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Original Article

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Volume 6 Number 1, January-June 2021

Role of Platelet Rich Fibrin Matrix

Shuvaraj Pokharel[1], Ravi Kumar Chittoria[2], Jacob Antony Chakiath[3]

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Abstract

Platelet rich fibrin matrix, which is rich in growth factors, has been demonstrated to be beneficial in the treatment of non healing ulcers in recent research. Aim of this study is to evaluate the role of Platelet Rich Fibrin Matrix (PRFM) in wound management. In our study, after two session of Platelet Rich Fibrin Matrix (PRFM) application, the two third of the defect was cover with granulation tissues.

Keywords: Platelet Rich Fibrin Matrix (PRFM); Wound, Management.

INTRODUCTION

The chronic ulcers and other damaged wounds impose a huge economic, social and public health burden which is steadily increasing as the population ages. Platelet derived growth factors serve a key role in tissue remodelling including neovascularisation. For the past four decades, platelet rich plasma (PRP) has been used and investigated. Exogenously applied platelet gel and fibrin sealant made from PRP combined with thrombin and calcium chloride has been shown to improve wound healing, bone development, haemostasis and tissue sealing.[1] Platelet rich fibrin matrix, which is rich in growth factors, has been demonstrated to be beneficial in the treatment of non healing ulcers in recent research.[2] We employed platelet rich fibrin matrix (PRFM) to prompt wound healing.

Author Affiliation: [1]Junior Resident, Department of General Surgery, [2]Professor, [3]Senior Resident, Department of Plastic Surgery, Jawaharlal Institute of Post Graduate Medical Education and Research, Pondicherry 605006, India.

Corresponding Author: Ravi Kumar Chittoria, Professor, Department of Plastic Surgery, Jawaharlal Institute of Post Graduate Medical Education and Research, Pondicherry 605006, India.

E-mail: drchittoria@yahoo.com

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MATERIALS AND METHODS

After receiving departmental ethical committee permission, this study was done in the department of Plastic Surgery at a tertiary care centre in South India. The patient provided written informed consent. 24 year old male with no known co morbidities was involved in a road traffic accident. He had sustained left Type IIIc fracture of proximal tibia with Popliteal Artery injury. He underwent wound debridement and Illizarov fixation for lateral tibia plateau in Orthopedics department. The patient now presents to the plastic surgery department with a non healing wound and exposed bone on the left proximal part of leg (Fig. 1). Multiple debridements were performed, and STSG was applied to the raw regions in multiple settings.

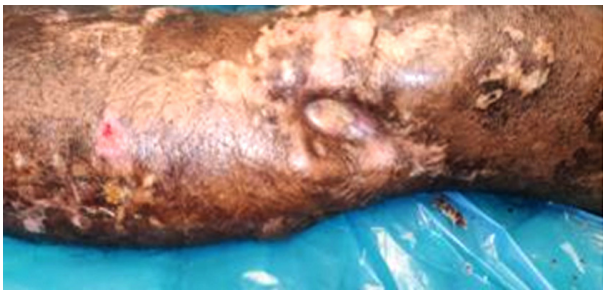

Fig. 1: Exposed bone and non healing ulcer at left proximal leg.

In our study, to attain a healthy granulation tissue over the defect with exposed bone, we used PRFM. Ten millilitres of venous blood were taken under rigorous aseptic conditions and placed in a sterile centrifugation tube devoid of anticoagulant. For 10 minutes, centrifugation was performed at 3000 rpm (about 400 g). Upper straw colored platelet deficient plasma (PPP), lower red colored fraction containing red blood cells (RBCs), and intermediate fraction containing PRFM were obtained. The upper layer of straw colour (PPP) was discarded. Using sterile forceps and scissors, PRFM was removed from red corpuscles at the base, leaving a thin RBC layer measuring roughly one millimetre in length that was deposited onto sterile gauze (Fig. 2).

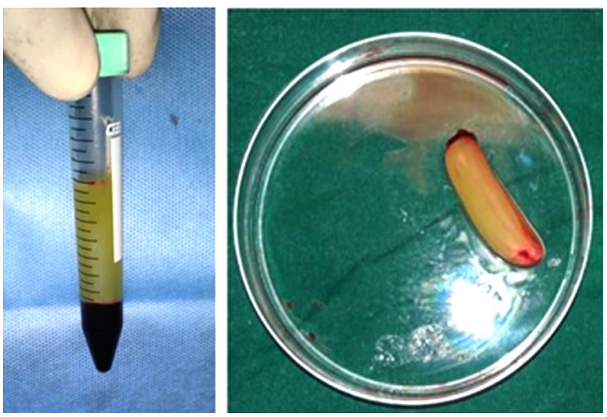

Fig. 2: Platelet rich fibrin matrix (PRFM)

The PRFM was applied to the raw region and sterile dressing was applied. Two sittings were performed one week apart, with the wound re-evaluated after two weeks. Healthy granulation tissue indicated that the wound was healing.

