Orbital complications of acute rhinosinusitis

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Abstract

Introduction. Rhinosinusitis is the infection and inflammation of at least one of the 4 paranasal sinuses (frontal, maxillary, ethmoid and sphenoid). Their correct diagnosis is generally determined by examining the patient clinically and by rhinosinusal endoscopic examination. There are also cases that show complications or continued evolution despite the correct treatment, and then we will use some imaging investigations to find out more about affection (radiography of anterior sinuses of the face, sinus computerized tomography, sinus magnetic resonance imaging). In particular, acute rhinosinusitis should be carefully managed to avoid complications such as the local ones: orbital cellulitis, orbital abscess, osteomyelitis, cavernous sinus thrombosis; and intracranial complications: meningitis, epidural abscess, subdural abscess, cerebral abscess. **Materials and methods.** There will be presented all orbital complications according to the cases treated in the ENT Clinic of the Coltea Clinical Hospital. **Conclusions.** Diagnosis of rhinosinusitis is largely clinical and endoscopic. When complications of the condition arise, these should be investigated imaginatively to determine their exact extent and to institute the correct treatment as soon as possible. The complications of rhinosinusitis are medical and surgical life-threatening emergencies, which is why in order to diagnose and correct and quickly institute therapy requires a multidisciplinary approach.

Key word: complications, rhinosinusitis, cellulitis, abscess

Introduction

Acute rhinosinusitis is a pathology commonly encountered in medical practice and has most often a viral etiology. Due to predisposing impairment, such as allergic rhinitis or an exaggerated inflammatory response, edema of the nasal mucosa leads to obstruction of the natural ostium of the paranasal sinus drainage, and bacterial suprainfection may occur. (1) Acute bacterial rhinosinusitis has a fulminant onset and develops for less than four weeks. The most commonly involved germs are *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Moraxella catarrhalis*. Although it is more frequently involved in chronic rhinosinusitis, MRSA can also be incriminated in cases of acute rhinosinusitis. (1) (2) Immunocompromised patients, such as diabetics or leukemia patients, may experience fungal rhinosinusitis, a highly aggressive pathology through invasiveness and rapid development. The most common fungal species are *Aspergillus* and *Mucor*. (3)

The diagnosis of acute rhinosinusitis is clinically, the patient accusing nasal obstruction, anterior or posterior rhinorrhea, pressure or pain at the anterior

sinus sites, hyposmia, fever and fatigue. Election investigation is nasal endoscopy and secretion from the middle meatus for cytobacteriological examination. (4) (5) Simple anterior X-ray examination of the face provides little information to establish the diagnosis and is not indicated. Computerized tomography or magnetic resonance imaging are investigations of cases where there are loco-regional complications. (1) (2)

Acute rhinosinusitis may cause complications by invasion of structures adjacent to paranasal sinuses and may be orbital, intra-cranial or bone wall. Dissemination of the infection predisposes to functional eye damage, neurological damage or even death despite appropriate treatment. Mainly, in the case of acute rhinosinusitis complications, the anterior orbital and the anterior skull is affected due to the proximity of the ethmoidal and frontal sinuses to these structures. The mechanism by which the adjacent structures are affected is either by contiguity and the loss of anatomical barriers, or by haematological dissemination. (3)

Materials and Methods

Periorbital and orbital complications of acute rhinosinusitis are most frequently encountered, followed by intra-cranial complications and bone complications, which are the most rare. In most cases, the infection has ploy-microbial background. (1)

Progression of disease from localized sinus infection to orbital complications can be explained using Chandler classification. **Class I** represents *peri-orbital cellulite*, the inflammatory process being located at the periorbital spaces delimited by the orbital septum, without orbital damage, and the patient accuses the palpebral edema without pain in the eye and without affecting eyesight. In **Class II** Chandler, the inflammatory process goes beyond the orbital septum and affect orbital content – *orbital cellulite*. **Class III** represents *the subperiosteal abscess* when the infectious process is located between the papyracea lamina and the periorbital space. *The orbital abscess* is Chandler **Class IV** and *cavernous sinus thrombosis* is **Class V**. (Fig 1) (3)

Fig 1. Chandler's classification of periorbital and orbital complications (3)

I. Preseptal cellulite

Fig 2. Patient with preseptal cellulite, as a complication of acute rhinosinusitis of the left ethmoidal sinus

Fig 3. Patient with preseptal cellulite as a complication of acute rhinosinusitis of the left maxillary sinus

