SERIOUS ORBITAL INFECTION SECONDARY TO PARANASAL SINUSITIS

Infecção orbitária grave secundária à sinusite paranasal

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Abstract
Orbital infection can lead to blindness and cavernous sinus thrombosis, a very dangerous situation for the patient. Paranasal sinusitis is the most relevant etiologic factor of this condition. The patient presented with a serious pre-septal subperiosteal orbital infection. Computed tomography examination showed a purulent collection in the supraorbital region with area of emphysema. All paranasal sinuses were opacified, and proptosis was clearly present. No signs of inflammation were present in the central nervous system. Orbital and sinus drainage was performed. One year after drainage, the patient has no signs of infection, and his visual acuity has been preserved.

Keywords: Orbit; Infection; Abscess; Sinusitis; Drainage.

Resumo
Infecções orbitárias podem ocasionar cegueira e trombose do seio cavernoso, afecções que apresentam sérios riscos para o paciente. A sinusite paranasal é o fator etiológico mais importante desta condição. O paciente apresentou-se com uma infecção orbitária subperiosteal pré-septal grave. O exame por tomografia computadorizada evidenciou uma colecção purulenta na região supra-orbital com área de enfisema. Todos os seios paranasais estavam velados e a proptose bulbar era evidente neste exame. Não havia sinais de inflamação no sistema nervoso central. Realizou-se a drenagem orbitária e sinusal. Um ano após a drenagem, o paciente não apresenta sinais de infecção e a acuidade visual está preservada.

Palavras-chave: Órbita; Infecção; Abscesso; Sinusite; Drenagem.

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Introduction

Orbital infection is a rare infection that leads to blindness or death in 25% of cases (1, 2). Its major etiologic factor is deeper spread of odontogenic infections or non-odontogenic sinusitis (3, 4, 5, 6, 7, 8).Computed tomography and nuclear magnetic resonance are relevant methods for classification and diagnosis (1). Correct antibiotic prescription, control of periorbital tissue swelling and surgical drainage of the abscess are basic procedures for achieving successful treatment (1, 8, 9).

The aim of this article is to report the case of a patient who presented with a serious pre-septal orbital infection, associated with inflammation involving all the ipsilateral paranasal sinuses. Emphasis is laid on the ability of computed tomography to adequately locate the infection, classify the process, indicate evidences of its origin, evaluate its potential dissemination into the encephalon and, therefore, significantly contribute to the treatment.

Case report

A 16 year-old boy was admitted at Roberto Santos General Hospital, Salvador, Bahia, Brazil complaining of a painful and large swelling in right eyelids. These symptoms began 10 days before and worsened progressively. His medical history had been uneventful and there were no systemic alterations present at the clinical examination.

On loco regional examination, an expressive, erythematous, tenderness swelling compromised the right eyelids. An important right globe proptosis hindered voluntary eyelid closure what was aggravated by severe conjunctival chemosis (Figure 1).

Figure 1- Clinical aspect of subperiosteal and pos-septal orbital abscess

Extraocular muscle weakness on this side caused ophthalmoplegia. It was not possible to assess visual acuity due to edema and tissue congestion in the conjunctiva. However, the right pupil was normally reactive. The patient was complaining of a large scotoma. Intraoral examination revealed no decayed or carious teeth.

Computed tomography examination with an intravenous injection of iodized contrast revealed that liquid had collected in the entire right maxillary sinus, right ethmoidal cells and right side of the frontal sinus (Figure 2 and 3).
**Figure 2** - Computed tomography. Axial section. Emphasis (arrow) inside the orbit and the sinusitis at ethmoidal cells and right side of the frontal sinus (A). The right side of the sphenoidal sinus mucosa was inflamed (arrow) (B).

**Figure 3** - Computed tomography. Coronal section. Emphasis (arrow) inside the orbit and the sinusitis at maillary sinus and ethmoidal cells (A). The right side of the sphenoidal sinus mucosa was inflamed (arrow) (B). Purulent collection (*) was compressing the ocular globe (B). No evidence of orbital roof fenestration or brain inflammation.
The right side of the sphenoidal sinus mucosa was inflamed. Inside the right orbital cavity, a hypodense region, suggesting purulent collection, was compressing the ocular globe (Figure 2). This examination showed emphysema inside the purulent collection and also confirmed the bulb proptosis. The skull and encephalon images discarded any fenestration in the orbital roof or presence of any collection, edema or inflammation inside the brain. The clinical and tomographic findings allowed the diagnosis of subperiosteal and pos-septal orbital abscess secondary to paranasal sinusitis to be concluded.

Antibiotic treatment began immediately with daily intravenous administration of 240mg of gentamicin and 180mg of clindamycin. On the same day, surgical drainage was performed under general anesthesia. An incision at the right eyebrow was the chosen approach to drain the purulent collection from the orbit (Figure 4A).

Figure 4 - Drainage of orbital abscess at the eyebrow (A) and of the maxillary sinus (B). Rigid and penrose drains were placed inside the orbit (C), and rigid drain was placed at an aperture in the lateral wall of the nose (D).
The purulent collection in the maxillary sinus was drained by an intrabuccal Caldwell-Luc approach and subsequent bone fenestration in the sinus anterior wall (Figure 4B). Rigid and Penrose drains were placed in the supraorbital region (Figure 4C). An aperture in the lateral wall of the nose enabled a rigid fenestrated drain to be placed inside the right maxillary sinus (Figure 4D). All drains were irrigated, three times a day, with saline solution till no pus was present. After the surgical procedure, the patient was taken to the intensive care unit to recover.