When the dressing was changed every 3-5 days, same procedure was repeated. (Fig. 3) After two weeks, the wound was examined again for signs of healing. Healthy granulation tissue indicated that the wound was healing.

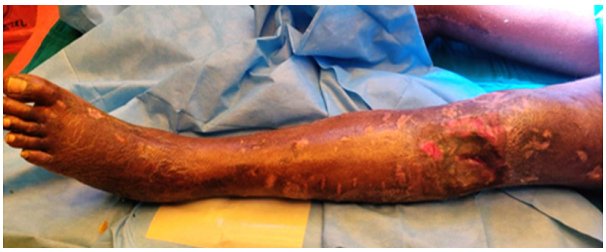

Fig. 3: Healthy granulation over exposed bone after the application of Platelet Rich Fibrin Matrix.

RESULTS

In our study, after two session of Platelet Rich Fibrin Matrix (PRFM) application thetwo third of the defect was cover with granulation tissues. (Fig. 4)

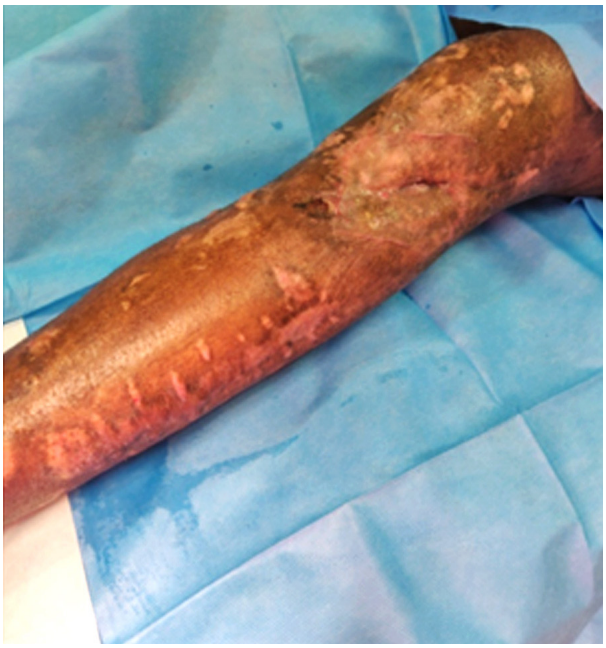

Fig. 4: Leg defect decreased significantly after two sesson of Platelet Rich Fibrin Matrix application

DISCUSSION

Platelets have a vital part in wound healing as well as haemostasis. Platelets emit cytokines and growth factors, which help keratinocytes, fibroblasts, and endothelial cells migrate, proliferate, and function better.[4] Fibrin is a type of fibrinogen that is active. Thrombin converts fibrinogen to insoluble fibrin, which aids platelet aggregation. Platelet concentrates are frequently devoid of coagulation components, hence platelet-rich fibrin matrix (PRFM) was created to address the expected features in tissue regeneration and wound healing.

Fibrinogen is concentrated in the upper section of the tube during centrifugation and combines with thrombin to create a fibrin clot. The release of these factors begins 5-10 minutes after clotting and lasts at least 60-300 minutes, resulting in a slow and steady release.[5]

PRFM is a fibrin matrix gel comprising platelets, leucocytes, cytokines, and circulating stem cells polymerized in a tetra molecular structure. PRFM preparation is simpler, requires lesshandling, and does not require the use of an anticoagulant or thrombin activator.[6] In a hospital; all of the necessary items are readily available. When opposed to the liquid formulation of APRP, the gel form of PRFM is easier to apply to the raw region. After fibrin formation, the action of autologous growth factors and the biomechanical rigidity of plasmatic proteins provide a unique architecture that aids in the healing process. Growth factors from activated platelet alpha granules, as well as others like fibrin, fibronectin, and vitronectin, play a crucial part in this process.Vessel endothelial growth factor (VEGF), fibroblast growth factor-b (FGFb), Platelet Derived Growth Factor (PDGF), hepatocyte growth factor (HGF), Epidermal Growth Factor (EGF), and angiopoietin-I are examples of these growth factors.[7]

CONCLUSION

This is a preliminary study to evaluate the use of platelet rich fibrin matrix(PRFM) in wound treatment where it has been demonstrated to be helpful in the management of chronic wound. To confirm the findings, a large multicentric, double-blinded control research with statistical analysis is needed.

