Afr. J. Med. med. Sci. (2011) 40, 171-175 *Case Report*

Complications of chronic sinusitis on orbital sonography and craniofacial computed tomography – a case report

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Summary
A 15 year old boy without a previous history of sinusitis presented with life threatening complications from chronic pansinusitis. This report highlights the role of ultrasound and computed tomography (CT) in the diagnosis and management of occult sinusitis and its complications.

Keywords: *Sinusitis, orbital, complications, CT scan, cavernous sinus thrombosis*

Résumé
Un jeune garçon de 15 ans sans histoire de sinusite se présentait à l'hôpital avec des complications de pansinusite sévère. Ce rapport illumine le rôle de l'échographie et la tomographie informatisée (TI) dans le diagnostic et les soins de l'occlusion sinusite et ses complications.

Introduction

The most frequent complication of the common cold is acute bacterial sinusitis but the latter may be unrecognized or misdiagnosed [1]. Some patients are predisposed to recurrent bouts of acute sinusitis which may result in a chronic infection. Chronic sinusitis typically presents with enigmatic facial pain or headache.

Extracranial complications of sinusitis most often involve the orbits and occur more commonly in patients with ethmoidal sinusitis [1]. Orbital complications range from orbital cellulitis, exopthalmos, and orbital abscess to cavernous sinus thrombosis. Intracranial complications of sinusitis are more commonly seen with infection of the frontal and ethmoid sinuses and this is attributed to their proximity to the dura and drainage of the diploic veins from the frontal sinus into the dural veins [1,2]. Two-thirds of patients with intracranial abscesses have sinusitis being the primary source of infection [3].

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This report highlights the role of ultrasound and Computed Tomography (CT) scans in the diagnosis of chronic sinusitis and its complications.

Case report

E. O. is a 15year old Junior Secondary School student who presented with a three week history of protrusion of the left eye. The eye gradually increased in size with tearing, redness, pain and severe headache. Two days after initial onset, protrusion of the right eye was also noted. There was one incident of vomiting on the fifth day following onset of symptoms. There was no prior history of trauma, cough, catarrh, ear discharge or nasal blockage. No septic spots were noted on the face.

Clinical examination revealed a young man who was ill-looking, febrile with peri-orbital edema and bilateral eye discharge. He was however conscious and alert. The right pupil was fixed and unreactive. Temperature was 37.9°C. Laboratory investigations revealed packed cell volume (PCV) of 43, random blood sugar of 83mg/dl and normal fasting blood sugar. The serum electrolytes and clotting factors were normal. White blood cell count was raised at 363,000. An impression of bilateral orbital cellulites with possible orbital abscess was made. Orbital ultrasound (USS) and craniofacial Computerized Tomography (CT) scan were requested.

Orbital ultrasound (Fig. 1) demonstrated marked thickening of the right upper eyelid and an oval hypoechoic lesion with internal low level echoes suggestive of an abscess was seen in the retro-orbital space medially. Both eyeballs appeared normal. The ultrasound findings supported the initial clinical assessment.

Craniofacial axial CT scan showed multiple, fairly rounded, ring- enhancing hypodense masses in the right orbit and sub-palpebral tissue with resulting in proptosis of the right globe (fig 2). The masses also compress the right optic nerve. The superior oblique and lateral rectus muscles were enlarged and there was thickening of the pre-orbital tissue. The left maxillary sinus showed hypodense contents (HU=10) and there

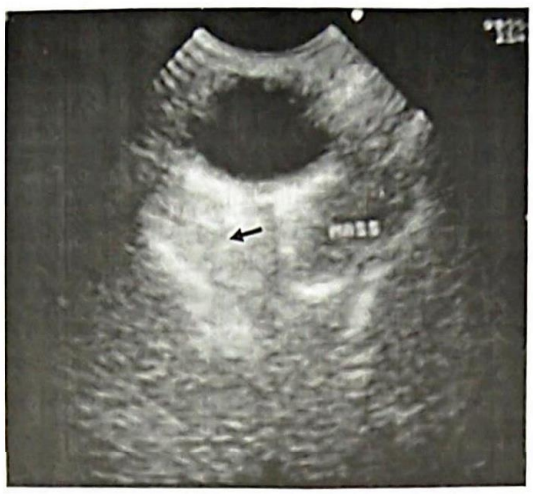

Fig. 1: Orbital ultrasound image showing a hypoechoic mass on the medial aspect of the right orbit. The optic nerve is noted centrally (arrow)

Fig. 2: Axial contrast enhanced CT image showing right orbital proptosis. Preseptal thickening is noted as well as multiple ring enhancing lesions in the right orbit.

