

SERIOUS ORBITAL INFECTION SECONDARY TO PARANASAL SINUSITIS

Infecção orbitária grave secundária à sinusite paranasal

Antônio Lucindo Pinto de Campos Sobrinho¹

Eduardo Azoubel²

Cristina Konishi da Silva³

Miguel Gustavo Setúbal Andrade⁴

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 coleção 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.

¹ Oral and Maxillofacial Surgeons. Maxillofacial Surgery Service. Roberto Santos General Hospital-SESAB. Bahia Foundation for Science Development.

² Oral and Maxillofacial Surgeons. Maxillofacial Surgery Service. Roberto Santos General Hospital-SESAB. Bahia Foundation for Science Development.

³ Ophthalmology Service. Roberto Santos General Hospital-SESAB. Salvador, Bahia.

⁴ Oral and Maxillofacial Surgeons. Maxillofacial Surgery Service. Roberto Santos General Hospital-SESAB. Bahia Foundation for Science Development. Salvador, Bahia. e-mail: miguelsetubal@hotmail.com

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).

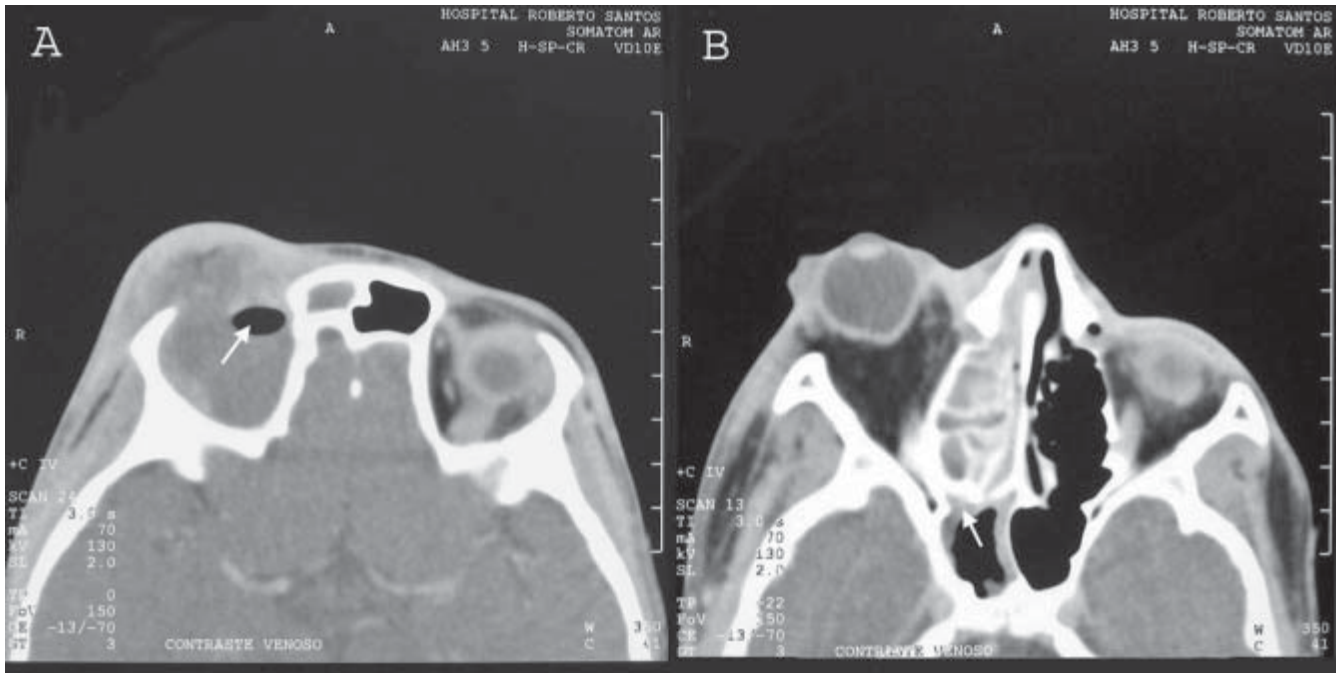


Figure 2 - Computed tomography. Axial section. Emphisema (arrow) inside the orbit and the sinusitis at ethimoidal cells and right side of the frontal sinus (A). The right side of the sphenoidal sinus mucosa was inflamed (arrow) (B)