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Conflict of Interest: None.

Disclosures: None.

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Simple isn't always Easy: An Otologist's Experience with Ear Foreign Bodies

N R Ankle[1], Chenchulakshmi Vasudevan[2], Prasheeta Basker[3], Mansi Venkataramanan[4]

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Abstract

Introduction: The presenting complaint of a foreign body in the ear is quite common at an otolaryngologist'sclinic or emergency room. It is mainly the paediatric population which presents with such history which is attributed to their tendency to play and explore their surroundings. None the less the challenge arises in correctly diagnosing the foreign body, and the site of the ear it has occupied and if or not its is impacted, all of which needs detailed examination and investigations. Many a times cases are referred after multiple attempts of removal with secondary complications. We must always bear in mind that the ear is a sense organ and one cannot tamper with it. In this manner we present a series of assorted cases of ear foreign bodies that we have come across at our tertiary care centre and their management.

Case Series: In the past 1 year we have had 62 cases of ear foreign bodies which have presented to us at our tertiary care centre, among which 40 cases were paediatric patients and the remaining were adults, 70% of the foreign bodies were inorganic which included beads, parts of toys, stones, jewellery etc and 30% were organic, including seeds and even insects, the presenting symptoms were otalgia, foreign body sensation in the ear, ear bleed, reduced hearing and with history of foreign body in the ear. Several cases were challenging but were managed at the emergency ward but Only one unique case required emergency surgery, for post auricular approach for retrieval which has brought to our attention what is usually regarded as a simple or common case.

Conclusion: The ear foreign bodies must be tackled with care and always preserving function must be kept in mine, the complications must be understood not only the medical fraternity but also the lay people who will encounter this first hand. It has been our prime motive to through light on this often-neglected condition.

Keywords: Foreign body ear; External Auditory Canal foreignbody; Post-Auricularapproach; Impacted foreign body; Paediatric foreign bodies.

Author Affiliation: [1]Professor, [2-4]Junior Resident, Department of Otorhinolaryngology & Head and Neck Surgery, Jawaharlal Nehru Medical College and Kaher University, Belagavi 590010, Karnataka, India.

Corresponding Author: Chenchulakshmi Vasudevan, Junior Resident, Department of Otorhinolaryngology & Head and Neck Surgery, Jawaharlal Nehru Medical College and Kaher University, Belagavi 590010, Karnataka, India.

E-mail: drnitinankale@gmail.com

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INTRODUCTION

Ear foreign bodies are described as any object other than wax and cerumen that is foreign to the ear. Ear foreign bodies are commonly encounteredby an otolaryngologists at the emergency department.[1] Children owing to their curiosity and playfulness represent a majority among the patients with ear foreign bodies and the removal is dependent on the type of object, location, duration of impaction, and the clinical setting.[2] As most cases have foreign

bodies limited to the external auditory canal is quite easily accessible and most of the time it can be removed in emergency department by simple manoeuvre and do not require any anaesthesia. But in some cases, depending on the site of Foreign body and age of the patient it may require administration of general anaesthesia for its removal.[3] Difficulty in removal especially by untrained or unqualified personnel or inappropriate instruments or multiple attempts of manipulation may result in trauma of EAC or still worse the impaction of the foreign body.[1] Multiple attempts at removal can lead to canal oedema and granulation and under such circumstances, removing these objects without injury to tympanic membrane and ossicular chain can be very challenging and it is advisable in such cases removal should be done under general anaesthesia in an operating theatre using a microscope.[4]

Here we presenta series of cases with ear foreign bodies and the challenges faced, while we highlight a rare case of apaediatric patient with am impacted foreign body and its managementat our tertiary centre.

CASE SERIES

In the past 1 year we have had 62 cases of ear foreign bodies which have presented to us at our tertiary care centre, among which 40 cases were paediatric patients and the remaining were adults, 70% of the foreign bodies were inorganic which included beads, pearls, parts of toys, stones, jewellery etc (Figure 1) and 30% were organic, including seeds and even insects. The presenting symptoms were otalgia, foreign body sensation in the ear, ear bleed, reduced hearing and as well as history of foreign body in the ear. While analysing this series we must bear in mind that ours is a tertiary care centre and only the complicated cases tend to get refereed whilst the others are managed at the peripheral centres, due to which we have a seemingly lesser case load of common cases such as foreign body ear, as is being discussed here in our study.

