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Foreign Bodies in the Ear Canal in Children: A Literature Review

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ABSTRACT:

Foreign bodies in the external auditory canal (EAC) are a common pediatric emergency, especially in children aged 1–4 years due to exploratory behavior and limited risk awareness. Common objects include beads, toy parts, organic materials, and button batteries, the latter posing significant risk of tissue damage. Clinical presentation ranges from asymptomatic cases to otalgia, hearing loss, and otorrhea. Diagnosis relies primarily on history and otoscopic examination, with imaging reserved for selected cases. Management should be prompt and individualized, using techniques such as forceps, suction, hooks, or irrigation, while complex cases may require sedation or general anesthesia. Delayed or unsuccessful removal increases complication risk, including infection and tympanic membrane perforation. Early recognition, appropriate management, and caregiver education are essential to prevent complications and improve outcomes.

KEYWORDS:

- external auditory canal
- foreign bodies
- pediatric otolaryngology
- ear foreign body removal
- complications and management

INTRODUCTION

Foreign bodies in the external auditory canal (EAC) are a common pediatric otolaryngological problem and a frequent cause of emergency department visits. Children account for the majority of patients presenting with ear, nose, and throat foreign bodies, underscoring the clinical importance of this condition in pediatric practice [1].

A wide variety of objects may be found in the pediatric ear canal. These include inorganic materials such as beads, toy fragments, jewelry pieces, paper, and pencil tips, as well as organic substances like seeds, food particles, and insects [2, 3]. Small decorative objects and toy

components are among the most frequently reported foreign bodies in children presenting to emergency departments [4].

The condition most commonly affects children between 1 and 4 years of age, largely due to developmental characteristics such as curiosity, exploratory behavior, and increasing manual dexterity. Limited awareness of potential risks and occasional lack of supervision further contribute to the insertion of objects into body orifices [3,5, 6].

Clinical presentation depends on the type and duration of the foreign body. Common symptoms include otalgia, hearing impairment, ear fullness, and irritation, while some patients may present with otorrhea or bleeding. In certain cases—particularly in younger children—the insertion may go unnoticed, delaying diagnosis [3,7]. Prolonged retention or repeated unsuccessful removal attempts may lead to complications such as external auditory canal trauma, infection, otitis externa, or tympanic membrane perforation [8].

Most foreign bodies can be removed safely in outpatient or emergency settings using instruments such as forceps, suction, or irrigation. However, cases involving uncooperative children or impacted objects may require procedural sedation or general anesthesia to ensure safe extraction [2].

This review summarizes current evidence on the epidemiology, types, clinical presentation, diagnostic approaches, management strategies, and complications associated with foreign bodies in the external auditory canal in children, emphasizing the importance of early recognition and appropriate management to prevent adverse outcomes.

EPIDEMIOLOGY

Foreign bodies in the external auditory canal are a common problem in pediatric otolaryngology. Tiago R.S. and colleagues reported that the ear is the most frequent location of ear, nose, and throat (ENT) foreign bodies in children [9]. Epidemiological analyses indicate that children account for the majority of patients presenting with ENT foreign bodies, emphasizing the clinical relevance of this issue in pediatric practice [1,9, 10].

The types of objects retrieved from the ear canal in children are highly diverse. Inorganic materials, such as beads, small plastic toy parts, paper fragments, stones, and button batteries, are reported most frequently, while organic materials, including seeds, food particles, and insects, occur less often but may elicit stronger inflammatory responses [1, 10]. Among these, small spherical objects, particularly beads and toy components, are consistently identified as the most common ear canal foreign bodies in children [11]. The type of foreign body also varies with age: children under 10 years are more likely to present with toy-related objects, such as marbles or air-gun pellets, whereas older children and adolescents more commonly exhibit cotton balls, insects, and earring materials. This trend may reflect behavioral differences,

including increased self-manipulation of the ear in older children and greater exposure to outdoor environments [8].

The incidence of ear canal foreign bodies peaks among children aged 1–4 years, a developmental stage characterized by curiosity, exploratory behavior, and increasing fine motor skills that facilitate the insertion of small objects into accessible body openings [6,11,12,13]. Younger children are particularly susceptible because of their limited understanding of potential harm and their tendency to explore their environment through tactile interaction.

Sex distribution varies among studies. Some research demonstrates a slight male predominance, possibly reflecting more risk-taking behavior among boys, whereas other studies report nearly equal gender distribution [9,11,12]. Behavioral and developmental factors may also contribute to the risk of foreign body insertion. A case-control study by Celenk et al. found that children presenting with self-inserted nasal and aural foreign bodies had significantly higher rates of attention-deficit/hyperactivity disorder (ADHD) compared with healthy controls, suggesting that impulsivity and inattentiveness associated with ADHD may increase the likelihood of inserting objects into the ear canal [14].

