not stuck in the EAC could be easily removed with otoscope and Bayonet forceps. However, cases of FBs near tympanic membrane or presence of secondary inflammation have to recommend consulting an otolaryngologist. Previous reports have recommended prompt referral to an otolaryngologist to minimize complications. One study reported a complication rate of 15.7% when the procedure was performed by otolaryngologists, compared with 68.1% for nonotolaryngologists.^[19] Another study suggested that multiple attempts by non-specialists can reduce patient cooperation and make subsequent procedures more difficult.^[5] In the current study, the incompleteness of the medical records made it difficult to check whether complications involved non otolaryngologists or otolaryngologists. But there is no doubt that early referral to otolaryngologists can reduce complications considerably.^[1]

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