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## Subclinical chronic sinusitis causing presumed ventriculoperitoneal shunt sepsis in a child

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### ABSTRACT

A Rhinosinusitis is often under diagnosed and overlooked in children. Fever as the only symptom of rhinosinusitis is rare and largely unreported. A three-year-old boy with a right frontal ventriculo-peritoneal (VP) shunt for congenital hydrocephalus presented with a three-month history of recurrent high grade intermittent fever. He had no other symptoms. A cranial Computed Tomogram for VP shunt evaluation revealed isodense lesions filling the right and left ethmoidal and maxillary sinuses. Bilateral inferior meatal puncture revealed frank pus in both maxillary sinuses. Microbacterial culture yielded *Streptococcus pyogenes* sensitive to Erythromycin. Following treatment, fever subsided and remained so in subsequent outpatients' visits.

**Key words:** Subclinical chronic sinusitis; Ventriculo-peritoneal shunt

### Abbreviations

ARS = acute rhinosinusitis; CRS =chronic rhinosinusitis; CT =computed tomography; CNS =central nervous system; ESS =endoscopic sinus surgery; URTI =upper respiratory tract infection; VP =ventriculoperitoneal;

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## Introduction

Rhinosinusitis commonly follows upper respiratory tract infection (URTI) in children.

An average child is likely to have 6-8 'colds' (i.e., upper respiratory tract infections) per year, and approximately 0.5-2% of upper respiratory tract infections in adults and 6-13% of viral upper respiratory tract infections in children are complicated by the development of acute bacterial sinusitis [1, 2].

This condition is under diagnosed and often overlooked in children. Occasionally they present with orbital complications, especially from ethmoiditis. The typical symptoms of this condition is nasal blockage, nasal discharge (watery to purulent) and sleep disturbance. They may also present with fever. Some affected children go on to develop chronic rhinosinusitis (CRS) [3].

Sinusitis causing unexplained fever, pyrexia of unknown origin, in children without any other symptoms characteristic of the condition is quite rare. We find no prior clinical example in the literature.

In this report, we present the case of presumed shunt sepsis in a 3- year-old male child living with a ventriculoperitoneal (VP) shunt for congenital hydrocephalus. The clinical presentation was with a 3-month history of recurrent fever alone. The eventual diagnosis was chronic bilateral maxillary and ethmoidal sinusitis.

## Case presentation

A 3-year-old Nigerian male child presented to the neurosurgical department of our institution with three months' history of recurrent high grade fever. He had no other symptoms. He had been treated on multiple occasions for malaria and suspected septicaemia. He had had a right frontal ventriculo-peritoneal (VP) shunt 30 months previously for congenital hydrocephalus. Examination at presentation did not reveal any hyperaemia or tenderness along the VP shunt track. Occipito-frontal circumference had not increased excessively; there was no vomiting, no seizures and no altered sensorium. There was no nasal discharge or blockage, no mouth breathing or other features suggestive of URTI or Adenoidal enlargement. There was a first degree relation

(father) with asthma.

He had no otologic or throat symptoms.

Complete blood count revealed packed cell volume of 31% and total white blood cell count of 15,780 per cubic millimetre (Neutrophils made up 42% while lymphocytes were 48%)

There was no evidence of malaria parasites in the blood film while the blood culture yielded no growth after 48 hours of incubation. A VP shunt plain radiograph series did not reveal any abnormalities.

A cranial computed tomogram done to rule out intracranial shunt infection, showed significant brain re-expansion when compared to the one done 30 months earlier (prior to the VP shunt). There was no evidence of migration or infection of the shunt (Figure 1).

An incidental finding of isodense lesions filling the right and left ethmoidal as well as maxillary sinuses was noted (Figure 2) on the CT scan. This necessitated a consultation for review and management by the Otorhinolaryngology head and neck surgery team.

The inferior turbinates were slightly engorged bilaterally; both maxillary sinuses appeared unusually large for the child's age, and the right antral lesion showed several septae reminiscent of abscess loculi. Other sinuses were rudimentary

We did not have facilities for endoscopic sinus surgery at that time. He subsequently had bilateral inferior meatal (Antral) puncture under general anaesthesia. The findings at surgery were 2 and 3 millilitres of frank pus from the left and right maxillary antra respectively. Thorough wash out of both antra was done.