Socioeconomic and environmental factors further shape the epidemiology of pediatric ear foreign bodies. Higher incidence rates have been reported in low- and middle-income countries, where children may have limited access to age-appropriate toys and therefore play with small household objects that can easily be inserted into the ear canal [11,15]. Cultural practices and the availability of particular small items within households may therefore influence both the frequency of foreign body incidents and the types of objects involved.

In the majority of cases, foreign bodies were found in the right ear, a pattern consistently observed in pediatric studies [5,16,17]. This right-ear predominance is thought to result from self-insertion, as most children are right-handed and tend to place objects into the ear on the same side [2].

These epidemiological patterns highlight the multifactorial nature of pediatric ear foreign body incidents, reflecting the interaction between developmental behavior, environmental exposure, and sociocultural factors. Understanding these determinants is essential for improving prevention strategies and facilitating early recognition in clinical practice.

SYMPTOMS

Foreign bodies (FBs) in the ear canal of children present with a spectrum of clinical manifestations that vary based on the type, location, and duration of the foreign body. The most common clinical presentation is unilateral otalgia (local pain), observed in approximately 47% of cases [18]. Additional symptoms include hearing loss, otorrhea (often foul-smelling), tinnitus, bleeding from the ear, dizziness, vertigo, cough, or facial palsy [3]. Children may

experience significant discomfort, irritability, head tilting, or scratching at the ear, and occasionally present with fever or discharge; animate FBs like insects provoke intense pain due to movement and skin excoriations [19]. A significant proportion of children remain asymptomatic at presentation, particularly when FBs are inert or recently inserted [3].

Although caregivers observe the insertion in 20–40% of cases, a significant number of incidents occur without supervision, resulting in delayed detection [18]. In unwitnessed incidents, detection can occur through the child's voluntary disclosure (33%), parental identification during bathing or play (6.8%), or incidental discovery during evaluation of unilateral symptoms like pain or discharge [18]. Research shows that the majority of cases (>60%) come to medical attention due to the child's ear discomfort, self-report, or caregiver discovery, with most identified within 24 hours [20].

The symptomatology varies significantly based on the type of foreign body. Organic materials like seeds, food, and paper are more likely to absorb moisture, swell, and trigger robust inflammatory responses leading to edema and infection [19,21]. In contrast, inorganic objects (50-70% of cases) such as beads (~21%, most common), toy parts, plastic, cotton swabs, and metal generally cause less severe symptoms unless they have sharp edges or chemical properties [8]. Button batteries represent a particularly concerning type of aural FB, causing electrical, chemical burns, and mechanical pressure to canal tissue within minutes to hours [3,20,22]. Complications include canal wall erosion, granulation, infection, and tympanic membrane perforation (up to 13%), with severity correlating to duration [23,24].

Long-retained foreign bodies in the external auditory canal may remain minimally symptomatic for prolonged periods. For example, Szleper and Bruzgielewicz described a case in which a plastic toy bullet remained in the ear canal for approximately 15 years, with the patient reporting only slight stable hearing loss and a persistent sensation of a clogged ear, without pain, otorrhea, or vertigo [25]. Nevertheless, other reports indicate that retained foreign bodies may present with symptoms such as otalgia, tinnitus, chronic otorrhea, granulation tissue formation, or inflammatory complications depending on the type of object and duration of retention [26, 27].

DIAGNOSTIC APPROACH AND DIFFERENTIAL DIAGNOSIS

The diagnosis of foreign bodies (FBs) in the ear canal of children relies primarily on clinical suspicion, detailed history-taking, and otoscopic examination, which allows direct visualization in the majority of cases [19]. A focused history often reveals unilateral ear pain, hearing loss, discharge, or a witnessed insertion event, while physical exam using an otoscope with a surgical headlight confirms the presence, location, and characteristics of the FB. Challenges occur with deeply lodged objects, spherical shapes, or those adherent to the canal skin or near the tympanic membrane (TM), where edema or cerumen may obscure visualization, prompting referral to otolaryngology for otomicroscopy [20].

Imaging is generally unnecessary for straightforward cases where the FB is visible and identifiable on otoscopy, particularly to avoid radiation exposure in children. Plain radiographs can detect radiopaque FBs like beads or batteries but fail for radiolucent ones such as insects, food particles, or plastic; they are reserved for suspected TM perforation, button batteries (due to liquefaction necrosis risk), or unclear histories [28]. Computed tomography (CT) offers superior detail for complex cases, deep FBs, or complications like canal erosion, though its use is limited by radiation; ultrasound may aid superficial soft-tissue FBs, while MRI is avoided for metallic objects.