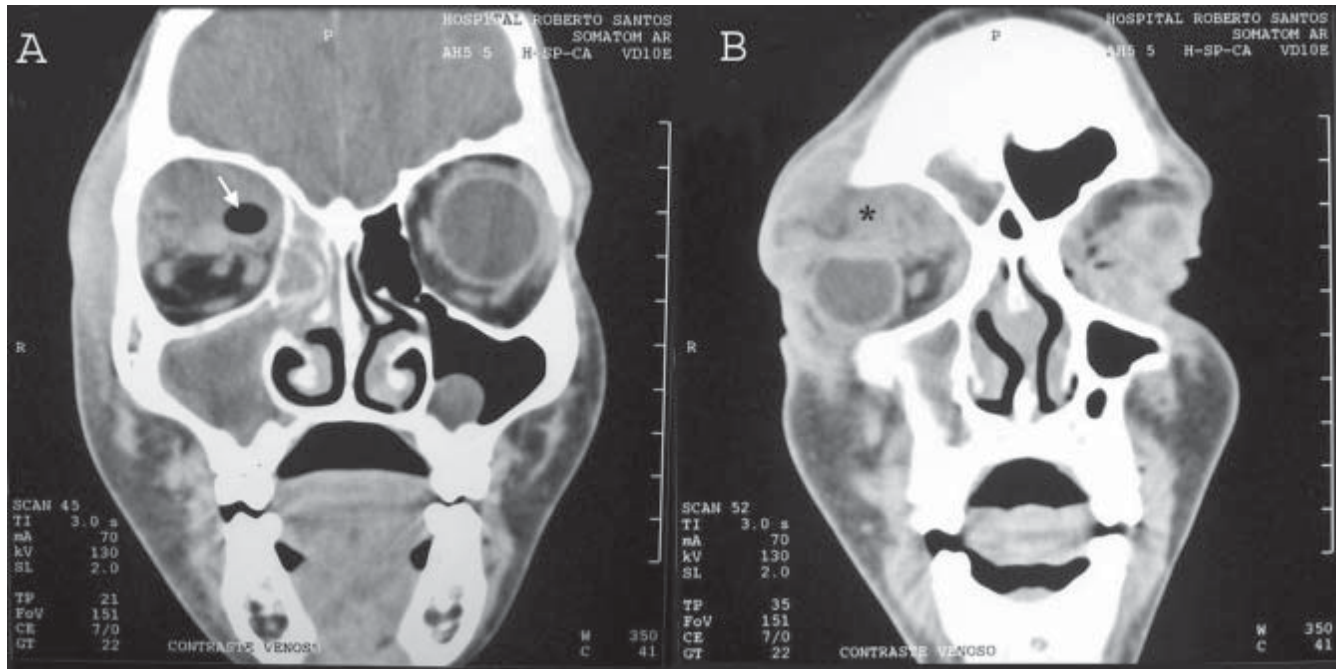


Figure 3 - Computed tomography. Coronal section. Emphisema (arrow) inside the orbit and the sinusitis at maillary sinus and ethimoidal cells (A). The right side of the sphenoidal sinus mucosa was inflamed (arrow) (B). Purulent collection (*) was compressing the ocular globe (B). No evidence of orbital roof fenestration or brain inflammation

The right side of the sphenoidal sinus mucosa was inflamed. Inside the right orbital cavity, a hipodense 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).

