Case Report

Acute Isolated Sphenoid Sinusitis†

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Abstract

Introduction: Acute isolated sphenoid sinusitis is seen in fewer than 3% of all cases of sinusitis. It is frequently misdiagnosed because of its vague symptoms and the paucity of clinical findings. We report 2 cases of isolated acute isolated sphenoid sinusitis with unusual presentations. Clinical Picture: Both patients presented with acute headache, eye pain and fever, and were provisionally diagnosed as meningitis. In 1 case, the symptoms were on the contralateral side of the sphenoid infection. Intracranial complications were also present. Treatment: Treatment included intravenous antibiotics and endoscopic sphenoidotomy. Outcome: Both patients recovered with no residual neurological disability. Conclusion: Acute sphenoiditis usually presents with subtle symptoms and elusive physical findings and hence a high index of suspicion is necessary. Complications may arise due to the close proximity of important structures to the sphenoid sinus. Uncomplicated cases can resolve with optimal antibiotic therapy if diagnosed and treated early. Persistence or progression of disease with development of intracranial complications are indications for immediate surgical drainage.

Ann Acad Med Singapore 2004;33:656-9

Key words: Complications, Endoscopy, Headache

Introduction

Isolated infection of the sphenoid sinus is uncommon. It usually occurs in conjunction with infection of the other paranasal sinuses.[1] Acute isolated sphenoid sinusitis is seen in fewer than 3% of all cases of sinusitis.[2] It is frequently misdiagnosed because of its vague symptoms and the paucity of clinical findings. The diagnosis is often delayed until the patient suffers a neurological complication. We describe 2 cases of acute isolated sphenoid sinusitis with unusual presentations.

Case Reports

Case 1

A 25-year-old healthy Chinese female presented to the hospital with a 2-week history of intermittent severe headache, left eye pain, fever, chills, nausea and vomiting. The headache was located at the vertex and bitemporal regions. There was a history of upper respiratory tract infection 2 weeks prior to admission. She had no nasal symptoms.

Physical examination revealed no signs of meningism or neurological deficit. The differential diagnoses included migraine, tension headache and meningitis. Investigations showed a markedly raised white cell count of 24.0/L (96% polymorph) and elevated ESR of 55 mm/h. A computed tomographic (CT) scan of the brain was normal. Lumbar puncture showed clear cerebrospinal fluid with a few white blood cells. Culture of the cerebrospinal fluid revealed no bacterial growth. She was treated with intravenous ceftriaxone.

By day 4 of admission, her left-sided headache, eye pain and fever had not improved. There was new onset of left hearing loss and left eyelid swelling. An otolaryngological consult was sought. Otoscopy revealed a mildly injected left tympanic membrane. Flexible nasendoscopy revealed mucopus exuding from the left sphenoid ostium. An urgent sinus CT showed an opacified right sphenoid sinus consistent with sphenoiditis and a partial left cavernous sinus and superior orbital vein thromboses (Figs. 1a and 1b). An urgent MR imaging scan confirmed these findings.

An urgent endoscopic sphenoidotomy was performed. Polypoidal mucosa obstructing the ostium was removed.

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† This paper was presented at 8th Asian Research Symposium in Rhinology, Tainan, Taiwan, March 15 to 16, 2003.

Thick yellowish pus under pressure was drained from the right sphenoid cavity. Culture of the pus showed no bacterial growth. She became afebrile with resolution of her symptoms by the second postoperative day.

Case 2

A healthy 10-year-old Malay boy presented to the hospital with a 4-day history of left-sided headache, left eye pain and fever. The headache was frontal in location and constant in nature. There were no other associated central nervous system symptoms or signs. He had been seen thrice by his family physician and had been treated with a course of amoxicillin. He had a history of mild asthma and allergic rhinitis.

On examination, his vital signs were: temperature 38.5°C, pulse 90/minute and blood pressure 110/60 mm Hg. Physical examination revealed no neurological deficits or eye signs. A provisional diagnosis of meningitis was made and intravenous ceftriaxone was commenced. Full blood count, urinalysis and blood cultures were normal. Lumbar puncture was performed and the cerebrospinal fluid findings were normal. A CT head revealed an air/fluid level in the left sphenoid suggestive of sphenoid sinusitis with mild posterior ethmoid cell involvement. There was free air in the middle cranial fossa (Fig. 2).

