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Management of orbital cellulitis: a retrospective study

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ABSTRACT

BACKGROUND: Orbital cellulitis is an infectious involvement of the tissues posterior to the orbital septum causing severe local and general complications.

MATERIAL AND METHODS: The aim of our work was to study the clinical, paraclinical and therapeutic characteristics of orbital cellulitis through a retrospective study of 89 cases collected between 2015 and 2019. The diagnosis of orbital cellulitis was based on clinical and imaging elements.

RESULTS: The average age was 17.5 years. Exophthalmos was noted in 33% of cases, ophthalmoplegia in 18% of cases, diplopia in 4.5% of cases and ocular hypertonia in 11% of cases. Orbital CT scan allowed the diagnosis of subperiosteal abscess in 20% of cases and orbital abscess in 10% of cases. Sinusitis was the main infectious origin in children, while dacryocystitis predominated in adults. All patients received parenteral antibiotherapy combined with corticotherapy after 48 hours. Complications occurred in 10 cases, dominated by exposure keratitis, panophthalmitis and optic atrophy with permanent blindness.

CONCLUSIONS: We emphasize the importance of rapid diagnosis and urgent treatment of orbital cellulitis.

KEY WORDS: orbital cellulitis; management; complications; prognosis

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INTRODUCTION

Orbital cellulitis is the most common primary orbital pathology. It is an acute orbital infection usually of bacterial origin. The diagnosis of orbital cellulitis is mainly clinical, confirmed by orbital CT scan. Chandler's classification (Tab. 1) allows to group orbital cellulitis into 2 main categories: preseptal cellulitis which describes the infection located before the orbital septum and "real" orbital cellulitis or postseptal cellulitis which involves the tissues posterior to the orbital septum and which is studied in this work.

Orbital cellulitis is a serious pathology causing severe local and general complications. Its unpredictable progression requires early diagnosis and appropriate and effective treatment. The difficulty of management is mainly seen at the stage of complications.

The aim of our work was to study the clinical, paraclinical, therapeutic and evolutive characteristics of orbital cellulitis through 5-years' experience.

Table 1. Chandler's classification of orbital cellulitis

Stage	Description
I	Pre-septal cellulitis: inflammatory oedema of the eyelids
II	True orbital cellulitis: diffuse oedema of the orbital contents, posterior of the septum
III	Subperiosteal abscess: collection of purulent material between the periorbit and the orbital wall (usually medial or superolateral)
IV	Orbital abscess: abscess collection within the orbital tissues
V	Cavernous sinus thrombosis

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MATERIAL AND METHODS

We conducted a retrospective study of patients presenting orbital cellulitis, hospitalized in Ophthalmology B Department at Ibn-Sina University Hospital in Rabat-Morocco, for a period of five years (From January 2015 to December 2019).

For each patient, we noted demographic parameters (age, sex, origin), the patient's medical history, the consultation delay, functional signs on admission and initial visual acuity. The slit-lamp examination specified: the presence of eyelids edema, chemosis, fistulization, exophthalmos, lagophthalmos, ophthalmoplegia, the anterior segment evaluation (degree of corneal transparency, anterior chamber inflammation, intraocular pressure measure) and finally the fundus eye examination. All patients underwent an urgent orbital CT scan. The diagnosis of orbital cellulitis was retained on clinical and imaging arguments.

Blood tests (complete blood count, electrolyte panel, C-reactive protein test) and microbiological examinations of purulent material were carried out during hospitalization.

We noted the medical and/or surgical treatment received by each patient, the modality of administration, the evolution after treatment and the complications.

RESULTS

AGE, SEX

In our case series, 89 patients were treated for orbital cellulitis. There were 45% males and 55% females. The average age was 17.5 years with a range of 24 months to 68 years. The age group < 18 years represented 38%.

IMMUNE STATUS

All patients were immunocompetent, except one patient who received chemotherapy for non-Hodgkin's lymphoma and 2 patients under long-term systemic corticotherapy for chronic rheumatic disease. Unbalanced diabetes was associated with 12 cases.

VISUAL ACUITY ON ADMISSION

Initial visual acuity was > 5/10 in 22% of patients, while 5 patients had a negative light perception on admission (Fig. 1). However, visual acuity was not determined in 33% of cases.

CLINICAL SIGNS

On ophthalmological examination, the clinical signs were (Tab. 2): inflammatory edema limiting eyelids opening with chemosis in all patients, exophthalmos in 33% of cases (Fig. 2), ophthalmoplegia in 18% of cases, diplopia in 4.5% of cases and ocular hypertonia in 11% of cases. Fever with the reduced general condition was particularly objectified in young children.