Microbiological culture of both antral aspirates yielded *Streptococcus pyogenes* sensitive to Erythromycin. This was commenced and continued for 14 days along with topical nasal decongestants (xylometazoline) as well as oral antihistamine. There was immediate resolution of the fever on the second day post surgery and this was sustained till discharge and subsequent follow up visits for 6 weeks.

## Discussion

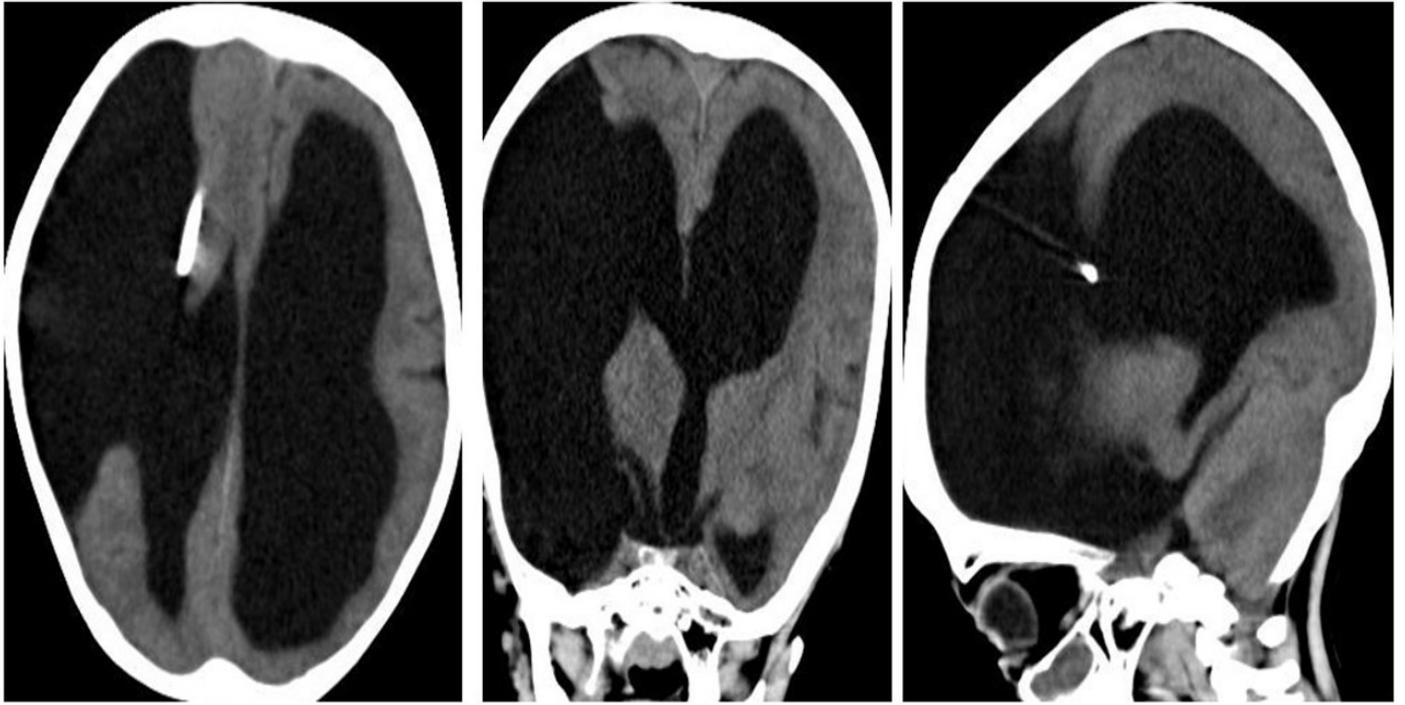


Figure 1 There was no evidence of migration or infection of the shunt.

