ORBITAL INVOLVEMENT IN SINUS PATHOLOGY: OFTEN WITHOUT OCULAR PAIN

F. GORDTS, R. HERZEEL***

ABSTRACT

Many and diverse sinus pathologies can present with an orbital involvement. Contrary to popular belief, uncomplicated rhinosinusitis causes rarely orbital pain or headaches. However, especially in children, acute ethmoidal rhinosinusitis can be complicated by an extension of the infection into the orbit. Also, isolated sphenoid sinusitis is often associated with significant ophthalmologic or neurological complications. Sinus surgery is another possible source of orbital complications associated with pain. The occurrence of orbital pain in these and other sinus pathologies is discussed, since early recognition and prompt therapeutic action are often necessary in order to avoid devastating sequellae.

SAMENVATTING

Vele en verscheiden sinusaandoeningen kunnen ook de orbita aantasten. In tegenstelling tot wat vaak gedacht wordt, veroorzaakt een ongecompliceerde rhinosinusitis zelden orbitale pijn of hoofdpijn. Nochtans, en zeker bij kinderen, kan een acute ethmoidale rhinosinusitis gecompliceerd worden door een uitbreiding van de infectie tot in de orbita. Ook bij een geïsoleerde ethmoidale sinusitis worden vaak belangrijke ophthalmologische of neurologische complicaties waargenomen. Sinusheelkunde vormt een andere potentiële bron van orbitale complicaties met pijn. Het optreden van orbitale pijn bij deze en andere sinusaandoeningen wordt besproken omdat het snel onderkennen en tijdig behandelen vaak noodzakelijk is teneinde invaliderende sequelen te voorkomen.

RÉSUMÉ

L'orbite peut être impliquée dans différentes pathologies du sinus. Contrairement à ce qu'on admet généralement, une rhinosinusite non compliquée entraîne rarement des douleurs au niveau de l'orbite ou des céphalées. Par contre, chez les enfants, une rhinosinusite ethmoïdienne aiguë peut se compliquer par une extension de l'infection à l'orbite. Les sinusites ethmoïdiennes isolées sont souvent accompagnées de complications ophtalmologiques et neurologiques. La chirurgie des sinus est une autre source potentielle de complications orbitaires avec douleurs. L'apparition de douleurs orbitaires en cas d'affections du sinus est discutée car sa sous-estimation et son traitement tardif peuvent entraîner des séquelles invalidantes.

KEY-WORDS

Orbital pain; sinus disease; endoscopic sinus surgery.

MOTS-CLÉS

Douleur orbitaire; maladies des sinus; chirurgie endoscopique des sinus.

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INTRODUCTION

Several pathologies are well known to the ophthalmologic and the ENT surgeon alike. However, orbital pain does not often appear to be a predominant symptom. The eventual occurrence of orbital pain will therefore be reviewed with respect to acute rhinosinusitis, complications of rhinosinusitis, complications of sinus surgery and some miscellaneous pathology.