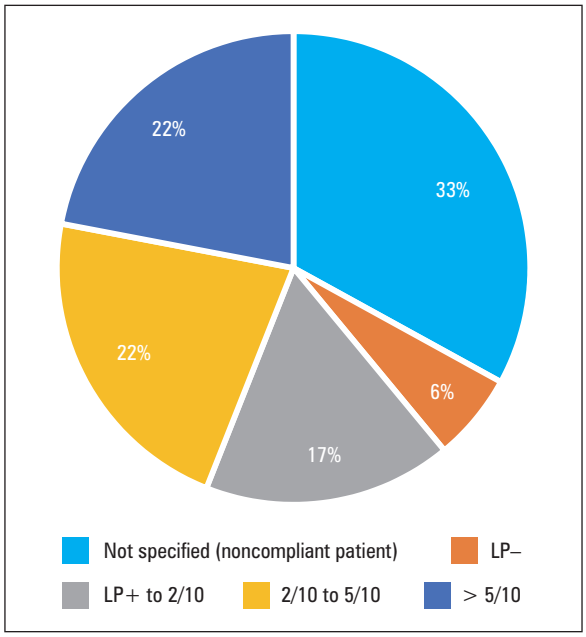

FIGURE 1. Distribution of cases according to initial visual acuity

Table 2. Table showing different clinical signs of orbital cellulitis

Clinical signs	Rate
Fever/reduced general condition	11.2%
Periorbital pain	95.5%
Eyelid edema/chemosis	100%
Exophthalmos	33%
Ophthalmoplegia	18%
Ocular hypertonia	4.5%
Diplopia	11%

ORBITAL CT SCAN SIGNS

Orbital CT scan allowed the diagnosis of orbital cellulitis in all patients, complicated by a subperiosteal abscess in 20% of cases (Fig. 3) and an orbital abscess in 10% of cases (Fig. 4). It also allowed the exophthalmos measurement (Fig. 5) and the diagnosis of related neighbouring infections.

INITIAL INFECTIOUS ORIGIN

Sinusitis was the main infectious origin in children (32 cases) while dacryocystitis was predomi-

FIGURE 2. Orbital cellulitis in a 62-year-old woman: Photo showing eyelid edema with manifest exophthalmos

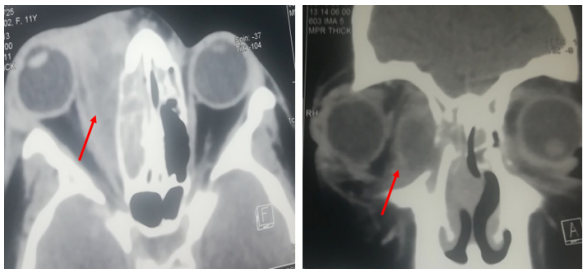

FIGURE 3. Orbital CT scan showing orbital cellulitis with subperiosteal abscess (arrow) in the right orbit complicating pansinusitis

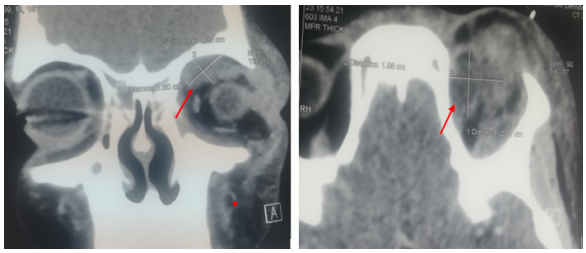

FIGURE 4. Orbital CT scan showing left orbital cellulitis complicated by an orbital abscess (arrow)

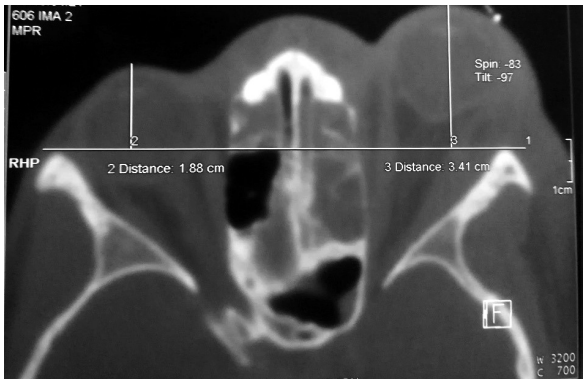

FIGURE 5, Orbital CT scan showing left orbital cellulitis with exophthalmos grade III complicating an acute ethmoiditis