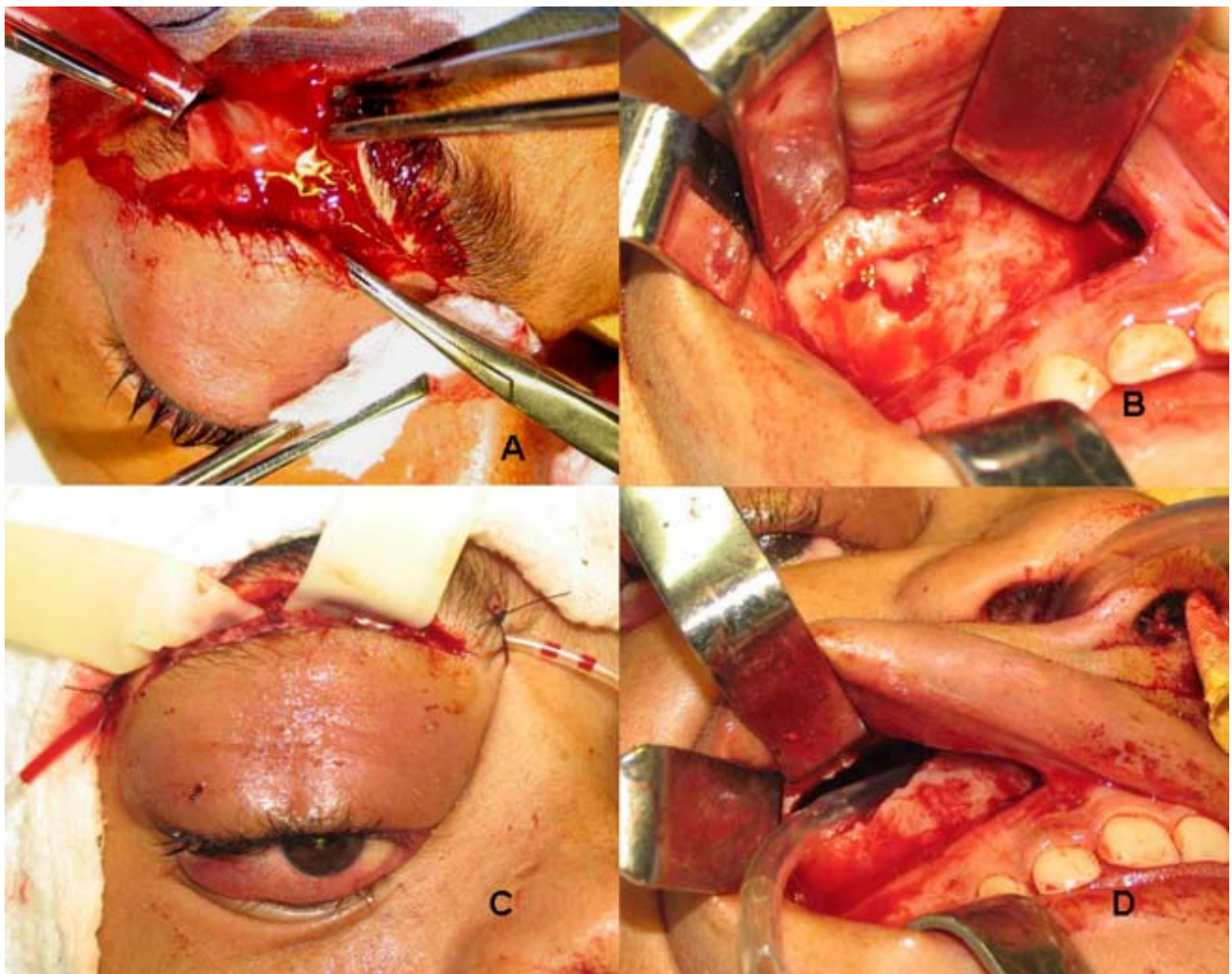


Figure 4 - Drainage of orbital abscess at the eyebrow (A) and of the maxillary sinus (B). Rigid and penrose drains were placed inside the orbit (C), and rigid drain was placed at an aperture in the lateral wall of the nose (D)

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 *Staphylococcus 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 - 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 periosteum (subperiosteal abscess), a purulent collection in the intraconal or extraconal 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. Haemophilus influenza* has been more commonly isolated in children (2, 15, 17). Oxford et al isolated *Streptococcus milleri* 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 pos-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

1. Pereira KD, Mitchell RB, Younis RT et al. Management of medial subperiosteal abscess of the orbit in children – a 5 year experience. Int J Pediat Otorhinolaryngol. 1997; 38:247-254.
2. Mahasin Z, Saleem M, Quick C. Multiple bilateral orbital abscesses secondary to nasal furunculosis – Case report. Int J Pediat Otorhinolaryngol. 2001; 58:167-171.