ORBITAL PAIN, HEADACHES AND ACUTE RHINOSINUSITIS

In contrast to common belief among many patients, headaches, facial and orbital pains are rarely caused either by uncomplicated sinus disease or minor ophthalmologic pathologies. Uncorrected refractive errors and heterophoria as causes of headaches are widely overestimated (5). Likewise, an extensive Dutch survey (22) carried out by general practitioners has shown that sinus disease is present in only 9% of the patients complaining of headaches. In fact the sinus ostia, the nasal turbinates and septum are more pain sensitive than the sinus-mucosa itself. Nevertheless, pain around and especially under the eye can be a symptom of acute rhinosinusitis. In adults, acute sinusitis is defined as a symptomatic sinus infection in which symptoms persist no longer than 6 to 8 weeks or there are fewer than four episodes per year of acute symptoms of 10 days duration. Sinusitis is acute when episodes of infection resolve with medical therapy leaving no significant mucosal damage (7). In children, an acute rhinosinusitis is a sinus infection in which complete resolution of symptoms (judged on a clinical basis only) without intermittent upper respiratory tract infection may take up to 12 weeks. Acute rhinosinusitis in children should be subdivided into severe and non-severe forms (2). Several studies (3) have shown that facial pain and toothache, together with the presence of purulent nasal secretions and a history of worsening complaints after an initial improvement of a common cold suggest an acute rhinosinusitis. These symptoms and signs are however neither very specific nor sensitive. Plain x-rays are only helpful in so far that they seem to be more suited to exclude rather than to confirm the diagnosis of sinusitis (3,9). Nevertheless, especially in the first line an obvious need for an accurate diagnosis of acute rhinosinusitis has emerged. With respect to the alarming increase in bacterial resistance, it is important to identify a limited subgroup of patients that could benefit from antibiotics. Apparently, only a CT scan is able to select those patients (11,12). However, it is felt that a widespread use of this imaging technique in the first line is associated with still other problems, which makes the debate on an accurate diagnosis unresolved.

Since sinusitis and minor ophthalmologic diseases are only infrequent sources of facial pain and headaches, other pathologies should be considered. One of the most likely causes is tension-type headache, usually with bilateral, steady, nonpulsatile pain, often present in the occipital region or as a band around the head. The pain is supposed to result from prolonged contraction of the muscles of the head and neck and typically occurs later in the day or after periods of physical or emotional stress or intense intellectual activity. Still other causes like migraine, cluster headache / paroxysmal hemicrania, vascular and intracranial disorders, as well as head trauma have to be considered (5). Precise prevalence data for the different causes of headaches are difficult to obtain and show important variations due to methodological differences and characteristics of the population studied (general population versus patients of headache clinics, male versus female patients, adults versus children). Among adults representative for the general population, the first prevalence study using the operational diagnostic criteria of the International Headache Society (5) shows a lifetime prevalence of tension-type headache of 69% in men and 88% in women, while the prevalence data for migraine are 8% in men and 25% in women (16). Among children admitted in paediatric emergency departments, the different causes for their headaches are (ranked from the highest to the lowest frequency): viral infections, viral meningitis, migraine, sinusitis, tension-type headache, trauma, hydrocephalic and/or shunt related problems, tumour, seizure (10). Due to this varied nature of possible causes of headaches, patients with persistent or pronounced

complaints would probably benefit from a multidisciplinary evaluation.

COMPLICATIONS OF RHINOSINUSITIS

The complications of rhinosinusitis can be divided into orbital complications, intracranial complications (meningeal irritation/ abscess, peridural abscess, brain abscess) as well as osteomyelitis of the cheek and the frontal bones. Orbital complications are the most frequently seen. Of all acute orbital complications, 2/3 occur secondary to sinusitis, with the ethmoidal sinuses as the most common source. Especially the paediatric population is at risk since 85% of the acute orbital infections are seen in children (14). This paediatric predilection is due to several distinct factors limited to the nature of the facial structures in childhood: thinner bony septa of the sinus walls, larger vascular foramina, more porous bones, and open suture lines. The paper-thin bony plates separating the ethmoid and maxillary sinuses from the orbit allow a rapid spread of infection in this age group particularly. One of the more practical classifications of orbital infections stems from Schramm and colleagues (19) (Table 1).