The differential diagnosis for foreign bodies (FBs) in the pediatric ear canal encompasses a range of otologic conditions presenting with unilateral otalgia, otorrhea, hearing loss, or aural fullness. Acute otitis externa (swimmer's ear) is a frequent mimic, characterized by canal erythema, edema, tenderness, and purulent discharge, often triggered by trauma or moisture, which may obscure or complicate FB visualization. Cerumen impaction, the most common alternative, appears as a waxy, obstructive mass on otoscopy and is distinguished by its texture, lack of motility, and absence of acute inflammation [29]. Otitis media with effusion (OME) or acute otitis media presents with TM bulging, retraction, or effusion, potentially correlating with EAC FBs due to eustachian tube dysfunction; studies note OME in up to 50% of contralateral ears in FB cases, urging bilateral assessment [30].

Chronic or neglected FBs can masquerade as severe otitis externa, granulation tissue polyps, or even malignant otitis externa in immunocompromised children, with embedded organic material causing malodorous discharge and canal erosion [31]. Tympanic membrane perforations (traumatic or infectious), cholesteatoma (with pearly mass and debris), or myiasis (live larvae mimicking animate FBs) require exclusion via serial otoscopy or imaging if symptoms persist. Rarely, behavioral comorbidities like ADHD or developmental delays increase FB risk and confound diagnosis with atypical histories, while tumors (e.g., rhabdomyosarcoma) must be considered in refractory unilateral symptoms [8]. Prompt differentiation via history, otomicroscopy, and adjuncts like tympanometry ensures appropriate management and avoids iatrogenic complications.

MANAGEMENT METHODS

Management of foreign bodies (FBs) in the ear canal of children requires a multifaceted, stepwise approach meticulously tailored to the object's type (e.g., spherical beads, insects, button batteries, vegetable matter), its precise location (superficial versus deeply impacted or adjacent to the tympanic membrane), duration of impaction, and the child's age, developmental stage, and level of cooperation [32].The literature underscores the critical need for prompt intervention—ideally within 24 hours—to minimize complications such as canal abrasion, otitis externa, tympanic membrane perforation, or deeper migration of the FB, with first-attempt success rates reaching 77-86% in experienced pediatric settings when proper techniques are employed. Effective management commences with a comprehensive clinical assessment, including history-taking to identify symptoms like pain, hearing loss, or discharge,

followed by thorough visualization using otoscopy, operating microscopy, or video endoscopy to confirm the FB's characteristics and rule out complications. Pharmacological adjuncts play a supportive role: topical lidocaine (4%) provides analgesia and immobilizes live insects (e.g., cockroaches or moths), while mineral oil or sesame oil can suffocate motile FBs prior to extraction; vasoconstrictors like phenylephrine are generally avoided due to rebound edema risks, unlike in nasal cases. Emergency airway equipment and suction must be immediately available, particularly for younger or uncooperative children (<5 years, who comprise ~70% of cases), to manage potential laryngospasm or aspiration during manipulation [3].

A hierarchy of removal techniques is recommended based on FB morphology and accessibility [20]. For superficial, non-spherical, non-fragile objects (e.g., beads, pebbles, or small toys), first-line methods under direct visualization include microalligator forceps, cupped forceps, right-angle ball-tip hooks (passed posterior to the FB for traction), or balloon (Fogarty) catheters inflated distal to the object and gently withdrawn—each achieving high efficacy when the canal is well-illuminated [33]. Suction via a 5-10 Fr catheter is particularly effective for lightweight, porous, or friable materials like paper or dried vegetable matter (e.g., beans), which might otherwise fragment. However, spherical or smooth-surfaced FBs (e.g., plastic pearls) resist direct instrumentation due to slippage, often necessitating referral to otolaryngology for otomicroscopy or, in adherent cases (>24 hours impaction), cyanoacrylate glue applied to a paper tip for adherence and extraction [34]. Irrigation with body-temperature saline via a 20-50 mL syringe and angiocatheter (angled 45°) is reserved for soft, non-hygroscopic, non-button battery FBs in intact canals, contraindicated in suspected tympanic perforation, vegetable matter (swelling risk), or batteries due to rapid tissue necrosis. Button batteries demand emergent (<2-4 hours) removal, as alkaline leakage and electrical current cause liquefactive necrosis, coagulopathy, and facial nerve palsy; specialized microhooks or suction under microscopy are preferred. Live insects require pre-immobilization to prevent erratic movement and tissue damage [3].