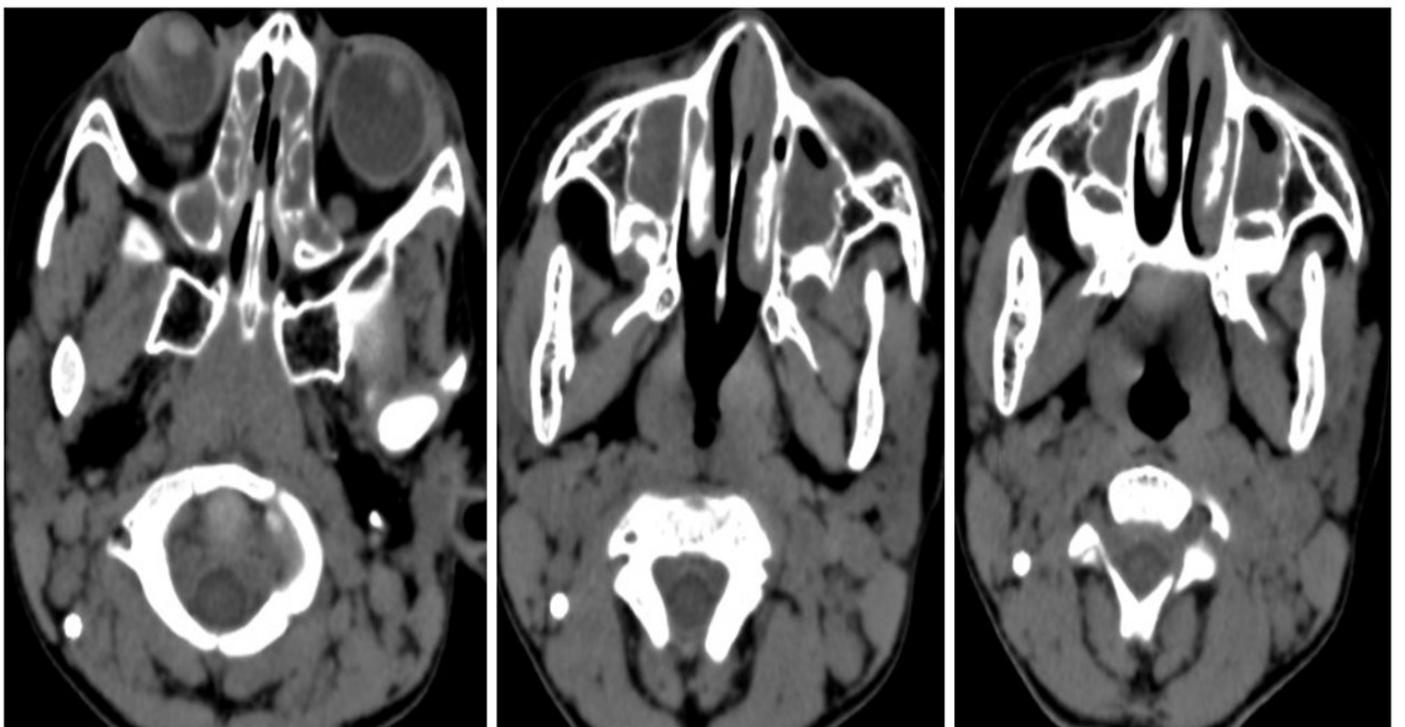


Figure 2 An incidental finding of isodense lesions filling the right and left ethmoidal as well as maxillary sinuses was noted on the CT scan

The diagnosis of rhinosinusitis in children may be difficult even to the experienced paediatric otolaryngologist. Typically, it should be suspected when 'the common cold' (flu-like symptomatology) does not improve beyond 10 days or there is presence of nasal blockage with purulent nasal discharge, headache, fever and diminution/loss of smell [2]. In chronic sinusitis the symptoms are more subtle.

The clinical symptoms of acute rhinosinusitis (ARS) in children include nasal stuffiness, coloured nasal discharge, and cough with resultant sleep disturbance. Facial pain/headache can be present in older children. ARS is defined as symptoms lasting up to 4 weeks. Subacute is when symptoms are between 4 weeks and 12 weeks, and CRS is when symptoms have been present for more than 12 weeks[4]. The American Academy of Paediatrics updated guidelines on the diagnosis and management of acute bacterial sinusitis in children and adolescents [5] include:

- Previous diagnostic criteria for acute bacterial sinusitis in children were acute upper respiratory tract infection (URI) with either nasal discharge and/or daytime cough for longer than 10 days or severe onset of fever, purulent nasal discharge, and other respiratory symptoms for 3 or more consecutive days. A third criterion added to the updated guideline is URI with worsening symptoms such as nasal discharge, cough, and fever after initial improvement.
- Physicians may now observe children with persistent infection lasting longer than 10 days for an additional 3 days before prescribing antibiotics, but antibiotics should still be given to children with severe onset or worsening symptoms.
- First-line therapy is amoxicillin with or without clavulanate.
- Imaging tests are not recommended for children with uncomplicated acute bacterial sinusitis, although children with suspected orbital or CNS complications should undergo CT scanning of the paranasal sinuses.

