

Otorhinolaryngeal foreign bodies in children presenting to the emergency department

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ABSTRACT

Introduction: Accidents with foreign bodies are common in the paediatric population. It is impossible to mandate that all foreign bodies (FB) in the ear, nose and throat (ENT) of children should be removed by the specialty-trained physicians. This study evaluates the management of ENT FB removal in children achieved by emergency physicians not trained in otolaryngology in an urban tertiary care paediatric emergency department.

Methods: A retrospective study was conducted on consecutive paediatric patients presenting with suspected foreign body in the ear, nose or throat to the children's emergency department (ED) of KK Women's and Children's Hospital over a 10-month period. Removal methods, foreign body types, rates of successful removal and associated complications were evaluated.

Results: There were 353 patients, most of whom presented after office hours. An attempt at removal of FB by the emergency physician was made in 76.8 percent of the cases. ENT specialist referral in the ED was made in 1.7 percent of the cases. 50.1 percent of cases were discharged after successful removal of FB in the ED. 4.2 percent of cases were admitted for removal of FB and 44.8 percent of cases were referred to the ENT specialist clinic for further assessment.

Conclusion: The emergency physician managed most cases in the ED and urgent referral to ENT specialists was not required. Complications and morbidity often occur from repeated attempts at removal of the FB. ENT opinion should be sought whenever there is doubt. The ED physician should be skilled in techniques of FB removal, especially throat FB, which had the lowest rate of success in our study.

Keywords: ear, foreign bodies, oropharynx, paediatrics

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INTRODUCTION

Accidents with foreign bodies (FB) are common in the paediatric population. The ease in dealing with the FB depends on its location as well as the child's co-operation. The emergency physicians may easily manage most FB, but some may benefit from early referral to the otorhinolaryngologist. However, it is impossible to mandate the specialty-trained physicians to remove all foreign bodies (FB) in the ear, nose and throat (ENT) of children presenting to the children's emergency department (ED). This study evaluates the management of ENT FB removal in children achieved by ED physicians not trained in otolaryngology in an urban tertiary care paediatric emergency department. We also hope to identify the profile of patients and FB type that will benefit from early referral to an otorhinolaryngologist.

METHODS

A retrospective study was done on consecutive patients aged less than 16 years who presented with suspected FB in the ear, nose or throat to the ED of KK Women's and Children's Hospital over a 10-month period between the period of 1 January 2002 to 31 October 2002. Demographical data collected included the patient's age, race and gender. Other data included the evaluation, management, outcomes and complications of the FB removal. The use of radiological and other investigations were included. The mode of removal of FB depended on the location and type of FB encountered.

External auditory canal FB were removed by the use of hook (Jobsorn horn), forceps (alligator forceps), suction catheter, and by irrigation. Direct vision with or without otoscopic assistance was employed. A microscope was occasionally used to locate the FB. Nasal FB were removed by forceps, hooks, and by suctioning. Direct removal was done with the aid of the otoscope. The flexible fiberoptic endoscope was employed to locate deep-seated nasal FB. Throat FB were removed with forceps under direct or indirect laryngoscopy. Direct vision was obtained

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Table I. Age group of patients.

Age group (in years)	Frequency	Percentage (%)
<4	139	39.4
4 to <8	153	43.3
8 to <12	45	12.7
12 to <16	16	4.5

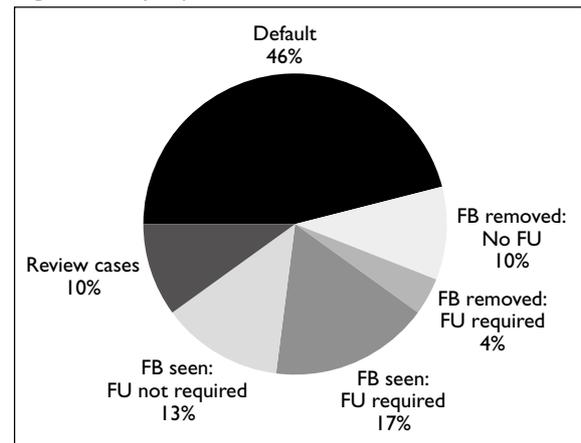
Table II. Types of ear foreign bodies.