An otolaryngological consult was obtained on day 3 of admission. Flexible nasendoscopy revealed mucopus exuding from the right sphenoid ostium. An urgent CT scan of the sinuses confirmed bilateral sphenoid sinusitis, predominantly on the left side, with free air in the left middle cranial fossa (Fig. 3). No fracture was noted. A neurosurgical consult was also obtained to help determine the cause of free air in the middle cranial fossa.

An urgent endoscopic sphenoidotomy was performed. The left middle turbinate was noted to be large and obstructing the sphenoid ostium. After displacing it laterally, pus under pressure was released from the left sphenoid sinus. Culture of the pus showed no bacterial growth. Post-operatively, intravenous metronidazole and crystalline penicillin as well as topical oxymethazoline nasal drops 0.025% were added to the treatment regimen. His headache and fever resolved on the second postoperative day. A repeat CT scan of the sinuses performed 2 weeks postoperatively showed resolution of the intracranial air.

Discussion

The sphenoid sinus has been described as the most neglected sinus by Van Alyea.[3] It is lined with ciliated pseudostratified epithelium with fewer mucous secreting cells as compared to the other paranasal sinuses. This contributes to fewer drainage problems and may explain the low incidence of isolated sphenoiditis.[4]

Various predisposing factors for acute sphenoiditis have been identified. These include anatomical obstructions such as abnormally placed or small sphenoid ostiums, septal deviation, and large superior or middle turbinates.[3] Injuries (blunt, penetrating or surgical) have been shown to lead to infection because of altered drainage patterns and direct inoculation of pathogenic organisms.[1,2] Swimming or diving with forceful water entry into the nose have also been linked to acute sphenoiditis.[5] Other predisposing factors include radiotherapy, immuno-suppression, sinonasal polyps, and primary or metastatic tumours.[1,2,6,7] Both patients in our report were otherwise healthy. Predisposing factors could be sphenoid ostium obstruction secondary to mucosal oedema from an upper respiratory tract infection (case 1) and allergic rhinitis and/or large middle turbinate (case 2).

Headache is the most common initial symptom of acute sphenoiditis.[1,5-9] This was the presenting complaint in both cases. The headache has been described in descending order of frequency as deep-seated retro-orbital, frontal, over the vertex, temporal, occipital or postauricular.[7] It is more often non-specific and may present anywhere in the craniofacial region.[10] The pain usually increases steadily with time, is refractory to medical treatment and interferes with sleep.[2,7] Facial pain is thought to be due to the involvement of V_1 and V_2 nerves. The headache in case 1 was on the contralateral side of the sphenoid infection. Proetz also reported a patient with similar symptoms.[11] An explanation for this is based on the anatomical fact that a dominant sphenoid cavity can contain or relate to structures on the contralateral side.

Visual changes such as blurring or loss of vision constitute the second most common symptom complex. The optic nerve is most commonly involved followed by the sixth cranial nerve.[10] Blindness is rare unless an orbital abscess or cavernous sinus thrombosis develops. Fever is usually present.[12,13]

The absence of nasal symptoms does not preclude the presence of sphenoiditis, as illustrated in both our cases. Significant physical findings are usually absent, though the presence of neurological findings would suggest an intracranial complication.

Any of the structures related to the sphenoid sinus can be affected by pathological processes involving the sinus. Proetz listed 13 structures adjacent to the sphenoid sinus that may be affected by disease: CN II, III, IV, CN V_1, CN V_2, CNVI, dura mater, pituitary gland, cavernous sinus, internal carotid artery, sphenopalatine ganglion, sphenopalatine artery, pterygoid canal and nerve.[14] Sphenoid sinusitis can thus lead to orbital cellulitis and abscess, orbital apex syndrome, blindness, sepsis, meningitis, epidural and subdural abscess, cerebral infarction, pituitary