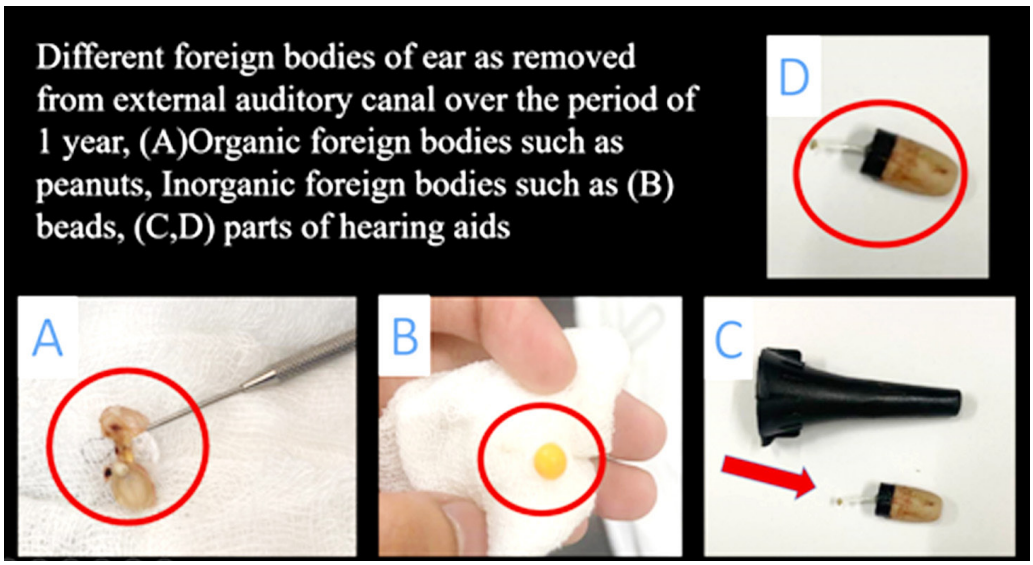

Fig. 1: The foreign bodies encountered.

All the cases were treated at the emergency department on outpatient basis and were removed by the use of cupped or alligator forceps or by aural toileting following which they were given antibiotics and antioedema measures.

6.45% of the cases had complications in the form of impaction of the foreign body, perforation of the tympanic membrane and EAC wall laceration and needed foreign body removal under vision through otoendoscopy or by microscopy. The foreign bodies were successfully removed in toto and in cases with complication in the form of perforation of the tympanic membrane, and at follow upthese perforations of the TM were managed based on the size. Most cases healed spontaneously or by chemical cautery, only one case needed myringoplasty which was done at a later date. (Figure 2)

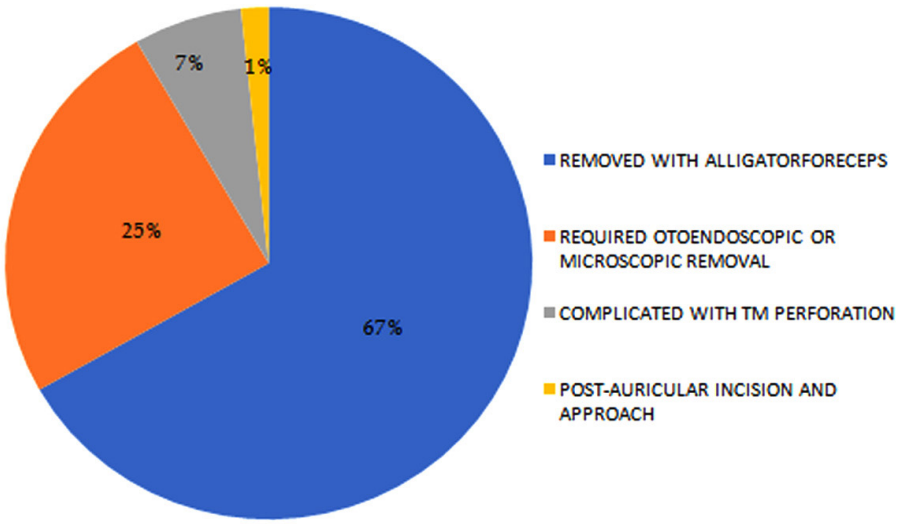

Fig. 2: Management of the Cases of Foreign Body Ear

We wish to highlight one single case in our series, i.e. 0.16% wherein we had to use surgical intervention to retrieve the foreign body as follows. A 4-year-old child presented to the emergency department of our tertiary care centre with the Alleged history of a stone in the left ear. Multiple attempts were made by the parents as well as a local doctor to remove the foreign body before coming to the hospital so at presentation there was profuse bleeding from the ear and oedema and excoriation of the external auditory canal wall which impaired proper visualisation of the foreign body. In spite of multiple attempts the difficulty to remove or dislodge the foreign body must have been due to the impaction of the foreign body at the level of the bony external auditory canal, which was later confirmed by x-ray and intra op findings. X- ray mastoid was done to visualise the foreign bodyas well as to identify if it was a metallic or a non-metallic foreign body and once the bleeding was controlled attempt was made for removal of foreign body but it was found to be impacted owing to its size and the narrow oedematous EAC. Thus, the child was taken to operation theatre and under short General anaesthesia, the ear was examined, using aLempert's speculum the EAC was visualised as shown in figure 3 and granulation tissue was seen around the foreign body an impacted stone. Using forceps and probe attempts were made to remove dislodge and remove the stone, but it was tightly impacted and removal was unsuccessful.