In uncooperative children—common in those under 3 years, representing up to 15-20% of pediatric presentations—office-based attempts risk failure (pushing FB deeper or canal trauma in 10-33% of novice efforts), prompting procedural sedation (e.g., intranasal midazolam or ketamine) or general anesthesia in 5-15% of cases for safe, definitive extraction [10]. Post-removal protocols are equally vital: repeat otoscopy/microscopy inspects for residual FBs, canal lacerations, or tympanic trauma; cerumenolytic drops (e.g., hydrogen peroxide) aid debridement if needed; topical antibiotics (e.g., ofloxacin) treat or prevent infection, with systemic therapy for severe otitis externa. Bilateral and multi-orifice examination rules out additional FBs, a finding in up to 10% of cases [24]. Comprehensive parental education on prevention—supervision of small objects, avoiding cotton swab use, and early presentation—is essential to curb recurrence, which affects 5-10% of children. In refractory scenarios (e.g., impacted beyond reach), otolaryngologic referral for endoscopic or postauricular surgical approaches ensures optimal outcomes with minimal morbidity [32].

COMPLICATIONS AND PREVENTIVE STRATEGIES

Foreign bodies (FBs) in the ear canal of children can lead to a range of complications, from minor irritation to severe structural damage, including cerumen impaction, external otitis, and tympanic membrane perforation, particularly with sharp or spherical objects like beads or seeds. Button batteries pose a unique risk due to their rapid liquefaction necrosis from alkaline leakage and electrical current, potentially causing deep tissue destruction, facial nerve palsy, and conductive hearing loss within hours. Prolonged retention may result in chronic inflammation, granulation tissue formation, or secondary infection with otorrhea and cellulitis. Failed removal attempts exacerbate risks, with complications such as canal lacerations (up to 17%), tympanic membrane tears (45%), and ossicular damage reported in non-specialist extractions. Rare but grave sequelae include intratympanic migration, cholesteatoma development, or intracranial extension via erosion [20].

Though uncommon, live insects can provoke intense pain, tympanic membrane rupture from movement, or allergic reactions leading to edema. Prompt irrigation or suction under microscopy is critical to avert these [35].

Complications from extraction are frequent in uncooperative children, with epistaxis, edema, and posterior FB displacement risking aspiration. Instrumentation with inappropriate tools like forceps often fails (23% rate) and heightens trauma, sometimes necessitating general anesthesia [32].

Effective prevention relies on education and systemic measures. Caregivers should supervise play, store small objects (beads, batteries, food) out of reach, and avoid cotton swabs, which account for many iatrogenic cases. Campaigns highlighting risks—e.g., batteries causing 1-2% of pediatric aural FBs but disproportionate harm—can reduce incidence. Toy safety standards mandating larger sizes (>3 cm) and secure battery compartments are essential [3].

In clinics, protocols prioritize immobilization, suction, or irrigation for cooperative patients, with referral to otolaryngology for deep/sharp FBs, tympanic contact, or prior failures (success rates 86% under microscopy) [20].

CONCLUSION

Foreign bodies in the ear canal are a common and largely preventable cause of morbidity in children, most frequently occurring in those aged 1–4 years due to exploratory behavior and increasing manual dexterity. The ear is one of the most frequent site of ENT foreign bodies in this population, with inorganic objects—especially beads and small toy parts—predominating, while organic materials and button batteries pose higher risks of inflammation, infection, and tissue necrosis. Right-ear predominance and a male predominance in some series further reflect patterns of self-insertion and behavioral risk factors, including ADHD-associated impulsivity.

Clinically, presentations range from unilateral otalgia, hearing loss, and otorrhea to asymptomatic incidental findings, with button batteries and animate objects such as insects

causing particularly severe or rapidly evolving symptoms. Diagnosis relies on high clinical suspicion, careful history, and otoscopic or otomicroscopic examination, supported by imaging only in selected cases. Management should be prompt (ideally within 24 hours) and individualized according to object type, location, and patient cooperation, using micro-forceps, hooks, suction, or balloon catheters, while reserving irrigation and emergent otolaryngologic intervention for hazardous or deeply impacted foreign bodies. Preventive strategies centered on caregiver education, supervised play, safe toy design, and avoidance of cotton-swab use are essential to reduce the incidence and complications of pediatric aural foreign bodies.

DISCLOSURE

Author's contribution

Conceptualization: Weronika Wasiniewska; Methodology: Marcin Barański; Check: Weronika Wasiniewska; Formal analysis: Maria Izabela Sroka; Investigation: Maria Izabela Sroka; Resources: Tomasz Kandefer; Data curation: Maria Izabela Sroka; Writing - rough preparation: Marcin Barański; Writing - review and editing: Tomasz Kandefer; Visualization: Maria Izabela Sroka; Supervision: Weronika Wasiniewska; Project administration: Marcin Barański; Receiving funding: no specific funding.

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In preparing this work, the authors used Perplexity AI for the purpose of checking language accuracy. After using this tool, the authors have reviewed and edited the content as needed and accept full responsibility for the substantive content of the publication.

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