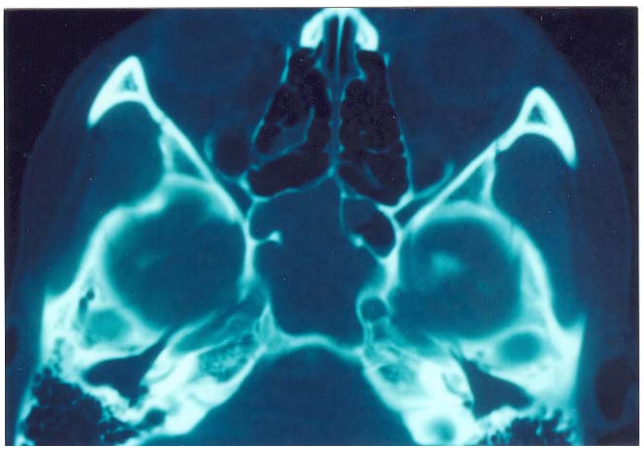

Fig. 1a. Axial CT scan of the sinuses showing right sphenoid opacification consistent with sphenoiditis.

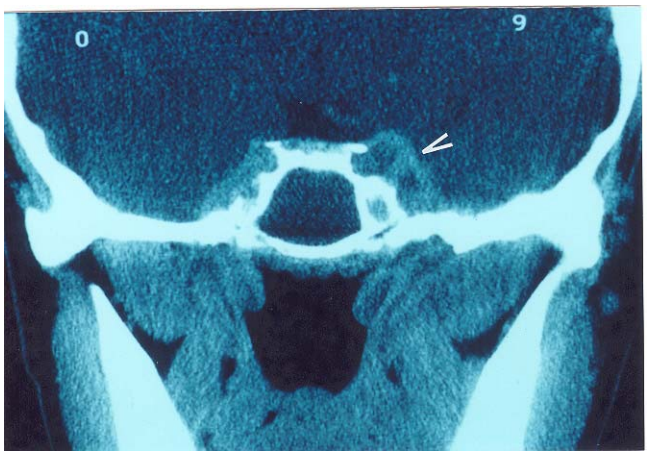

Fig. 1b. Coronal CT scan of the sinuses showing sphenoiditis and a partial left cavernous sinus and superior orbital vein thrombosis (arrow).

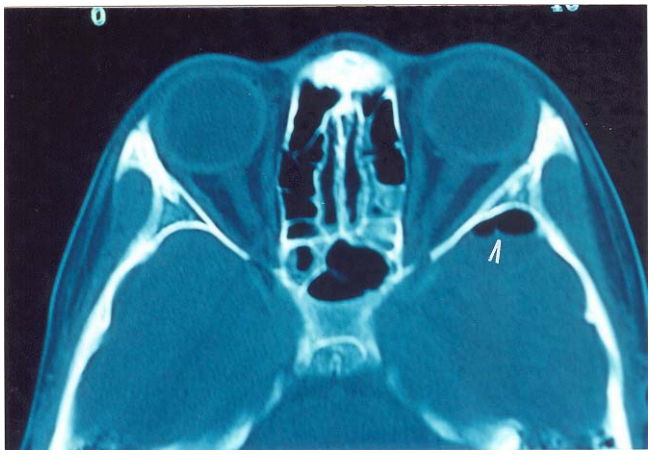

Fig. 2. CT head showing sphenoid sinusitis with mild posterior ethmoid sinusitis. There was free air in the left middle cranial fossa (arrow).

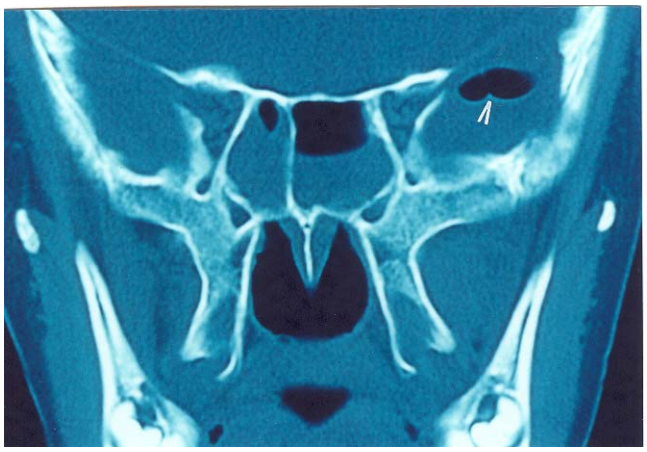

Fig. 3. Coronal CT sinuses showing sphenoid sinusitis with left sphenoid air-fluid level and air in the middle cranial fossa (arrow).