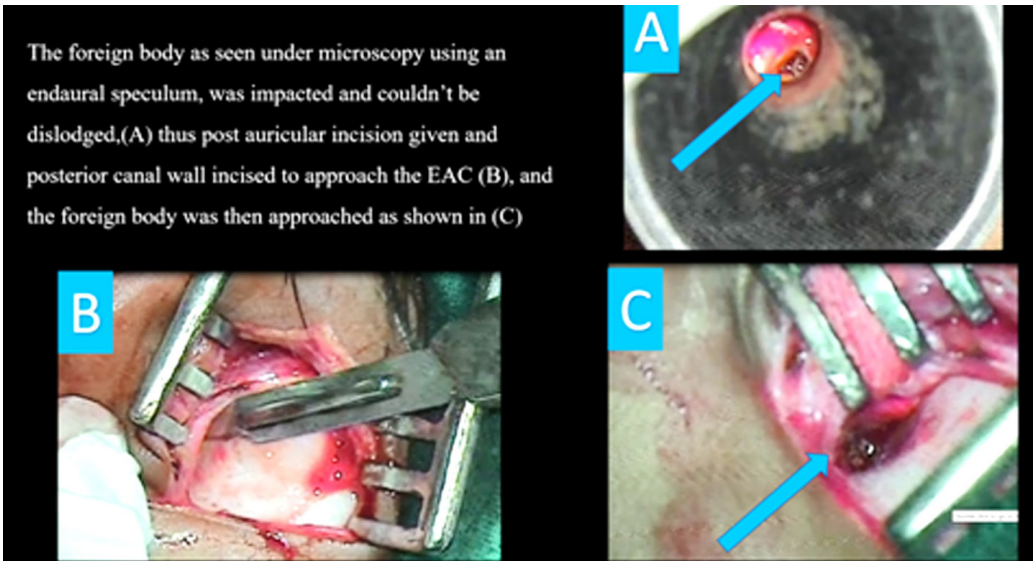

Fig. 3: Foreign body visualized using post aural approach under microscopy.

Then a Heerman'sendaural incision was given in view of widening the EAC, and thus procuring more space to manipulate the stone, but still it couldn't be removed. As a final resort a post aural incision was given and flap was secured and a small piece of the stone was chipped out using forcepswhich in turn helped to mobilise the remnant and finally the stone was entirely removed as shown in figure 4 and figure 5. Tympanic membrane was visualised and found to be intact. Post aural wound was closed and dressing was done. The post-operative period was uneventful.

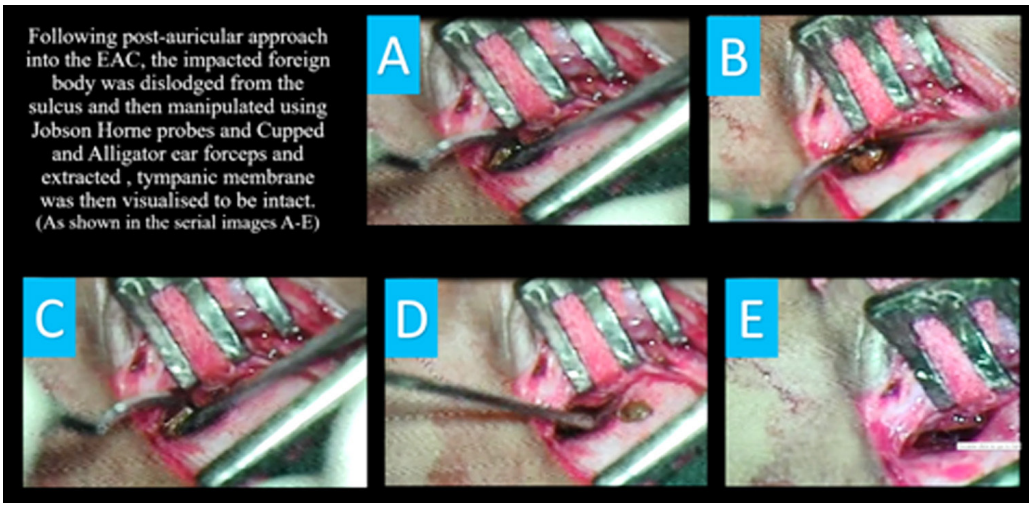

Fig. 4: Successful removal of the foreign body by post aural approach.