Fig.3 Contrast enhanced Axial Computed Tomographic image showing proptosis of the right globe. Ring enhancement is noted in the opaque left maxillary sinus.

Fig. 4: Axial CT image (bone window) showing opaque sphenoid sinuses. An air fluid level is noted in the left mastoid air cells (arrow)

was enhancement of its thickened mucosa on injection of contrast (fig 3). Both sphenoidal sinuses were also hyperdense. In addition, the left mastoid air cells were also opaque with air- fluid (fig 4). A hypodense, ring-enhancing mass was also seen in the right cerebellum, close to the cerebellopontine angle. Both cavernous sinuses were enlarged and showed central hypodensities with peripheral enhancements (fig 5) suggestive of cavernous sinus thrombosis. The final diagnoses based on CT and USS findings were

1. Pan-sinusitis with abscess collection in the left maxillary sinus
2. Left suppurative mastoiditis
3. Right cerebellar abscess
4. Cavernous sinus thrombosis

The patient was placed on parenteral antibiotics-Cephtriaxone, Gentamicin and Metronidazole . Patient subsequently had surgery: to drain the right orbital abscess, right frontoethmoidectomy and left intranasal

antrostomy. He was discharged three weeks later after resolution of all symptoms.

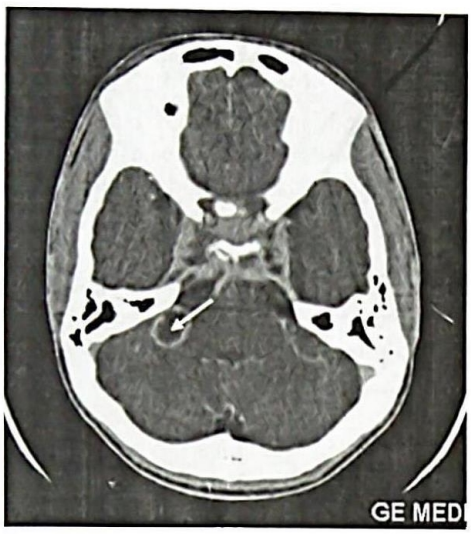

Fig. 5: Contrast enhanced Axial Computed Tomographic image showing bilateral cavernous sinus enhancement with central hypodensities (black arrows). A ring enhancing abscess is seen in the right cerebellar hemisphere (white arrow)

Discussion

Ultrasound (USS) and Computed Tomographic (CT) scans are invaluable imaging modalities in the evaluation of suspected extracranial and intracranial complications of sinusitis. Ultrasound is useful in the diagnosis and follow- up of most of the ocular complications. It is a rapid, accurate and non-invasive method of evaluating ocular and orbital diseases [4]. It is also cheap and readily available. However, its diagnostic capability is insufficient when intracranial complications are suspected as seen in the index case.

On the other hand, Computed Tomography (CT) provides a good detail of the orbital soft tissue, bones and adjacent intracranial structures. Calcification, bone erosion, vascular and orbital diseases are well delineated on CT. In the case presented, the orbital infection and abscesses were clearly and better delineated on CT scan. CT Angiography (CTA) can also facilitate the study of the lateral wall of the cavernous sinus which frequently bulges out in cases of cavernous sinus thrombosis [5]. Magnetic Resonance Imaging (MRI) with fat suppression technique will also improve orbital soft tissue delineation [6]. However, MRI does not give good visualization of bone details. It is also expensive and is not readily available. CTA and MRI were not carried out in the index case since ultrasound and CT were cost-effective and sufficient for the diagnosis in this patient.

