Ref: Ro J Neurol. 2017;XVI(1)
DOI: 10.37897/RJN.2017.1.5

Isolated acute sphenoid sinusitis as an unexpected cause of acute headache in a 9-year-old male

Miorita Toader[1], Alina Oprea[2]

[1]Department of ENT, "Grigore Alexandrescu" Emergency Clinical Hospital for Children, Bucharest, Romania

[2]Department of General Pediatrics, "Grigore Alexandrescu" Emergency Clinical Hospital for Children, Bucharest, Romania

ABSTRACT

Isolated sphenoid sinusitis represents a rare pathology encountered in the pediatric population. The clinical presentation is often nonspecific and misleading, thus causing a delay in diagnosis. Progressive acute headache is the chief complaint, followed by cranial nerve involvement, most frequently the optic nerve. The underlying pathology and evolution towards ocular or intracranial complications reside in the particularities of the sphenoid sinus and in its close relations with the surrounding anatomical structures. Prompt diagnosis and initiation of wide-spectrum antibiotherapy are vital for an optimal therapeutic outcome with preservation of normal vision. We report a case of a previously healthy 9-year-old male who presented for an intense progressive headache without any neurological signs. Under intravenous antibiotherapy he had a rapid favourable evolution and did not develop any complications. An emphasis is put on the importance of a rapid diagnosis followed by prompt treatment with close monitoring.

Keywords: secondary headache, sphenoid sinus, bacterial sinusitis

INTRODUCTION

Headache represents a common chief complaint in the pediatric population. Establishing the differential diagnosis between a primary and a secondary cause is of paramount importance and it should always be the first step in the management. While primary headaches account for approximately 90% of aetiologies, secondary headaches are the ones that require immediate diagnosis and management due to their potential fatal underlying causes (1).

Obtaining a detailed history and performing a thorough physical examination are vital. Secondary headaches are suspected in the presence of systemic symptoms and neurologic signs (1). According to ICHD-3beta (International Classification of Headache Disorders – third edition), they are secondary to head and/or neck trauma, to cranial or cervical vascular disorder, to non-vascular intracranial disorder, to a substance or its withdrawal, to infections, to disorder of homeostasis, to disorders of cranium, neck, sinuses, or to psychiatric disorder (1,2).

The top three causes of pediatric acute headache remain viral infection, migraine and sinusitis (1,3). American Academy of Pediatrics defines bacterial sinusitis according to the following clinical criteria: persistent illness (nasal discharge, daytime cough lasting more than 10 days without improvement), or worsening course (fever after initial improvement), or severe onset (fever ≥39°C, purulent nasal discharge for at least 3 consecutive days) (1,4). Imaging studies (contrast-enhanced computed tomography) should be performed only in the presence of orbital or central nervous system complications (4).

We report a case of an isolated acute sphenoid sinusitis in a 9-year-old male patient who presented with acute headache. Emphasis is put on the multidisciplinary management needed in order to establish a prompt diagnosis and initiate a rapid treatment, thus preventing complications.

Corresponding author:
Alina Oprea, MD
E-mail: alina.i.oprea@gmail.com

Article History:
Received: 13 February 2017
Accepted: 26 February 2017

CASE HISTORY

A previously healthy 9-year-old male, fully immunized with a non-contributory past-medical history, presented to the Emergency Department for acute onset of vomiting (4 episodes in 12 hours prior to admission) and a 2-weeks history of acute headache. He did not experience any systemic symptoms such as fever or malaise. The symptomatology occurred 5 days after the resolution of a common viral infection.

The headache was localized on the vertex, it had a pulsatile character and exhibited a progressive increase in intensity – starting from 5/10 VAS (Visual Analogue Scale) and reaching 9/10 VAS on presentation. The cephalalgic episodes occurred throughout the day, including during the night, with a variable duration and initially responded to non-steroidal anti-inflammatory drugs, but eventually became non-responsive.

Upon admission the general clinical examination and neurological examination were within normal range with no meningeal signs or neurological focal findings. The ENT exam only revealed an intense rhino-pharyngitis. The ophtalmoscopic exam was normal with no papilledema; intraocular pressures were also normal. A pediatric infectious disease consult was also requested which excluded any clinical signs of infectious pathology concerning the central nervous system.