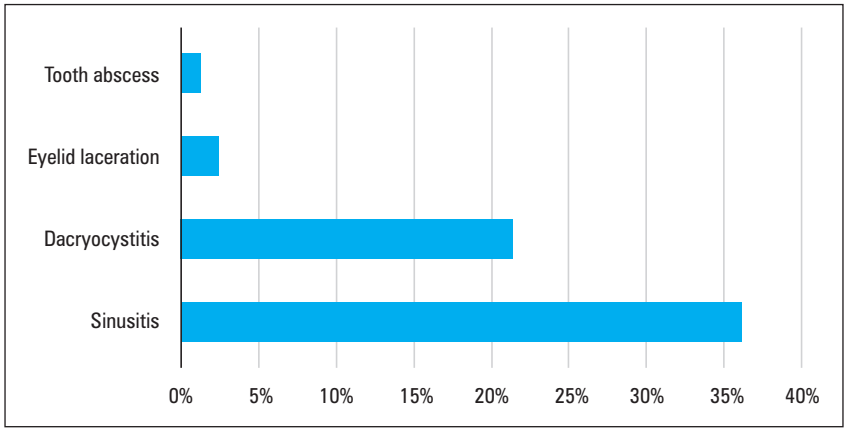

FIGURE 6. Distribution of cases according to initial infectious origin

nant in adults (19 cases) (Fig. 6). Two cases of eyelid laceration with a retained foreign body (Fig. 7) and one case of dental abscess were found.

BACTERIAL IDENTIFICATION

Microbiological examinations of purulent material taken either at the fistulization site or by needle puncture allowed the identification of bacteria in only 13% of cases. Isolated germes were respectively (Fig. 8): *streptococcus pneumoniae*, *staphylococcus aureus*, *haemophilus influenzae* and *streptococcus mitis*.

TREATMENT

Medical treatment required urgent hospitalization and initiation of parenteral antibiotherapy based on amoxicillin/clavulanic acid or ceftriaxone

FIGURE 7. Orbital cellulitis in a 24-month old infant; photo showing a punctiform wound with a vegetable foreign body (arrow) at the medial canthus, with inflammatory edema limiting the eyelid opening

associated with aminoglycoside. Metronidazole was added if there was any doubt about the presence of anaerobic germs. Systemic corticotherapy was considered after 48 hours of effective antibiotherapy. Surgical treatment consisted of prefistulated collections drainage or needle puncture when the collection was deep.

COMPLICATIONS

The evolution after treatment was favorable in the majority of cases. Complications were encountered in 11.2% of cases, such as exposure keratitis, panophthalmitis, optic atrophy with permanent blindness and retinal detachment (Tab. 3).

Table 3. Distribution of cases according to orbital cellulitis complications

Complications	Number of cases
Exposure keratitis	5
Optic atrophy	2
Panophthalmitis	2
Retinal detachment	1

DISCUSSION

Orbital cellulitis is an inflammatory process of infectious origin involving the tissues posterior to the orbital septum. The morbidity and mortality associated with orbital cellulitis have greatly decreased thanks to diagnostic and therapeutic advances. However, prompt diagnosis and urgent treatment remain crucial.

Although that can occur at any age, orbital cellulitis is more common in the paediatric population [1]. In our study, the mean age was 17.5 years with a range of 24 months to 65 years and 38% of cases under 18 years. Wane et al. [2] reported an average age of 18 years with a range of 7 months to 50 years. Kaimbo et al. [3] found an average age of 68 years with a significant proportion of patients for more than forty years. In the various published paediatric series [4–6], the age varied between 6 months and 14 years with an average of 5 years. Orbital cellulitis mainly affects young male patients [1]. However, we found a slight female predominance, also objectified in Aidan et al. study [7].