abscess, cavernous sinus thrombosis, sepsis and internal carotid artery thrombosis.[12] Both our cases developed early intracranial complications. Case 1 developed partial cavernous sinus thrombosis and superior ophthalmic vein thrombosis with oedema of the left eye. In the second case, the intracranial air in the CT head of the child could be attributed to the infection that had weakened the thin sphenoid roof and breached the dural barrier, allowing air to be forced into the cranial cavity during sneezing. Another possibility would be involvement of gas-forming organisms, though the patient would be expected to be more ill in such an instance.

The diagnosis of acute sphenoiditis presents with various diagnostic dilemmas. As previously mentioned, the most common feature of sphenoid sinus disease is difficulty in its diagnosis based on history and physical examination alone. Flexible nasendoscopy may reveal purulent drainage from the sphenoid ostium or in the nasopharynx and this was helpful in both cases. After the sphenoid lesion is established, further investigations are necessary.

The diagnostic study of choice is a high-resolution CT scan (axial and coronal views). This may reveal the presence of fluid (or opacification) and delineate the walls of the sphenoid sinus. In sphenoid sinusitis there is usually no bony erosion as compared to malignant disease. MR imaging with contrast should be obtained if there are any cranial nerve abnormalities as it is superior to CT scan in revealing pathology in the cavernous sinus and its adjacent neurovascular structures.

Acute sphenoiditis is most commonly caused by *Staphylococcal aureus*, followed by *Streptococcal* species.[2,13,15] Gram-negative and anaerobic organisms are occasionally cultured.[2,6,8,15] Fungi, especially *Aspergillus*, must be considered in all patients particularly if the patient is immunocompromised.[5] The cultures obtained intra-operatively from both patients showed no bacterial growth, probably due to the administration of broad-spectrum antibiotics preoperatively.

Uncomplicated cases of acute sphenoiditis can resolve with optimal antibiotic therapy if diagnosed and treated early.[2,12] Prompt treatment is necessary as delay can result in serious morbidity and mortality.[2,13] The choice of antibiotic therapy should take into account the wide spectrum of organisms isolated and these would include a combination of high-dose clindamycin (targets *S. aureus*, *Streptococcus* species and anaerobes) and a third generation cephalosporin (targets gram-negative organisms) given parenterally.[15] Cloxacillin can be added for additional cover for *S. aureus*.[15] Patients who are allergic to cephalosporin can be given aminoglycosides instead. Specific antimicrobial therapy can be adjusted once the culture results from the cerebrospinal fluid, blood and sinus aspirates are known. The duration of antibiotic treatment is about 3 to 4 weeks.[13] Topical decongestants and saline irrigation help to promote drainage of the obstructed sinus.

If symptoms progress or continue for more than 24 hours or if complications arise, immediate surgical drainage of the sphenoid sinus is indicated.[5] Various approaches to the sphenoid sinus are available. Endoscopic approach to the sphenoid sinus, either directly to its anterior surface or through the ethmoids, is the current method of choice.[16] Both patients had drainage using the direct endoscopic approach through the anterior surface of the affected sphenoid sinus. In case of limited exposure, the posterior segment of the middle turbinate may be excised to improve accessibility.[16]

Conclusion

Acute isolated sphenoiditis is uncommon. It usually presents with subtle symptoms and elusive physical findings and hence a high index of suspicion is necessary. Nasendoscopy, with the aid of CT/MRI sinuses, allows for early diagnosis. Complications may arise due to the close proximity of important structures to the sphenoid. Uncomplicated cases can resolve with optimal antibiotic therapy if diagnosed and treated early. Persistence or progression of disease with development of intracranial complications are indications for immediate surgical drainage.

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