However, laboratory tests revealed an important inflammatory response (white blood cell count = 27,000/mm^3, C-reactive protein= 32 mg/dL, erythrocyte sedimentation rate = 80 mm/h, fibrinogen = 680 mg/dL). All cultures were negative. An emergency contrast-enhanced cerebral computed tomography was performed. It revealed a complete opacification of the sphenoid sinuses, the other sinuses being clear (Figure 1, Figure 2).

A diagnosis of isolated sphenoid sinusitis was established and the patient was put on a wide-spectrum intravenous antibiotherapy (Ceftriaxone) with coverage on gram-positive bacteria. The headache significantly improved after 24 hours and after 36 hours, ENT examination revealed an abundant purulent posterior rhinorrhoea which progressively diminished in the following 5 days. The patient received 14 days of intravenous antibiotherapy, followed by additional 7 days of oral Cefuroxime. The evolution was rapidly favourable and was discharged after 14 days. The 3-months follow-up CT was normal with normally aerated sphenoid sinuses.

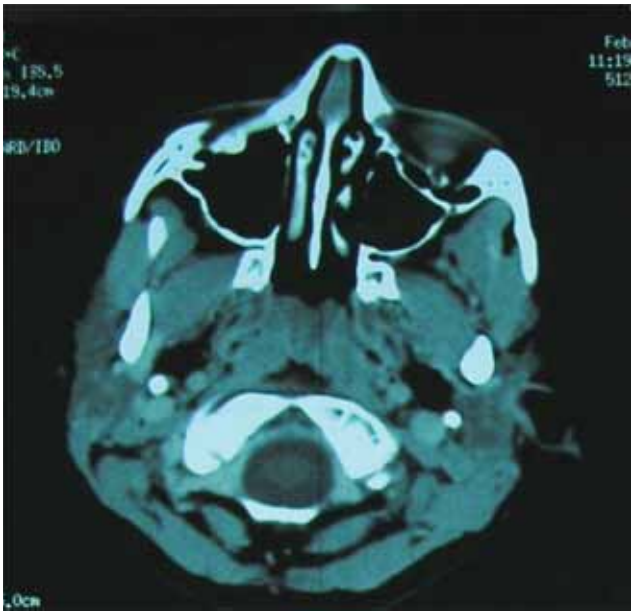

FIGURE 1. *Contrast-enhanced cerebral CT – clear maxillary sinuses, nasal fossa*

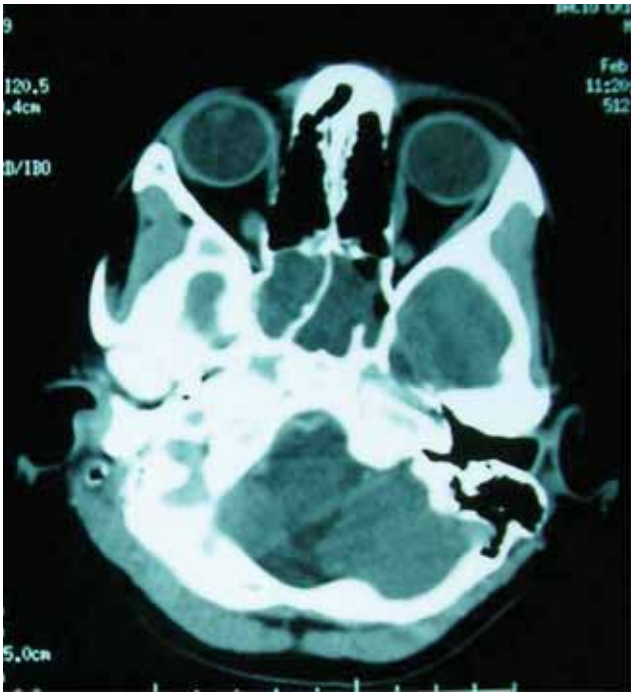

FIGURE 2. *Contrast-enhanced cerebral CT – opacification of the sphenoidal sinus*

DISCUSSION

Sphenoid sinusitis represents a rare clinical entity both in children and adults, accounting for less than 3% of cases. It is usually accompanied by infections of the surrounding sinuses (5). Apparently, isolated forms have been described only in the pediatric population, affecting predominantly older children – pre-adolescents and adolescents (5,6). The rarity is ensured by its location and by the bone reduced thickness compared to the paranasal sinus-

es (5). The underlying pathology is dependent on the sinus development and on the close relations with the surrounding anatomical structures (5,7).