Type of foreign body	Frequency	Percentage (%)
Others	38	32.4
Paper/ Cotton	21	17.9
Toy	20	17.1
Pencil lead	19	16.2
Earring	11	9.4
Eraser	7	6.0
Organic matter	3	2.5
Crayon	3	2.5
Ball bearing	2	1.7
Plasticine	1	0.8
Peanut	1	0.8
Bean	1	0.8
Ring	1	0.8
Styrofoam	1	0.8
Toothpick	1	0.8
Stone	1	0.8
Comb	1	0.8
Shell	1	0.8

with a tongue depressor or by transnasal flexible endoscopy. If the attempt at FB removal by the ED physician was not successful, the patient would be immediately referred to the ENT specialist on duty in the ED itself or referred to the ENT specialist clinic on the same day. In the event that the patient presented after office hours, the patient was referred to the ENT specialist clinic on the next working day.

RESULTS

There were 353 patients. Those between 4 and 8 years of age comprised the largest group (43.3%) followed by those less than 4 years old. The mean age was 4.73 years old. The age distribution is shown in Table I. Males made up 59.5% of the cohort. The racial distribution was: Chinese (63.7%), Malays (21.8%), Indians (11.9%), and others (2.5%). The majority of the patients presented after office hours, between 6 pm to 12 midnight, when specialist ENT clinics would have closed. The average delay in

Fig. 1 Summary of patients referred to ENT clinic.

presentation was 3 days. Throat FB had an average delay of 12 hours, nasal FB had an average delay of 41 hours, and ear FB had an average delay of 7.7 days. There was an almost equal distribution of FB in the ear (33.1%) [left ear (11.3%), right ear (20.7%), both ears (1.1%)], nose (35.4%), and throat (31.4%).

50.1% of cases were discharged after successful removal of FB in the ED. 4.2% were admitted for removal of FB after consultation with the ENT specialist. 44.8% of cases were referred to the ENT specialist clinic for further management. 0.9% of cases had no FB removed but were discharged with advice. Of the 158 cases that were referred to the ENT specialist clinic, 10.1% had FB removed with no follow-up, 3.8% had FB removed with follow-up required, 29.2% had no FB removed, of which 16.5% required follow-up, and 12.7% were discharged. 10.1% of patients were referred for follow-up due to complication or for review after removal of the FB at the ED. The remaining cases (46.8%) did not turn up for follow-up (Fig. 1).

Ear FB

There were 117 cases of ear FB, with 66.7% males and 33.3% females. The majority of the cases were between 4 and 8 years old (43.3%). There were 51.3% Chinese, 29.1% Malays, 17.1% Indians, and 2.6% others. Table II lists the types of ear FB removed. The commonest object was toy parts. The commonest presentation was local pain, found in 47% of cases. Other means of presentation include verbal admission by the child (33.3%), incident witnessed by the caregiver (6.8%), bleeding from the ear (4.3%), ear discharge (0.9%), tinnitus (2.6%), fever (1.8%) and others (4.2%).

Most of the FB was seen on direct vision (90.6%). Removal was attempted by the ED physician in 77.8% cases and by the ENT specialist at ED in one

Fig. 2 Ear FB removal by ENT specialists.