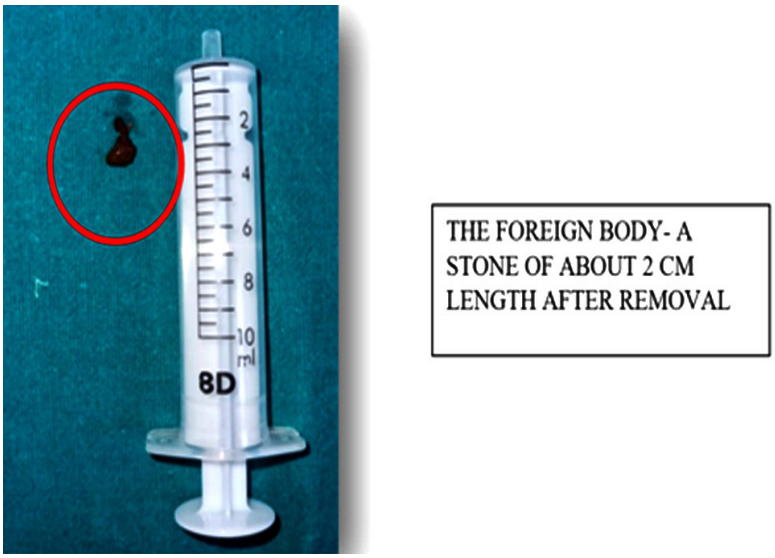

Fig. 5: The foreign body-stone, after removal measuring about 2 cm.

DISCUSSION

In this case series we've discussed the common ear foreign bodies in general and also about the management of impacted ear foreign bodies. Ear foreign bodies are common Otorhinolaryngological emergencies worldwide.[5] They occur more in children between age group of 1 to 5 years (42.5%).[6] Children are by nature inquisitive and like to explore the various orifices in the body and hence land up with this presentation commonly in comparison to adults. Insertion of foreign body also depends on the availability of the foreign body and absence of caretakers.[7] Foreign body removal should not be attempted many times and impacted foreign should be examined under microscope. Foreign bodies as common as they are paediatrics, among adults in the ear they present more in those

who are psychologically challenged or having an underlying psychiatric disorder due to which they aren't always aware of their surroundings or in control of their behaviour, making such cases further more challenging to manage as well as to prevent recurrence.[10] The dimensions of the external auditory canal must be taken into consideration, especially in paediatric patients in whom the EAC diameter is still less than an adult, some studies show an average being about 7-10. 3mm, thus making the lodgement of foreign bodies more common, such as ours which was the same size as the maximum diameter of the EAC, due to which it was impacted.[9] Complications of foreign body removal like bruised ear canal, total perforation of tympanic membrane, ossicular chain destruction can be avoided if untrained health personnel know their limits and refer the patient to otorhinolaryngologist.[8,1] some foreign bodies require removal under General anaesthesia due to their shape, impacted and deep seated location, age of the patient, uncooperative patients or previous attempts of removal. Particularly if previous history of instrumentation was present. In rare cases like ours general anaesthesia was required for proper visualisation and to ensure atraumatic removal and further complication related to instrumentation.[3] In our studywe have discussed about an impacted ear foreign body (stone) in a paediatric age group, which was complicated due to the size of the stone in comparison to a paediatric EAC and its lodgement at the tympanic sulcus and due to multiple unsuccessful attempts of removal and injury to the ear canal, which warrantedremoval under short GA under microscopy, by a post-auricular approach.

CONCLUSION

Ear foreign bodies presenting to otorhinolary ngologists usually can be removed on OPD basis but at times this may become a herculean task due to impaction, bleeding, risk of TM perforation or infectionwhich may need urgent surgical intervention. The main aim of foreign body removal is to prevent complications like injuring of tympanic membrane, injury to ear canal, such a case must be immediately recognized and intervened to ensure safe and aseptic removal, more so in children keeping in mind future repercussions if not managed with due vigilance. Understanding the probable complications and the risks associated with ear foreign bodies is a message to be conveyed to not just the medical community but also the general population as they will be the one to encounter this situation first hand.

