CASE REPORT

Bacterial meningitis: a rare complication of an unrecognised nasal foreign body in a child

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SUMMARY

We present an interesting case of a 7-year-old child who developed severe bacterial meningitis requiring admission to paediatric ICU. Initial investigations failed to identify the reason for this otherwise healthy child to develop this life-threatening condition. The child recovered fully with no long-term sequelae. Further on-going unilateral purulent rhinorrhoea lead to ENT referral. CT head from a previous admission showed mucosal thickening and fluid within paranasal sinuses. Reluctance to expose the child to further radiation meant that no formal scan of sinuses was organised and the child was diagnosed with chronic rhinosinusitis. Symptoms failed to improve despite the treatment. A subsequent CT scan of sinuses revealed a radiopaque foreign body in the nasal cavity. This is a rare presentation of a nasal foreign body causing bacterial meningitis. This case highlights the importance of comprehensive investigations to avoid delays in establishing a correct diagnosis and initiating the appropriate treatment.

BACKGROUND

Nasal foreign bodies are a common entity in children. Children's natural curiosity leads them to place foreign bodies into different body orifices. Numerous different objects whether animate or inanimate have been removed from nasal cavities at any one time. Resulting symptoms depend on the type of the object. Some foreign bodies are inert and cause minimal symptoms and, therefore, can be present undetected for a long time, others can cause severe inflammation of mucosa with destruction of surrounding structures. A unilateral mucopurulent nasal discharge with foul odour is the most consistent finding in the patients with a nasal foreign body.^{1 2} In a paediatric patient, this is diagnostic for nasal foreign body until proven otherwise. Serious complications of untreated foreign bodies in nasal cavities have been reported in the literature, which underlines the importance of early diagnosis and management.

CASE PRESENTATION

A 7-year-old child presented with severe bacterial meningitis and pneumococcal septicaemia following an upper respiratory tract infection. The child required intubation with ventilator support and admission to the paediatric intensive care unit due to seizures and dropping GCS. The patient was treated with intravenous antibiotics, steroids and anticonvulsants.

Two CT scans of the head were performed showing normal intracranial findings and one MRI

scan of the brain which showed shallow subdural effusions in keeping with meningitis. Extensive mucosal thickening and fluid within paranasal sinuses was noted (figure 1).

The child recovered fully and was discharged home. She continued to experience severe upper respiratory problems with thick unilateral nasal discharge. The patient was referred to the ENT outpatient clinic.

CT scans were reviewed and, together with clinical findings, the patient was diagnosed with chronic rhinosinusitis and treated with a 6-week course of oral antibiotics and saline douching and topical steroid sprays.

On follow-up, there was persistent purulent rhinorrhoea from the right nostril. The 6-week course of antibiotics settled the initial symptoms, but shortly after stopping the antibiotics, purulent discharge from the right nostril returned. Flexible nasal endoscopy showed unilateral purulent discharge only. No masses or foreign bodies were seen.

In view of these findings a clinical suspicion of a right sided nasal pathology was formulated and a CT scan of the paranasal sinuses was organised.

INVESTIGATIONS

CT scan of sinuses showed a ring-shaped foreign body within the right nasal cavity. The right osteomeatal complex was opacified with complete occlusion of the right maxillary antrum. Associated mucosal thickening was seen (figures 2 and 3).

Figure 1 CT brain—axial view, the most inferior slide. *Note:* The scan extends only to the superior part of the ethmoid sinuses.

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Figure 2 CT sinuses—axial view showing radiopaque foreign body and opacified right maxillary sinus.

TREATMENT

The child underwent endoscopic examination of the nose and middle meatal antrostomy under general anaesthesia. A foreign body in the right middle meatus was found and removed (figures 4 and 5).

OUTCOME AND FOLLOW-UP

A microbiology swab taken at the time of surgery grew *Streptococcus pneumoniae*. The patient was treated with oral antibiotics and topical nasal therapy. On follow-up in clinic, the child was well. The purulent rhinorrhoea settled.

DISCUSSION

Nasal foreign bodies in children are very common. Unilateral purulent nasal discharge in a young child should raise clinical suspicion of a possible foreign body being present in the nasal cavity. If left untreated, this could lead to possible complications such as rhinoliths, erosion, infection, acute sinusitis, otitis media, periorbital cellulitis and as in our case meningitis.^{1 3}

Other differential diagnoses, although less common in children, should be considered when dealing with unilateral

Figure 4 Intranasal endoscopic view showing mucopus and foreign body in the right middle meatus.

symptoms. These range from structural anomalies (deviated nasal septum, unilateral choanal atresia, etc), benign conditions (polyps, odontogenic sinusitis) to malignancy (Ewings sarcoma). Unilateral presentation always warrants a comprehensive investigation to determine the underlying cause.

Although it is impossible to say for sure that the foreign body in the nasal cavity was the reason for this otherwise well child to develop severe meningitis, this is definitely highly suspicious. Supporting clues are:

- ▶ The child was 7 years old at the time of presentation. Children of this age are usually able to give good history which would suggest the child was much younger when the foreign body was inserted.
- ▶ The foreign body was a calcified hair band. Calcification is a process that takes time, which supports the theory of a prolonged position in the nasal cavity.
- ▶ The swab taken from middle meatus at the time of surgery grew *S. pneumoniae* which is the same organism that caused meningitis and septicaemia.

Figure 3 CT sinuses—coronal view showing radiopaque foreign body in the right nasal cavity with associated opacification of the right maxillary sinus.

Figure 5 Foreign body—a calcified hair band.

Initial CT and MRI scans of the brain performed to look for causes and complications of meningitis showed right-sided ethmoid opacity. Standard sequences of the brain do not extend down to cover the inferior nasal cavity or maxillary sinuses and therefore the foreign body was missed. In this instance, the CT scan of the brain initially gave false reassurance of absence of significant underlying pathology.

The risk for developing a radiation-related cancer can be several times higher for a young child compared with an adult exposed to an identical CT scan. Reluctance of clinicians to expose children to repeated 'unnecessary' radiation may delay diagnosis. For an individual child, the risks of CT are small and the individual risk-benefit balance favours the benefit when used appropriately. CT scans can be a lifesaving tool for diagnosing pathology in children.⁴

Long-standing history of unilateral purulent discharge despite prolonged treatment with broad spectrum antibiotics eventually lead to further investigations and discovery of calcified foreign

body which consequently lead to treatment and complete resolution of symptoms in this child.

Single case reports of bacterial meningitis secondary to penetrating nasal foreign bodies can be found in the literature; however, to the best of our knowledge, this is the only reported case where an unrecognised non-penetrating nasal foreign body caused this serious complication.^{5 6}

In this case, the opportunity to identify the causative factor was initially missed due to the lack of detailed history taking and full investigation. An important clinical lesson can therefore be learnt: bacterial meningitis with confirmed *S. pneumoniae* culture should alarm clinicians of potential underlying pathology within nasal cavity, paranasal sinuses, ear, mastoid and oropharynx, and these areas should therefore be examined in detail in search for the cause of the infection.

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Learning points

- ▶ Unilateral purulent nasal discharge in a child should raise clinical suspicion of a possible foreign body in nasal cavity.
- ▶ Careful history taking and examination is essential in the process of establishing the aetiology of the bacterial meningitis.
- ▶ CT head does not cover nasal cavity or maxillary sinus fully therefore cannot exclude pathology in this region.
- ▶ Use of appropriate imaging in children if indicated is imperative in identifying the underlying pathology.

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