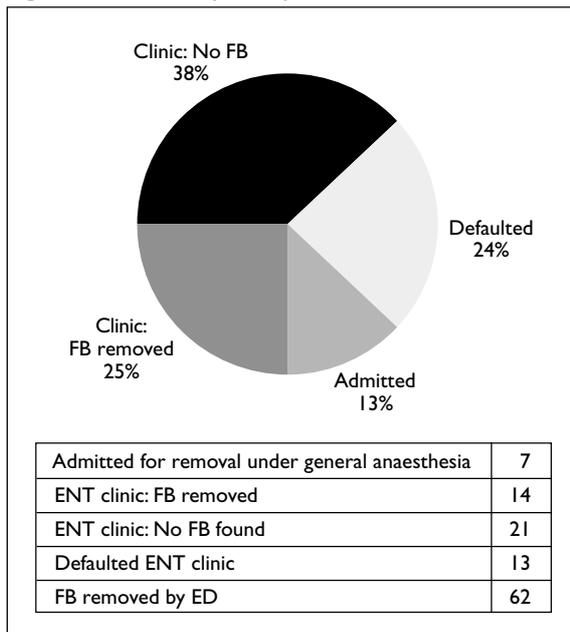
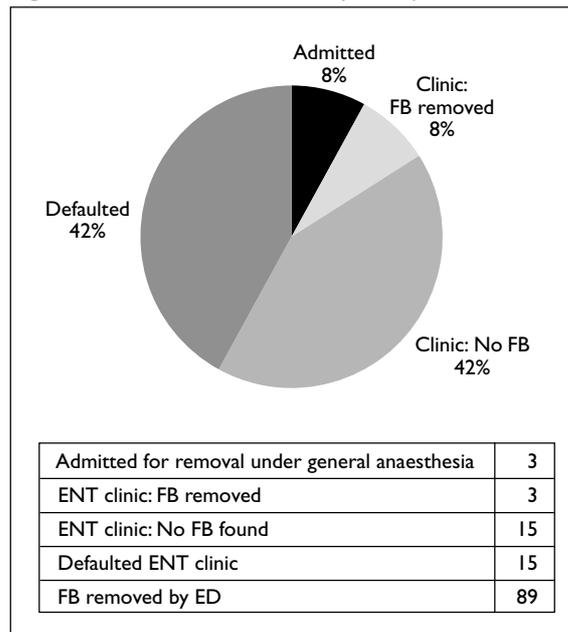


Fig. 3 Outcome of nose FB removal by ENT specialists.



case. Conscious sedation was employed in 19.7% of cases. There was failure of FB removal in 22.2% of cases, laceration in 5.1% of cases, perforated tympanic membrane in 6% of cases, bleeding in one case, and other complications in 4.3% of cases. 53% of cases were discharged after successful removal of FB in the ED, 6% cases were admitted for removal of FB after consultation with the ENT specialist, and 41% cases were referred to the ENT specialist clinic on the next working day for further management. Of the 41% of cases that were seen in the ENT specialist clinic, 9.4% of cases had their FB removed with no follow-up, 2.6% of cases had FB removed with follow-up required, 14.4% of cases had no FB seen and required follow-up, and 3.4% had no FB removed and were discharged from the clinic. 11.2% cases did not turn up for follow-up (Fig. 2).

Nasal FB

There were 125 cases of nasal FB, with 56% males and 44% females. The majority of the cases were less than 4 years old (56.1%). The mean age was 3.1 years. There were 64% Chinese, 19.2% Malays, 12.8% Indians and 4% others. Presentations include local pain (20%), nasal discharge (10.4%), epistaxis (4%), admission by the child (56.8%) and others (rhinitis, difficulty in breathing, sensation of swelling). Most of the FB was seen on direct vision (94.4%). The commonest objects include beads, toy parts and organic matter (e.g. sweets, seeds, peanuts). Investigations were performed when the FB could not be found. These included lateral

neck, chest and abdominal radiographs. There were 11 cases where radiographs were performed and only two of them had positive reports of FB. The rest were normal radiographs.

The ED physician attempted removal in 88% of cases, and no attempt was made in 10.4% of cases. One case had FB removed by the ENT specialist at the ED. Conscious sedation was employed in 31.2% of cases. Complications include failure of FB removal (25.6%), epistaxis (1.6%), laceration (0.8%) and septal perforation (0.8%). 71.2% of cases were discharged after successful removal of FB in the ED. 2.4% of cases were admitted for removal of FB after consultation with the ENT specialist while 25.6% were referred to the ENT specialist clinic for further management. Of all the cases that were seen in the ENT specialist clinic, only 2.4% had FB removed and 12% had no FB removed. The remaining cases (12%) did not turn up for follow-up (Fig. 3).

There were four cases of button battery FB inserted in the right nostril. Three were boys and one was a girl, with ages ranging between 16 months and three years. Two of them presented with bleeding and nasal discharge for four days, another presented with local pain and nasal discharge for several hours, and the last child had a witnessed insertion of the FB. Three of them had the FB removed by the ED personnel under conscious sedation using intramuscular ketamine and atropine. One was discharged after successful removal at the ED. One had complications of epistaxis, laceration and perforation of the nasal septum, while another had

ulceration of the nasal septum. These complications were documented to be present before removal of the FB. Both patients were referred to the ENT clinic for review at a later date. For the fourth child, whose button battery insertion was witnessed, no FB could be found on examination by the ED personnel. Lateral neck and chest radiographs were performed at the ED, and the FB was found to be at the junction of the mid and lower third of the oesophagus. The child was admitted and observed. Serial radiographs were performed after the child was given microlax suppository until the FB was subsequently passed out.