A microbiological study of the purulent secretion (Gram stain and biochemical tests) showed growth of gram-positive cocci disposed in clusters, identified as *Staphilococcus aureus*, sensitive to clindamycin and gentamicin. On the 4th day of hospitalization the infection signs showed a significant improvement and drains were removed. Fifteen days after admission and surgery, the patient was discharged from hospital.

Forty five days later, the patient presented excellent general health. Eyelid esthetics and movement had been preserved, and bilateral globe mobility was symmetrical (Figure 5).

![Figure 5](image)

**Figure 5** - Clinical aspect forty-five days after treatment

Ophthalmologic examination performed one year after complete recovery from the orbital infection disclosed a normal visual acuity and the anterior segment presented no signs of damage. Informed consent was obtained from the patient and their parents for all the image exams performed, the surgical procedure, as well as the data given in this report to be published.

**Discussion**

Acute bacterial sinusitis, especially when the ethmoidal sinus is involved, is the major cause of orbital infections and is generally present in 80% of all patients with this condition (1-5,10,11,12). The acute purulent sinusitis in the ethmoidal cells spreads to the orbit via the thin lateral wall of the ethmoidal sinus (1,3,4,6,7,13,14). Periosteum is an important barrier to prevent the purulent secretion from disseminating from the paranasal sinus into the intraorbital fat (10). This fibrous tissue extends anteriorly from the orbital margins into the eye lids where it forms a thin connective tissue membrane known as the orbital septum (1), that separates the superficial portion of the eyelid from the deep orbital structures, such as the ocular globe. Orbital septum erosion may result in the spread of a pre-septal infection into the orbit (1).

Orbital inflammation is classified in accordance with its relationship with the orbital septum (4,7,15,16,17). Diffuse inflammation anteriorly to the orbital septum results in pre-septal cellulitis. An infectious foci posterior to...
the orbital septum can configure a diffuse intraorbital inflammation (post septal cellulitis), a purulent collection between the orbital walls and the periorbitum (subperiosteal abscess), a purulent collection in the intracranal or extracranal space (orbital abscess) and cavernous sinus thrombosis (1, 8, 9).

Clinical manifestations of a pre-septal inflammation are mild and are expressed by eyelid edema, and chemosis, while the globe mobility is preserved. In post-septal inflammation, proptosis, ophthalmoplegia, periorbital soft tissue edema, chemosis and visual deficit are the major signs (9, 10).

The inter anastomosing venous system complex shared by orbit, facial soft tissues, paranasal sinuses, and intracranial cavity allows phlebitic and periphlebitic extension of the infection from one compartment to another (14). Therefore, an orbital infectious process may be aggravated by dissemination of the inflammation to the encephalon through the valveless ophthalmic venous system (1, 3, 4, 6, 7, 13).

Computed tomography is very important to enable correct classification and to guide the treatment (1, 9, 18). It should be performed under injection of iodized contrast in order to provide the most precise abscess location, thrombus formation and to evaluate the presence of inflammatory process inside encephalon (9, 10). This examination is imperative when it is impossible to perform a satisfactory ophthalmologic examination, when there is deterioration of orbital signs despite intravenous antibiotic therapy, diminished visual acuity or restriction of ocular movement, and absence of clinical improvement after 24 hours of antibiotic therapy (1). Nuclear magnetic resonance may be useful when it is necessary to make a better assessment of confirmed brain or ocular globe damage or when cavernous sinus thrombosis is strongly suspected (3, 9).

The commonest microorganisms involved in orbital infection are S. aureus, S. pyogenes, S. epidermidis, S. pneumoniae and Streptococcus. Haemophylus influenza has been more commonly isolated in children (2, 15, 17). Oxford et al isolated Streptococcus millerii and others anaerobic bacteria in orbital infections secondary to paranasal sinusitis (19, 20). These bacteria are part of normal flora of the paranasal sinus and nasopharynx, and are most likely to grow in sinuses when the ostia becomes obstructed (3, 9). Other microorganisms can also constitute orbital infection flora, such as the following fungi: Aspergillus, Mucor, Penicillium, Cladosporium and Fusarium (9, 21, 22, 23, 24).

The treatment of this condition depends on the clinical status and the ophthalmologic evaluation and basically consists of intravenous antibiotic therapy and surgical drainage (5). In the early stage of the disease, antibiotic therapy could be the best option (2). In the most severe cases like this one was, surgical drainage, in association with intravenous antibiotic therapy is mandatory (2). Relevant signs that indicate drainage are presence of abscess inside the orbit, failure of the infection to subside with intravenous antibiotics, visual loss, increasing proptosis, isolated muscle weakness and continued fever (10).

In the case reported here, a subperiosteal and post-septal orbital abscess was probably caused by a non-odontogenic sinusitis that involved the right maxillary, ethmoidal, sphenoid and frontal sinus. There was no previous history and no clinical evidence of trauma was observed near the right ocular globe, and there were no teeth compromised by caries or pulp necrosis. Several important signs were present in the case reported here, thus drainage was done immediately.

Orbital infection is a very complex process as it is associated with a high morbidity rate, due to the proximity of vital structures, such as the encephalon and ocular globe, and can lead to blindness and death in severe cases (2, 3, 4, 6, 7, 10, 20). Hence, its treatment requires a multidisciplinary approach (19). Careful and constant evaluation and re-evaluation by Ophthalmology, Neurosurgery, Infectious disease and Maxillofacial Surgery services is very important for clinical improvement. Full ophthalmologic monitoring is indispensable throughout the entire treatment (7).

References


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Relatos de casos


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