3. Oxford LE, McClay J. Complications of acute sinusitis in children. *Otolaryngol Head Neck Surg.* 2005; 133:32-37.
4. Eufinger H, Machtens E. Purulent pansinusitis, orbital cellulites and rhinogenic intracranial complications. *J Cranio Maxillofac Surg.* 2001; 29:111-117.
5. Pond F, Berkowitz R. Superoateral subperiosteal orbital abscess complicating sinusitis in a child – Case report. *Int J Pediat Otorhinolaryngol.* 1999; 48:255-258.
6. Greenberg MF, Pollard ZF. Medical treatment of pediatric subperiosteal orbital abscess secondary to sinusitis. *J. AAPOS.* 1998; 2:351-355.
7. Herrmann BW, Forsen Jr JW. Simultaneous intracranial and orbital complications of acute rhinosinusitis in children. *Int J Pediat Otorhinolaryngol.* 2004; 68:619-625.
8. Goldman A. Complications of sphenoid sinusitis. *Operat Techniq Otolaryngol Head Neck Surg.* 2003; 14:216-218.
9. Watkins LM, Pasternack MS, Banks M et al. Bilateral cavernous sinus thromboses and intraorbital abscesses secondary to *Streptococcus milleri*. *Ophthalmology.* 2003; 110: 569-574.
10. Poon TL, Lee WY, Ho WS et al. Odontogenic subperiosteal abscess of orbit – a case report. *J Clinic Neuroscien.* 2001; 8:469-471.
11. Simon GJB, Bush S, Selva D et al. Orbital cellulites-A rare complication after orbital blowout fracture. *Ophthalmology.* 2005; 112:1-6.
12. Gilhooly MG, Falconer DT, Wood GA. Orbital subperiosteal abscess and blindness complicating a minimally displaced zygomatic complex fracture. *Brit J Oral Maxillofac Surg.* 1995; 33:185-188.
13. Karkos PD, Karagama Y, Karkanevatos A et al. Recurrent periorbital cellulites in a child-a random event or an underlying anatomical abnormality? *Int J Pediat Otorhinolaryngol.* 2004; 68:1529-1532.
14. Reddy SC, Sharma HS, Mazidah AS et al. Orbital abscess due to acute ethmoiditis in a neonate-case report. *Int J Pediat Otorhinolaryngol.* 1999; 49:81-86.
15. Cruz AAV, Pinhata MMM, Akaishi PMS et al. Neonatal orbital abscess. *Ophthalmology.* 2001; 108:2316-2320.
16. Shinagawa Y, Ando I, Kukita A. et al. Cellulitis of the eyelids associated with sinusitis and brain abscess-case report. *J Eur Acad Dermatol Venereol.* 1998; 11:74-77.
17. Reynolds DJ, Kodsi SR, Rubin SE et al. Intracranial infection associated with pre septal and orbital cellulitis in the pediatric patient. *J. AAPOS.* 2003; 7:413-417.
18. García CE, Cunningham MJ, Clary RA et al. The etiologic role of frontal sinusitis in pediatric orbital abscesses. *Amer J Otolaryngol.* 1993; 14:449-452.
19. Laloyaux P, Vanpee D, Gillet JB. Orbital cellulites with abscess formation caused by frontal sinusitis. *J Emerg. Medic.* 2000; 18:253-254.
20. Watkins LM, Pasternack MS, Banks M et al. Bilateral cavernous sinus thromboses and intraorbital abscesses secondary to *Streptococcus milleri*. *Ophthalmology.* 2003; 110: 69-574.
21. Donahue SP, Schwartz G. Preseptal and orbital cellulitis in childhood: a changing microbiologic spectrum. *Ophthalmology.* 1998; 105:1902-1906.
22. Grassi MA, Lee AG, Kardon R et al. A lot of clot. *Surv Ophthalmol.* 2003; 48:555-560.
23. Skouteris CA, Velegrakis G, Christodoulou P et al. Infantile osteomyelitis of the maxilla with concomitant subperiosteal orbital abscess-a case report. *J Oral Maxillofac Surg.* 1995; 53:67-70.
24. Bizakis JG, Papadakis CE, Prassopoulos P et al. Transantral evacuation of an orbital abscess following a molar tooth extraction. *Am J Otolaryngol.* 1997; 18:277-279.

Received in: 10/09/2006

Recebido em: 09/10/2006

Accepted in: 11/11/2006

Aceito em: 11/11/2006