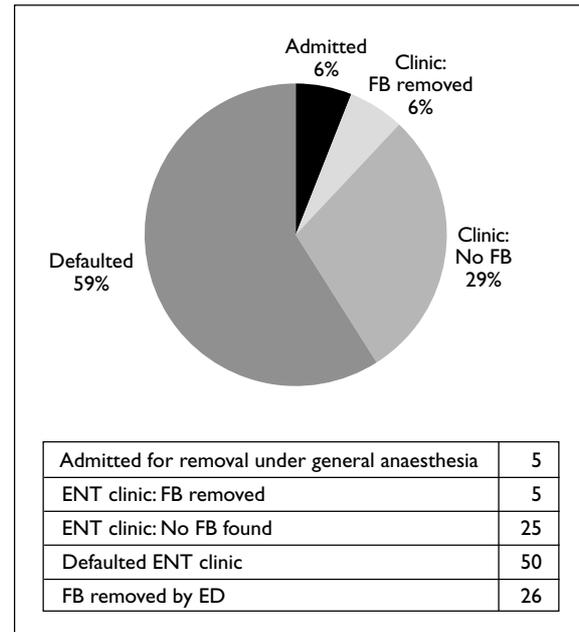
Throat FB

There were 111 cases of throat FB, with an almost equal distribution of males (55.9%) and females (44.1%). The majority of the cases were between 4 and 8 years old (47.7%). There were 76.6% Chinese, 17.1% Malays, 5.4% Indians and 0.9% others. The commonest presentation was local pain (89.2%), followed by dysphagia (13.5%), vomiting (10.8%), drooling (2.7%), crying (1.8%), and haemetemesis (0.9%). The commonest throat FB was fish bone (81.1% of cases). Other FB included other bones (chicken, pork) (2.7%), toys (4.5%) and others (11.7%).

Radiographs were performed when the FB could not be found. These were mainly lateral neck radiographs, and where necessary, chest and abdominal radiographs. Of 98 radiographs performed, only 6.3% of them had positive reports of FB. The rest were normal. The ED physician attempted removal in 63.1% of the cases, and the rest were referred to the ENT specialist clinic. Conscious sedation was employed in 2.7% of the cases. Complications include failure of FB removal in 56.8% of cases, bleeding in one case and migration of the FB in one case that was noted prior to removal attempt by the ED physician.

23.4% of cases were discharged after successful removal of FB in the ED, 4.5% were admitted for removal of FB after consultation with the ENT specialist, 70.3% were referred to the ENT specialist clinic for further management, and 1.8% were discharged with advice from the ED. One case was immediately referred to the ENT clinic. The child was symptomatic for FB in the throat after eating fish. The lateral neck radiograph was abnormal and there was failure of removal of the FB at the ED. The ENT specialist in the ENT clinic subsequently successfully removed the FB. Of the cases that were referred to the ENT specialist clinic, 4.5% had FB removed. 22.3% had no FB removed, of which 10.3% of them

Fig. 4 Outcome of throat FB removal by ENT specialists.



required further follow-up, and 12% were discharged from the clinic. The remaining cases (41.4%) did not turn up for follow-up (Fig. 4).

DISCUSSION

Young children are curious and will insert FB into their ears and noses, usually with objects found at home⁽¹⁾. The majority of nose and ear foreign bodies in our cohort of patients were toys and household products. The commonest presentation of ear FB in our cohort was local pain followed by admission by the child, but this is dependent on the age of the child. The external ear canal is divided into two regions, namely: the lateral one-third, which is cartilaginous, and the medial two-thirds, which is bony. The bony portion is narrower and lined with a very vascular and highly sensitive thin layer of skin. The slightest trauma to this portion causes bleeding and pain. Whatever method is used, the operator only has only one or two chances before the child loses his patience and becomes uncooperative. Further attempts with an uncooperative child will lead to complications, parental and patient distress⁽²⁾. This was the commonest cause of failure of removal of FB among the ED doctors.