Table 1: *Stages of orbital infections*

I. Periorbital cellulitis
II. Periorbital cellulitis with chemosis
III. Orbital cellulitis
IV. Subperiostal abscess
V. Orbital abscess
VI. Cavernous sinus thrombosis

As long as the orbital infection is limited to periorbital cellulitis (stage I/II), characterised by edema and erythema of the eyelids, there is no need for an immediate CT-scan (2) but the patient should be hospitalised and intravenous antibiotics started (6). However, as soon as proptosis, decreased eye movements or vision changes are noted, an immediate CT-scan should be obtained to rule out a progression to an orbital cellulitis or a (sub-) periostal abscess (stages III, IV,V). The most important and at the same time the most difficult differentiation (4) is the one between orbital cellulitis and subperiostal abscess: orbital cellulitis usually responds to medical therapy, whereas a (sub-) periostal abscess requires surgical drainage. An MRI-scan may be helpful in the presence of these diagnostic difficulties or when intracranial complications such as meningitis, brain abscess or cavernous sinus thrombosis are suspected. Surgical drainage, traditionally performed by means of an external ethmoidectomy approach, is more and more supplanted by an endoscopic endonasal approach, which avoids the external facial scar and allows a more rapid resolution of periorbital inflammation. This technique requires however an ample experience in paediatric sinus endoscopy (6). In the presence of a bilateral orbital involvement, complete ophthalmoplegia and ''picket fence'' fever spikes, cavernous sinus thrombosis (stage VI) is to be feared. This very rare complication should be treated with massive antibiotic therapy, while the use of anticoagulants and corticosteroids remains controversial (6).

The sphenoid sinus, with its ostium opening into the spheno-ethmoidal recess, is less frequently affected and often without involvement of the frontal, anterior ethmoidal and maxillary sinuses who are usually simultaneously diseased due to their common pathway for drainage and ventilation into the nose, under the middle turbinate. Despite its often-benign inflammatory origin, isolated sphenoid sinusitis is associated with ophthalmologic or neurological complications in 75% of the patients (8). Permanent disabilities are present in 29% of these cases. In a recent review including 39 patients, cranial nerve deficits were noted in 21% of the patients, while one of them suffered from permanent unilateral visual loss (18).

COMPLICATIONS OF SINUS SURGERY

In the past, an endonasal partial ethmoidectomy has been considered as ''the blindest and most dangerous operation in all surgery'' (15). Since the advent of the CT-scan and the endoscopes however, the philosophy of the surgical treatment of chronic sinusitis has changed radically. The histopathologic changes of the chronically diseased sinus mucosa are no longer considered as irreversible. Instead of removing as much of the sinus mucosa as possible, often

by an external approach, endoscopic sinus surgery has become the standard of care for the surgical management of chronic sinus disease. By means of a meticulous surgical technique, the restoration of the permeability of the ostiomeatal complex is pursued. The ostiomeatal complex is a functional entity of the anterior ethmoid complex that represents the final common pathway for drainage and ventilation of the frontal, maxillary and anterior ethmoid cells. This anatomically convoluted region is, due to the very constricted nature of the area, prone to devastating complications. The dura, frontal lobe, olfactory bulb, optic nerve, pituitary gland, internal carotid artery, the second and third divisions of the trigeminal nerve as well as the nerve of the pterygoid canal are all at risk. Especially the orbit, separated from the lateral wall of the ethmoid sinus only by the very thin lamina papyracea, is vulnerable to surgical penetration. Surgical orbital complications include nasolacrimal duct damage, extraocular muscle injury, intraorbital haemorrhage/emphysema, and direct optic nerve damage (1). Intraorbital haemorrhage is an acute surgical emergency with a relatively high potential to cause visual loss. Retraction for instance of a bleeding anterior ethmoidal artery into the orbit gives rise to a sudden and important increase of the orbital pressure resulting in an interruption of the blood flow of the central retinal artery and compression of the optic nerve. Early recognition and immediate management (20) is imperative for the preservation of vision. Decompression of the orbit and restoration of the arterial blood flow can be based on