While the maxillary and ethmoid sinuses are present since birth, the frontal and the sphenoid ones start to develop in the first years of life, gradually becoming pneumatised. They finally become visible on x-ray between the ages of 7 and 15 (3,7). The beating cilia covering the sinuses transport debris to the nasal passages. Whenever there is an obstruction in the mucociliary flow (virus infection, allergies), bacteria can multiply (3). The sphenoid sinus contains pseudostratified epithelium with a lower number of mucous secreting cells which makes it less prone to drainage problems (6).

Due to its nonspecific symptoms and to the scarcity of the clinical presentation, sphenoid sinusitis is often misdiagnosed until the patients develop neurological complications (4,5,7). In our patient the onset was after the complete resolution of a common cold, which questions the aetiology, given the presence of an asymptomatic period between the two illnesses. He had a nonspecific clinical presentation with severe progressing headache and vomiting, without systemic symptoms such as fever. A particular clinical finding which could have oriented towards the suspicion of bacterial sinusitis would have been persistent purulent rhinorrhea, but the patient exhibited no nasal discharge.

What is, perhaps, the most surprising is the absence of neurologic signs, especially of cranial nerve involvement. In sphenoid sinusitis, all complications derive from the surrounding anatomical relations (7). The sphenoid sinus comes into cranial contact with the pituitary gland, optic nerve, optic chiasm and the middle cranial fossa. It is laterally adjacent to the cavernous sinus, oculomotor nerve, trochlear nerve and internal carotid artery (8). The lack of a substantial barrier facilitates dissemination of infection and makes patients vulnerable to the development of various complications (5,8).

The infectious spread results in orbital, intracranial and general complications such as: orbital cellulitis, ophtalmoplegia, orbital abscess, visual loss, cavernous sinus thrombosis, internal carotid artery thrombosis, pituitary abscess with complete stalk disconnection, epidural abscess, meningitis, sepsis (3,8). As a result, aggressive management is immediately required (3,7). Whenever there is worsening of symptoms or when the infection becomes resistant to antibiotherapy after 48 hours, the optimal therapeutic approach is immediate surgery (7,8).

For reaching the sphenoid sinus there are transnasal, transethmoid and transseptal routes. The preferred method is endoscopic transnasal sphenoidotomy. The transnasal approach is preferred for the easy access to the sphenoid ostia with a shorter operating period. In case of a narrow nasal fossa, a transethmoidal approach could be used for performing a wide opening in the sinus. In children, given the continuing growth of the facial bones, conservative surgical methods are recommended (8).

In our patient, the sinusitis had a favourable evolution after the initiation of the wide-spectrum antibiotherapy. The chosen antibiotics should be active on the most common bacterial pathogens such as Streptococcus Pneumoniae, Moraxella catharalis, Haemophilus influenza. Broad-spectrum antibiotics should be considered when there is an unsatisfactory response to first-line antibiotics, a moderate-severe form, a complicated or potentially complicated form (frontal or sphenoid sinusitis. The treatment duration should be for at least 10-14 days and until asymptomatic plus an additional 7 days (4,7,9).

CONCLUSION

Isolated sphenoid sinusitis is a rare cause of secondary headache which can result in devastating complications. Pediatricians should raise their awareness towards this uncommon clinical entity. In every patient a thorough neurological examination should be performed and whenever there is a suspicion for central nervous system involvement, contrast-enhanced computed tomography should be performed. Prompt treatment with intravenous wide-spectrum antibiotherapy is needed and in case of poor response, after maximum 48 hours, endoscopic surgery should be the election. The sooner the treatment is initiated, the fewer complications there will be.

Conflicts of interest

The authors have no conflict of interest to declare. All authors have contributed equally to this article.

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