The key to successful removal is immobilisation⁽³⁾. If the child is not co-operative, a sheet wrap is applied and the child is held down by an assistant. The majority of our patients did not require sedation for external ear canal FB removal. Success in removing ear canal FB also depended on other factors, such as the size and shape of the FB, the ability to visualise the FB, repeated attempts at removal of the FB,

the equipment available for FB removal, and the experience and skill of the individual attempting the removal⁽⁴⁾.

Age and gender did not have significant bearing on outcome. The FB type mattered in success rates. Commonest objects in our study were cotton buds, toys and pencil lead. While cotton buds and irregularly-shaped toys may be graspable, we had less success with smooth and spherical toys and pencil leads. In some studies, smooth and spherical FB had the worst outcomes^(2,4). Dimuzio et al found that the complication rates for smooth-surfaced objects were considered higher than those of irregularly-shaped objects: 70% versus 14% ($p < 0.001$), which is understandable as the objects cannot be readily grasped⁽²⁾. Schulze et al found that spherical FBs were associated with the least success rates for removal and the highest complication rate, and the complication rate showed the greatest dependence on the presence or absence of multiple attempts⁽⁴⁾.

Those who required referral for ENT intervention had more often failed at self or parental home FB removal attempts⁽⁵⁾. Reasons include the previously discussed reasons of a "difficult to remove category" of FB, trauma to the external auditory canal which may obscure vision, and sensitisation of the patient such that they are less cooperative with subsequent attempts⁽⁴⁾. Hence, parents should be cautioned against attempting to remove objects that are not readily visible or not capable of being grasped easily. FB that are more medial in the external auditory canal or are touching the tympanic membrane are also more difficult to remove^(6,7). Objects in the ear for prolonged period of time may result in an inflammatory response that sensitises the external auditory canal or causes oedema, making removal much more difficult. In our study, we found that FB removed between 24 hours and one week had a lower success rate of removal than those who present within a shorter period of time.

External auditory canal FB may be triaged by its type and location to allow for successful removal with low complication rates while avoiding unnecessary referrals. Non-urgent ENT referrals may be made for the "difficult to remove category" of FB except for cases with obvious infection, presence of disc battery or vegetative matter. The disc battery is notorious because the alkaline battery may produce intense liquefaction necrosis on contact with moist tissue or irrigation with water. Vegetable matter may expand with moisture^(3,7). These are indications for immediate ENT referral at the ED.

The age of patients who insert nasal FB were younger compared to the age of patients who had other ENT FB. This trend is also noted in studies conducted overseas⁽⁸⁻¹⁰⁾.

The commonest presentation among our cohort was from history, either by admission by the child, witnessed by another person, or found during routine cleaning of the child by a caregiver. The other cases were diagnosed when complications occurred, such as pain, rhinorrhea and epistaxis. No patients in our study aspirated objects lodged in their noses although the possibility exists. Complications that occurred, such as ingestion of FB or epistaxis, were usually related to repeated attempts at removal⁽¹¹⁾. Many different types of nasal foreign objects were found in our study. This finding is not unique locally as this finding has also been reported in previous studies^(8,10). As such, the physician should have several techniques for removing the different types of FB. Numerous techniques have been well described⁽¹⁰⁾.

The methods used most successfully in our centre include the use of forceps, hooks and suctioning. If the FB was not seen, the use of a flexible fibre-optic endoscope inserted through both nostrils to view the entire post-nasal space and down to the vocal cords was employed to locate the FB. Radiographs were performed in patients who had negative findings. However, these were few (10%) and the yield is also low (positive in 2 out of 10 radiographs). It is important to realise that many materials such as food, wood and plastic may not be visible on radiographs.

In our centre, if the child is cooperative, he is usually seated upright to reduce the risk of aspiration. However, if the child is not cooperative, he is sedated under conscious sedation and placed in a supine position. He may be premedicated with nasal drops of 0.5% phenylephrine and 1% lidocaine to provide local anaesthesia and decrease mucosal swelling. Most of our patients with nasal FB were managed successfully without referral to the otorhinolaryngologist.