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A Case Report of a Common Infantile Upper Airway Block Discovered to be A Sinister Retropharyngeal Abscess

Sangeetha Balaji[1], Prashanth S N[2], Santhosh Kumar M[3], Chetak K B[4], Anitha C[5], Supraja P[6]

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Abstract

A 10 month old male child was brought with history of fever, poor feeding, cough, regurgitation of feeds, and stridor. Child was initially treated as Acute laryngotracheobronchitis, but as he was not improving, was referred for further management. At admission child was irritable, non-toxic, afebrile, drooling of saliva and weak cry was noted, inspiratory and expiratory stridor with respiratory distress was noted. Investigations were suggestive of sepsis. Chest Xray showed resolving bilateral upper lobe pneumonia. As distress worsened, CT Neck and Thorax was done which revealed a retropharyngeal abscess. Child was then intubated and ventilated due to deteriorating clinical condition, and he was taken up for drainage of the abscess through transoral approach. He tolerated the procedure well and was treated with a full course of IV antibiotics as per culture report which grew Staphylococcus aureus. He was discharged in a stable condition. This highlights the need to closely investigate adeceptively simple upper airway obstruction as there may be a more serious underlying pathology such as a retropharyngeal abscess.

Keywords: Sinister retropharyngeal abscess; Common Infantile; Upper Airway Block.

INTRODUCTION

Retropharyngeal abscess is an acute life threatening infection of the retropharyngeal space, seen usually in children between the ages of two and five[1], and also in older children and adults in whom it is a result of trauma to the posterior pharynx. In younger children, it is usually preceded by an upper respiratory tract infection that leads to suppurative cervical lymphadenitis which progresses into a retropharyngeal abscess. This abscess can eventually lead to upper airway compromise and hence early diagnosis is imperative for intravenous antibiotics and surgical drainage. This case report details the uncommon presentation of a retropharyngeal abscess as stridor in an infant.

Author Affiliation: [1,6]Post Graduate, [2,5]Professor, [3]Associate Professor, [4]Assistant Professor, Department of Pediatrics, JSS Medical College, JSSAHER, Mysore 570015, Karnataka India.

Corresponding Author: Santhosh Kumar M, Associate Professor, Department of Pediatrics, JSS Medical College, JSSAHER, Mysore 570015, Karnataka India.

E-mail: santhosh.kumar94@yahoo.com

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CASE REPORT

The infant who presented to us was a 10 month old developmentally normal male child who came with complaints of fever of 15 days, regurgitation of feeds and cough since 1 week, and stridor with respiratory distress since 4 days. At admission, he was irritable, non-toxic, afebrile, and drooling of saliva and weak cry was noted. Child was pale, inspiratory and expiratory stridor was heard. He

had bilateral suprasternal and subcostal chest retractions with conducted sounds on auscultation. Investigations showed anemia with leukocytosis (TC 24920) and thrombocytosis (10.24 lakh), and CRP was negative. Chest Xray showed resolving bilateral upper lobe pneumonia. Child was initially treated as croup with no improvement. As distress was worsening, an emergency CT neck and thorax was done to identify cause of upper airway obstruction which revealed a retropharyngeal abscess measuring 2.8x1.4x2.2 cms corresponding to C1 to C4 levels. Child was immediately intubated due to deteriorating clinical condition and was taken up for drainage of abscess via transoral approach. Child tolerated the procedure well. Pus culture showed growth of Staphylococcal aureus and child was given a full course of antibiotics as per sensitivity report. Child was extubated on post-operative day 2 and showed good clinical improvement. He was discharged in a stable condition with no stridor. This presentation of RPA as fever and stridor in this age group is relatively uncommon, hence a vigilant approach is needed in all cases of seemingly simple upper airway obstruction not responding to conventional treatment, and more sinister culprits such as Retropharyngeal abscess must always be borne in mind.

DISCUSSION

A retropharyngeal abscess (RPA) is an acute life-threatening infection of the retropharyngeal space, which requires urgent and aggressive management. They are most frequently encountered in children, with 75% of cases occurring before the age of 5 years, and often in the first year of life.[2] This may be due to the prominence of retropharyngeal lymph node tissue in that age group along with increased frequency of upper respiratory and nasopharyngeal infections.

The retropharyngeal space lies between thebuccopharyngeal fascia, which is the middle layer of the deep cervical fascia, and the prevertebral fascia, which is the deep layer. It extends from the base of the skull to the level of TI in the superior mediastinum where the twolayers fuse. The lymph nodes in the retropharyngeal space drain the nose, paranasal sinuses, middle ear, nasopharynx, andadenoids. Infection of any of these structures can progress into a RPA. Infection can also spread directlyinto the anterior and posterior media stinumanteriorly, hence mediastinitis is a rare complication of retropharyngeal abscess. These lymph nodes are prominent till 5 years of age, beyond which they start to involute and in adults, RPA is more commonly due to local trauma such as foreign body or surgical procedures.