Fever as the only reported symptom of rhinosinusitis is rarely reported. The index patient did not display any of the other major and minor symptoms required in the diagnosis of rhinosinusitis hence the delay in the clinical presentation, diagnosis and treatment. The finding suggestive of infection of the sinuses was only an incidental discovery on CT scan evaluation of the presumed VP-shunt-related intracranial sepsis.

Anterior rhinoscopy and Fiberoptic nasal endoscopy are useful in the assessment of middle meatal pathology, polyps and nasal masses as well as adenoidal enlargement. Anterior rhinoscopy, with the aid of an otoscope, was unremarkable in our patient. Endoscopic nasal cavity examination was not done in our patient as the CT scan images had already enumerated the nasal cavity and paranasal sinuses.

The role of laboratory investigations such as white blood cell count, Erythrocyte sedimentation rate and C-reactive protein levels have been claimed by some physicians to be of help in the diagnosis of acute rhinosinusitis in children. These tests however appear to add little to the predictive value of clinical findings in the diagnosis [6]. The index patient's white blood cell count was 15,780/mm<sup>3</sup> (Reference value in our laboratory is 3- 11,000/mm<sup>3</sup>) which was suggestive of an ongoing infection.

The diagnosis of the index case was confirmed by the CT scan. Imaging studies however are not necessary when the probability of sinusitis is either high or low [3]. They are useful when the diagnosis is in doubt, based upon a thorough history and physical examination. Plain sinus radiographs (Waters' view) may reveal mucosal thickening, air-fluid levels and opacity. A CT scan is necessary when a complication is suspected, in children with polyps, or in those children who failed medical therapy and are considered for surgery [3]. In this patient, the CT scan was done to assess the intracranial component of the VP shunt. Rhinosinusitis was not considered a possibility at that time.

The most common pathogens isolated from maxillary sinus cultures in patients with acute bacterial rhinosinusitis include *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. *Streptococcus pyogenes*, *Staphylococcus aureus* and anaerobes are less

commonly associated with acute bacterial rhinosinusitis; they have been found in fewer than 10% of patients with acute bacterial sinusitis, despite the ample environment available for their growth. The exceptions are in sinusitis resulting from a dental source and in children with chronic sinus disease, in whom anaerobic organisms are usually isolated [7].

Surgical treatment of rhinosinusitis in children is reserved for cases where there is failure of medical treatment or there are complications. We did not attempt further medical treatment in this index patient as he had been treated on several occasions with various classes of antibiotic (Penicillins and Cephalosporins) by the primary care physicians earlier consulted. Moreover, we felt that the radiological features warranted a surgical intervention to forestall development of any intracranial or orbital complication. Whereas failed medical therapy is treated surgically in adults with Endoscopic Sinus Surgery (ESS) [8], in children various surgical options are often initially carried out before ESS is considered mainly because of the fear of facial growth retardation that may be caused by ESS. This complication however appears largely only putative [9].

Adenoidectomy has been advocated by many as an initial step in the management of these patients. However the success rate is less than that obtained by ESS [10, 11, 12]. Adenoidectomy with sinus lavage has been shown to be effective in the treatment of sinusitis in children [13]. Bilateral maxillary antral lavage was done as the facilities for Endoscopic Sinus Surgery were unavailable at that time. There was no evidence of adenoidal enlargement (clinically and radiologically) in this patient; hence adenoidectomy was not done.

Antibiotic therapy was instituted in this patient according to the sensitivity pattern of the organism cultured. Good response of patients to targeted antibiotic therapy in children with CRS has been demonstrated in quite a number of reports lending credence to the role of bacteria in the aetiology of CRS [14]. The index patient, at present, has sustained clinical improvement.

Children with chronic rhinosinusitis especially with background allergy require regular follow up visits and medical treatment with antibiotics and intranasal steroids may be required.

## Conclusion

Fever presenting as the only clinical symptom in children with rhinosinusitis is quite rare. Chronic rhinosinusitis as the cause of presumed paediatric VP shunt sepsis is equally rare. The cause of this patients' fever was largely discovered incidentally. Perhaps it can be recommended that in the evaluation of a child with fever of indeterminate origin; imaging studies (at least a Plain radiograph [Waters'view]) of the paranasal sinuses may be added to the investigative armamentaria required to identify the cause of the fever.

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