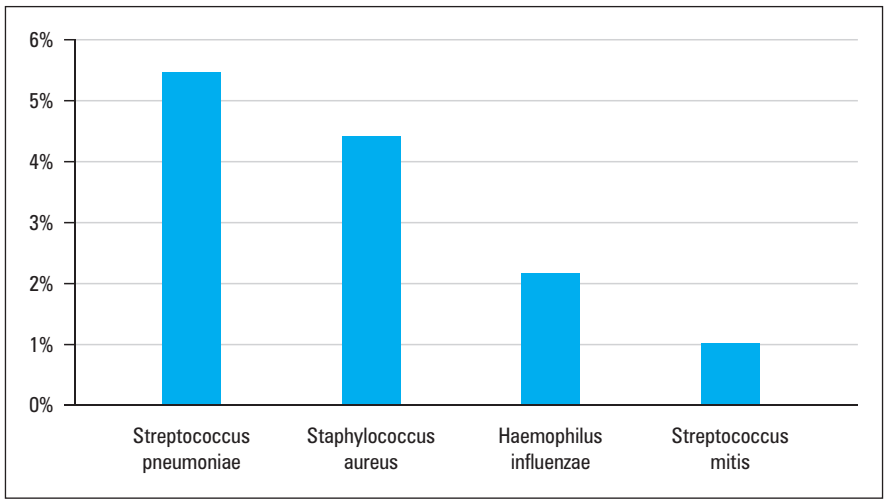

FIGURE 8. Bacterial identification in orbital cellulitis cases

The clinical signs depend on the location of the infection objectified by Chandler's anatomo-clinical classification [8]. The presence of inflammatory eyelids edema with chemosis is characteristic. They were constantly present in all our cases. An inadequate initial treatment, prescribed on an outpatient basis or by self-medication, was the cause of a delayed consultation and a source of complications. The patients presented with a rapidly increasing and irreducible exophthalmos. Visual acuity could be severely decreased or even lost. In our series, 5 patients presented a negative light perception on admission.

Sinusitis is involved in at least two-thirds of orbital cellulitis in adults and 90% of cellulitis in children [1–9]. The second infectious origin described in the literature is skin infections and eye trauma with contaminated wound. In our study, the infectious origins are dominated by sinusitis, especially pansinusitis, which highlights the influence of delayed diagnosis until the spread of infection to other sinuses. Dacryocystitis predominated in adults followed by skin and oral infections [10]. Orbital cellulitis before the age of 5 years is almost always due to ethmoid sinusitis and the germs involved are *Hemophilus influenzea* and *staphylococcus* [11]. In our study, the most common germ was streptococcus, focusing on the severity of neighbouring infections (ENT sphere). However, many microbiological tests returned non-contributory and negative as a result of inappropriate initial treatment and self-medication.

Orbital CT scan is the imaging modality of choice in orbital cellulitis. It allows good visualization of orbital contents, sinus cavities, the surrounding structures and makes it possible to determine the stage of the cellulitis [1, 9–12]. All of our patients received an urgent orbital CT scan confirming the diagnosis.

Once the diagnosis of orbital cellulitis is confirmed, the hospitalization with the institution of probabilistic broad-spectrum parenteral antibiotherapy is indicated without waiting for the paraclinical investigations results. The aim of treatment is to avoid the abscesses formation and to prevent their rupture and their spread to neighbouring structures. In this study, streptococcus was the main germ found, so we associated amoxicillin/clavulanic acid or ceftriaxone with aminoglycoside, metronidazole was added if there was any doubt about the presence of anaerobic germs. The addition of systemic corticotherapy helped relieve inflammation, improve antibiotics spread, and decrease pressure in the orbit in order to protect the optic nerve. Antibiotics and lubricating eye drops protected the cornea from ulceration and superinfection. Subperiosteal abscesses can be treated with parenteral antibiotics alone, especially in young patients, if the collection is < 10 mm with no mass effect on the medial rectus and in the absence of air bubbles suggesting an anaerobic infection [13]. In all other cases, particularly in the presence of severity signs such as a significant decrease in visual acuity, an afferent pupillary deficit (reflecting optic neuropathy), an ophthalmoplegia, a diplopia, an elderly patient, a collected orbital abscess or a clinical aggravation under medical treatment, surgery is recommended [1]. In the case of an accessible abscess, it can be evacuated by puncture drainage. However, if the abscess is deep, the surgical drainage guided by imagery is ensured by orbitotomy or by endonasal surgical technique.

The evolution of orbital cellulitis is unpredictable. In some cases, the eyeball can be spared for a long time, while in other cases, despite appropriate treatment, visual function may be threatened and lead to blindness [14]. This blindness can be secondary to an optic neuropathy of mechanical origin by intraorbital pressure elevation, or of vascular origin by ischemia, central retinal artery occlusion or thrombophlebitis, or of inflammatory origin (infectious neuritis). Retinal and choroidal vascular occlusions, retinal detachments and phthisis of the globe have also been described. Finally, a poor functional result can be linked to exposure keratitis or more exceptionally to retinal haemorrhages and retinal exudates [15].

CONCLUSION

Orbital cellulitis is a serious infection that can affect the visual prognosis, especially when the diagnosis is late and the treatment is inadequate. Sinus infections are mainly involved in this condition. Faced with the significant rate of functional complications, the ophthalmologist must make a rapid diagnosis, assess the ocular repercussions and initiate urgent medical treatment. Surgery will remain reserved for complications.

Conflict of interest

The authors do not declare any conflict of interest.

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