Usually, it is preceded by an upper respiratory tract infection. The classical presentation of RPA is with fever, neck swelling, head tilt, respiratory distress or stridor, cervical lymphadenopathy or a pharyngeal mass. It is a serious condition with need for immediate management as it can cause upper airway obstruction leading to airway compromise. Older children are less likely to have neck swelling. They were most likely to have specific complaints such as neckpain or stiffness and sore throat.[3] The etiological agents include Group A Streptococcus, Staphylococcus aureus, Haemophilus influenzae, anaerobic organisms, e.g. Bacteroides, Peptostreptococcus, and Fusobacterium, Mycobacterium tuberculosis (in endemic areas or in the immunocompromised individuals).[4]

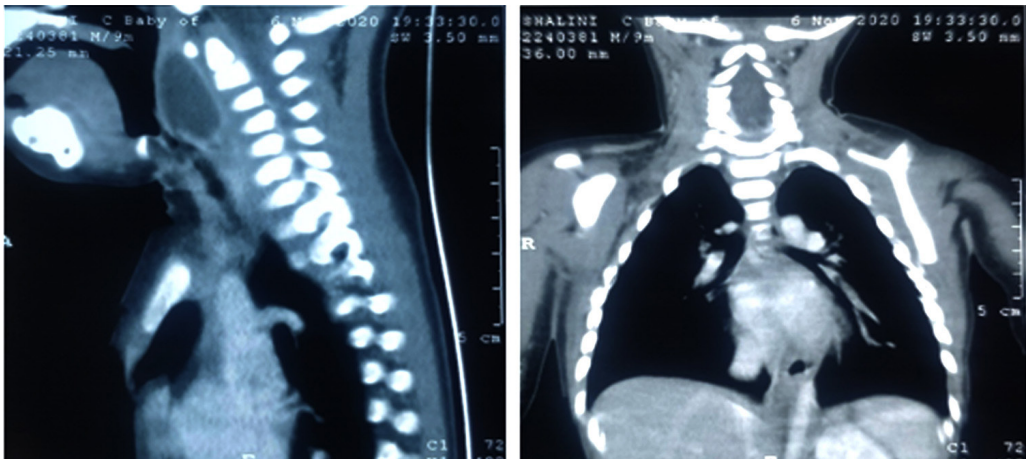

Fig. 1: CT neck and thorax revealing the abscess in C1 to C4 levels:

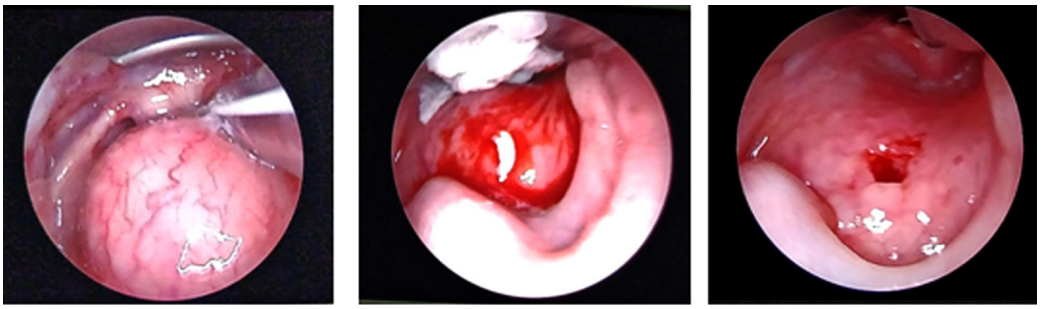

Fig. 2: Video laryngoscopic view of drainage of abscess.

Diagnosis of RPA requires a high index of suspicion. Lateral neck X-rays taken with the neck held in extension can demonstrate soft tissue swelling posterior to the pharynx, with a widening of the prevertebral soft tissue.[5] A close differential of this appearance is the prevertebral abscess. CT with contrast is a superior tool to delineate an RPA and to differentiate it from retropharyngeal cellulitis. Ultrasound is also a useful investigation in experienced hands and can minimize radiation exposure.

A differential diagnosis includes Foreign body in airways, Pneumonia, Mediastinitis, Epidural abscess, Oral cavity infections, Epiglottitis, and Pharyngitis.[6] Complications include Airway obstruction and compromise, Bronchial erosion, Mediastinitis, Sepsis, Acute respiratory distress syndrome, Cranial nerve palsies, Esophageal perforation, Meningoencephalitis, and Erosion into carotid artery or jugular vein.

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[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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