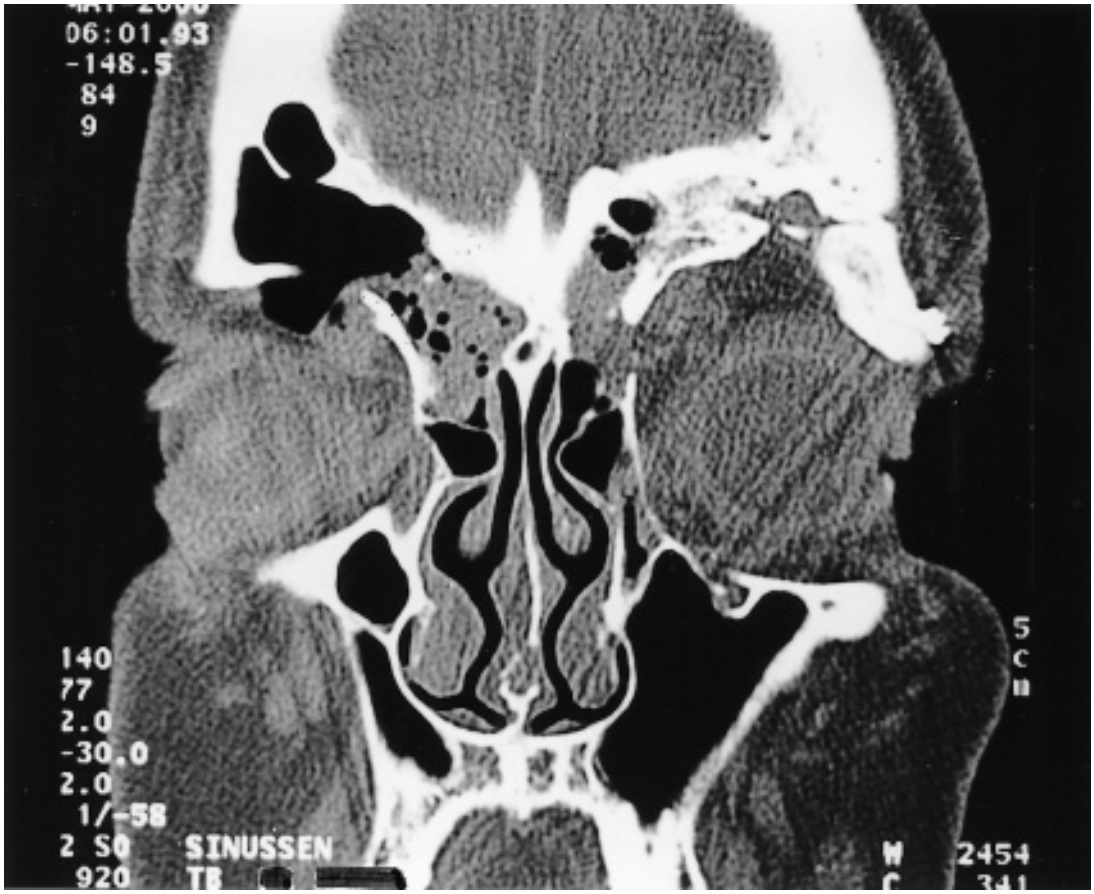

Fig. 1: Facial trauma with fracture of the right orbital roof resulting in a direct communication with an infected frontal sinus.

decreasing the volume of the orbital contents (intravenous mannitol, acetazolamide, corticosteroids, and topical β blockers) and on increasing the orbital volume. Of the 5 orbital boundaries, only the fifth (anterior) boundary is not bony. Lateral canthotomy and cantholysis are probably the simplest and least hazardous procedures for early and immediate orbital decompression (20).

Optic nerve damage can also be caused by electrocoagulation following surgery (21) or direct surgical laceration (17).

MISCELLANEOUS PATHOLOGIES

Orbital pain can be caused by corneal exposure secondary to facial nerve paralysis. Due to its course within the temporal bone and the parotid gland, ENT surgeons should be aware of the preventive measures to avoid this corneal exposure and drying with eventual ulceration and permanent scarring. Sino-orbital fractures (fig.1), sinus tumors like mucoceles (fig.2) and their infected equivalents (mucopyoceles), hypoplastic maxillary sinuses (13) and dysthyroid ophthalmopathy are all ENT pathologies that may cause orbital complaints ranging from some vague periorbital discomfort to pronounced orbital pain.