The children with throat FB tend to be older than the nasal FB cohort in our study. Most of the children were able to identify the FB but the younger child may present with choking, refusal to eat, vomiting, drooling, wheezing, blood-stained saliva, or respiratory distress^(12,13). The majority of our patients presented with local pain and dysphagia. Those patients whose FB was not picked up during clinical examination underwent radiological examination which included a lateral neck radiograph. The yield for positive radiographs was low. Fish

Table III. Real FB types and outcomes/attempts at removal.

	Removal by ED	Removal by ENT (admitted or in clinic)	Actual total FB	% actual FB to total
FB throat (n = 111)	26	10	36	32.4%
FB nose (n = 125)	89	6	95	76%
FB ear (n = 117)	62	21	83	70.9%

or chicken bones, wood, plastic, most glass and thin metal objects are not readily seen⁽¹²⁾. In the study by Gautam et al⁽¹⁴⁾, the majority of their patients underwent soft tissue radiographs of the neck, but less than 10% were thought to be abnormal by the doctors and it was concluded that the routine use of radiographs in the assessment of FB in the throat was inappropriate.

In our study, the use of radiographs had very low yield. There were 98 radiographs performed for throat FB of which only 6.3% of them had positive reports of FB. The rest were normal. The use of radiographs should be limited as the last resort to localise a foreign body after thorough clinical examination and indirect laryngoscopy and if the suspicion of the FB is present. It should not be ordered at triage before the patient has been examined.

In our hospital, the use of direct laryngoscopy yielded good results. The younger child was wrapped in a blanket and placed in a dentist chair. With the assistance of a nurse, the child was held tightly and the physician was given one chance to localise the throat FB, failing which, the child would become uncooperative. The child would be referred to the otorhinolaryngologist the next working day. Urgent intervention is required when the object involved is sharp, a disc battery, or whose impaction creates a high-grade obstruction and the patient is unable to manage his secretions⁽¹⁵⁾.

There appeared to be a higher success rate for nose FB removal and the worst for throat FB removal among the ED physicians. Of the patients with ear FB that were referred, one-third of the cases required ENT intervention. For nasal FB, one-quarter required ENT intervention. Although throat FB had the highest numbers of referrals, there was also the most number of defaulters. But of those who saw ENT specialists, only one-quarter required intervention.

Table III shows the outcomes of real FB versus suspected FB removed. Only one-third of suspected throat FB were actual FB removed. The rest were either not real throat FB or resolved without any intervention. In comparison, the actual yield was more than two-thirds in patients with nose and ear FB. 27.7% of "actual throat FB" had to be removed

by the ENT specialist versus 6.3% of "actual nose FB" removed by ENT specialist and 25.3% of "actual ear FB" removed by ENT specialist.

From our results, it appeared that throat FB had the highest number of referrals to the ENT specialist and the lowest success rate of removal. However, two-thirds of the patients defaulted ENT referral and of the remaining one-third, only 32.4% required ENT intervention.

Throat FB remains the trickiest to manage in children as it is the most difficult to get the child's co-operation. If laryngoscopy is negative and the patient remains symptomatic, the shift doctor in charge (Registrar level and above) will review the patient. All patients with negative laryngoscopy will be referred to the ENT specialist clinic on the next working day. As such, the ED physician will refer the patient even if the suspicion of throat FB is low. All patients are given advice on discharge to return if they experience increasing pain, have haemoptysis, haematemesis or chest pain. It is suspected that most patients default follow-up because their symptoms resolve.

There were limitations to this study. Being a retrospective study, documentation was inadequate. Failure of FB removal was not differentiated from cases where the FB was not seen. Pre-existing complications at presentation were also not differentiated from complications resulting from FB removal. Defaulters were not followed-up for the reasons for default.

Children with ENT FB are commonly encountered in the ED. To have all ENT FB in children referred to the ENT specialist for management is not practical or economically feasible. In our study, the ED physician could successfully manage most children with FB in the ED. However, the goal of management should be to minimise complications and morbidity, which often occur from repeated attempts at removal. ENT opinion should be sought whenever there is doubt. Urgent referral to ENT was not required in most cases and a follow-up in the ENT clinic the following day was adequate. The ED physician should be skilled in techniques of FB removal, especially throat FB, which has the lowest rate of success in our study.

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