The term orbital cellulitis is often used imprecisely to describe a number of entities that make up the spectrum of orbital and peri-orbital sepsis [2]. This spectrum can be viewed as occurring in three anatomical compartments namely (i) the pre-septal area superficial to the orbital septum, (ii) the orbit itself and (iii) the cavernous sinus.

Peri-orbital cellulitis is specifically inflammation of the eyelids superficial to the orbital septum and is more common than true orbital cellulites [7]. Orbital cellulitis is commonly due to underlying sinusitis [5,8,9] and the relationship between these conditions and sinusitis is well established [2]. Spread may occur either by means of septic thrombophlebitis or direct extension to the adjacent tissues [8]. Venous connections exist between the ethmoid, frontal and maxillary sinuses and the orbit and these veins have no valves, thus allowing flow in either direction [10]. Direct extension from the ethmoid cells can also occur because of congenital dehiscences in the lamina paparacea [11]. Loss of vision is an uncommon complication of orbital sepsis [12] but proptosis and increased orbital pressure can produce a reversible deterioration of vision [2]. The case presented had some deterioration of vision.

Unilateral involvement of the orbit is usual initially as seen in this case, but this sometimes progresses to bilateral orbital involvement. Involvement of the second eye implies thrombosis of the cavernous sinuses due to extension of the infection through the circular sinus to the opposite side. Bilateral orbital involvement occurs in more than 50% of cases complicated by Cavernous sinus thrombosis (CST) [13]. The cavernous sinus is the most important venous channel at the base of the skull; it lies between layers of the dura beneath the temporo-sphenoidal lobe and extends along the side of the sella turcica. The cavernous sinus is separated from the sphenoidal sinus by a very thin bony wall and, the fissure at the apex of the orbit where it receives the ophthalmic vein [13]. Cavernous sinus thrombosis may be septic or aseptic. Septic CST may occur in association with contiguous or venous spread of infection in cases of orbital cellulitis , boils on the face and chronic bacterial infections of the sinuses (usually the ethmoid air sinuses) [14]. In the index case, no history of previous sinusitis could be elicited suggesting an occult or misdiagnosed sinus infection. Septic cavernous sinus thrombosis is a life threatening emergency [6]. Aseptic cases of CST are associated with carotid aneurysms, debilitated patients and obstruction or compression of the cavernous sinuses from malignant tumours of the skull base or

nasopharynx. Spontaneous aseptic CST in a healthy individual has been reported but it is extremely rare [6]. This case is apparently a septic type of CST due to the co-existence with CT- diagnosed pansinusitis.

The most frequent cause of cerebral abscess is spread from infections of the ear, nose and throat [15]. A previous study from our centre recorded an 11.7% incidence of intracranial complications from paranasal sinus infections [16] and these were mostly in the 2nd and 3rd decade of life, as was the patient presented. Acute mastoiditis may also result in brain abscess [17] and is regarded as part of the spectrum of otitis media [18]. In acute mastoiditis, CT scan shows opaque mastoid air cells sometimes with air fluid levels but the mastoid cortical bone is preserved [17,18]. Cerebellar abscesses have been documented as complications of mastoiditis and usually occur in the anterior portion of the lateral lobe [17,18]. Left acute mastoiditis and right cerebellar abscess were demonstrated in this patient and because the infections are on opposite sides, they are presumably sinogenic (i.e. of sinus origin) rather than causative. The cerebellar location of the abscess is however unusual as sinogenic abscesses are commoner in the frontal lobe [15]. On the other hand, otogenic intracranial abscesses (i.e. abscesses of ear origin) are more common in the temporal lobes. Sinogenic temporal lobe abscesses may however complicate infections of the sphenoid sinuses [15].

Treatment of chronic sinusitis is with appropriate antibiotic therapy; however involvement of the sphenoid sinus may result in a poor outcome [1]. Intracranial complications should be suspected when there is no resolution or worsening of symptoms following antibiotic therapy. Small intracranial abscesses can also be managed conservatively with antibiotics [19] and difficult cases may require open drainage. Mastoidectomy is another treatment option in cases of chronic mastoiditis [19].

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