CONCLUSIONS

Many and diverse ENT pathologies can present with an orbital involvement. Pain is however rarely a predominant symptom. Nevertheless, early recognition and prompt therapeutic ac-

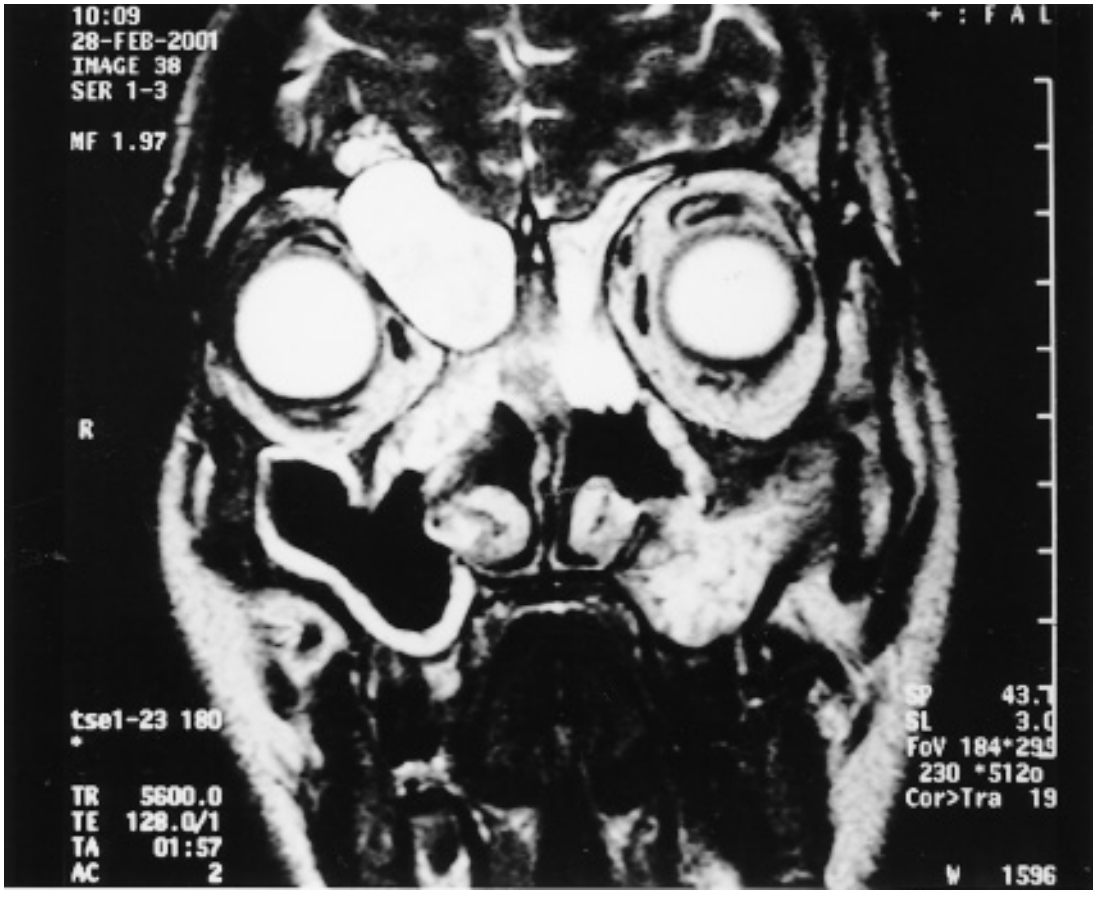

Fig. 2: Mucocele of the right frontal sinus involving the ipsilateral orbit.

tion are often necessary in order to avoid devastating sequellae.

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