Preseptal cellulitis is associated with acute infections of paranasal sinuses. In ethmoiditis the infection spreads through the papyracea lamina (fig 1). In maxillary sinusitis, the infection crosses the orbit floor (Fig 3). In the frontal rhinosinusitis, the infectious process can get into orbit through its ceiling. The infection can dissect the bone causing subperiosteal abscesses. Without proper and rapid treatment, orbital complications lead to blindness and death. (2) (3)

Generally, proper antibiotic treatment parenteral or oral is enough to cure the disease. In cases with severe signs and symptoms, broad-spectrum antibiotic therapy and hospitalization are required, followed by appropriate oral antibiotics, as improvements occur. (2)

II. Orbital cellulite &

III. Subperiosteal abscess

Fig 4. Patient with orbital cellulite and acute frontal rhinosinusitis

Fig 5. Patient with subperiosteal abscess (Elouarradi H, Daoudi R – Pan Afr Med J (2014))

At the clinical examination, the patient with orbital cellulitis (Fig 4) has edema and erythema of the tissues near orbit. 28.8% of the orbital cellulite are complications of rhinosinusitis. Examination of the patient is, in general, very painful, and preseptal cellulitis, unlike the subperiosteal abscess (Fig 5), no movement of the eyeball is observed. Axial proptosis is not pathognomonic, requiring differential imaging or surgical diagnosis between orbital cellulitis and subperiosteal abscess. (3)

In the case of orbital cellulite, parenteral treatment is enough. Surgical treatment is indicated when the patient is not responding to treatment, or his condition deteriorates during treatment; when decrease

or deterioration of motility or visual acuity occurs; in case of the presence of cranial neuropathies; or if the patient has an abscess, other than a subperiosteal one, small and medial localized. (3) The treatment of the subperiosteal abscess is surgical, endoscopic or open. The open surgery approach ends with postoperative facial scarring, delayed healing, suture infections, overlapping diplopia, recurrent periorbital cellulitis with or without subperiosteal abscess. In the case of postseptal cellulitis, associated with ophthalmoplegia and loss of vision, urgent decompression and drainage of the orbit is immediately required. (2) (3)

IV. Orbital abscess

Fig 6. Patient with orbital abscess

Clinically, the orbital abscess can not be distinguished from orbital cellulite. It can present with severe proptosis, ophthalmoplegia and displacement of the eye ball. (Fig 5) (3)

V. *Cavernous sinus thrombosis:*

Fig 7. Patient with sinus cavernous thrombosis and chemosis

Cavernous sinus thrombosis is a life-threatening condition. It is produced by acute sphenoid rhinosinusitis and orbital cellulitis. Signs of suspicion are headache, orbital signs, cranial neuropathies. Headache is intense, with the tendency to worsen and does not respond to analgesics. The pain is located at the level of the territory innervated by the branches of the trigeminal nerve and it is unilateral. This affection associated diplopia, periorbital edema, mental status alteration, ptosis, photophobia, chemosis, side vision restrictions, midriasis, hypoesthesia or hyperesthesia. (3) (4)

The treatment of cavernous sinus thrombosis requires massive intravenous antibiotic treatment with or without cavernous sinus drainage (dangerous because of the high risk of morbidity). To this two should be added surgical drainage of the primary source of infection (sinuses) and anticoagulation therapy for 4-6 weeks. (3) (4)

Conclusions

- ◆ The most common isolated microorganisms are *S. Pneumoniae*, *Staph Aureus*, other streptococcal and anaerobic species.
- ◆ Diagnostic delay increases the probability of adverse events.
- ◆ The periosteal abscess, and less the postseptal abscess or orbital cellulite, are the most common stages of Chandler; they are very rarely accompanied by orbital abscess and profound sinus thrombosis.
- ◆ Endoscopic drainage is preferred in superior or refractory orbital abscesses.
- ◆ Preseptal and postseptal cellulitis, small subperiosteal abscesses can be treated with intravenous antibiotics.
- ◆ To differentiate the subperiosteal abscess from orbital cellulitis requires imaging investigations or surgery.
- ◆ Head CT scan is required in immunocompromised patients with a history of central nervous system disease, recent onset seizures, papillary edema, altered state of consciousness.
- ◆ Any delay in initiating treatment of cavernous sinus thrombosis or orbital abscess may result in blindness, intracranial extension of the infection and death.

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