



Management of medial subperiosteal abscess of the orbit in children—a 5 year experience

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Abstract

A medial subperiosteal abscess (SPA) of the orbit is the most common serious complication of sinusitis in children. The distinction between SPA and the more benign pre-septal disease is difficult to make especially in a young child in whom an ophthalmological evaluation is often difficult. Computerised tomography (CT) is the investigation of choice in making this distinction. Subperiosteal inflammatory disease of the orbit is initially treated with intravenous antibiotic therapy with surgery reserved for those patients who do not respond to medical treatment and in whom a medial SPA is confirmed by CT. Conventionally, the abscess is drained via an external incision and an ethmoidectomy is performed at the same time. More recently, successful drainage of SPA's has been accomplished endoscopically via a intranasal approach with less morbidity and superior cosmesis. We present a 5 year experience of 24 patients with CT scans suggestive of medial SPA who underwent endoscopic exploration of the medial subperiosteal orbital space. We discuss the current management of medial subperiosteal disease of the orbit in children and include a review of the literature. Also included is a clinical staging system which aids the management of orbital complications of sinusitis. Copyright © 1997 Elsevier Science Ireland Ltd.

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2. Patients and methods

A review of all children with clinical and CT evidence of medial subperiosteal orbital inflammation, unresponsive to medical treatment, was carried out at the LeBonheur Childrens Medical Center from January 1990 to December 1994. Twenty four patients (15 male, 9 female; age range 2–14; mean age 5.2) were included in the study. Seventeen patients were admitted via the emergency room and seven patients were referred from other hospitals because of an inadequate response to antibiotic therapy or deterioration in orbital signs. Sixteen patients were started on intravenous (i.v.) cefuroxime sodium. The other i.v. antibiotics used were oxacillin, penicillin, chloramphenicol and cefotaxime. Ophthalmologic consultation and CT scans (coronal and axial views) were obtained on all children.

Patients with CT evidence of a medial subperiosteal mass lesion in the orbit were treated with endoscopic sinus surgery (ESS). A modified Messerklinger technique was used to perform an endoscopic ethmoidectomy. The lamina papyracea was inspected and if intact, a horizontal cut was made on the inferior surface of the bone using a Freer elevator and extended anteriorly and superiorly. Pus was evacuated by elevating the plate of bone medially. Pus and/or infected tissue was sent for microbiological examination and culture. Entrance into the orbital tissues was meticulously avoided and the procedure completed without using packing or splints. The patients were discharged from hospital on oral broad spectrum antibiotics and a steroid nasal spray which were administered for 2 weeks. The post-operative follow-up was essentially the same as that following an ESS. Endoscopic examination of the operative site was performed on all patients under a general anesthetic 2–3 weeks after surgery in accordance with our protocol for pediatric endoscopic ethmoidectomies. The operative site was inspected, crusts and blood clots were removed, granulations were cleared if present and early synechae were lysed.

3. Results

A complete ophthalmological examination could be performed in 15 of the 24 patients (62%). CT scans were obtained on eight patients immediately after admission; 13 were scanned within the first 24 h and in three the CT was obtained within 48 h of admission. All 24 CT scans showed a medial subperiosteal mass lesion in the orbit adjacent to the lamina papyracea (see Figs. 1 and 2). Sixteen patients had bilateral ethmoidal and maxillary sinusitis. Four had unilateral maxilloethmoiditis and four had only ethmoiditis on the affected side. Pus was encountered in 21 patients (88%) after elevation of the lamina papyracea (Fig. 1). In two patients (8%) only serous fluid was evacuated and one patient (4%) had granulation tissue with inflammatory exudate in the medial subperiosteal

Table 2
Stages of orbital involvement in sinusitis

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| I. Pre-septal inflammation |
| a. Without chemosis—lid edema |
| b. With chemosis—lid and conjunctival edema, pseudo-proptosis |
| II. Post-septal inflammation/infection |
| a. Extraconal—proptosis, chemosis, decreased EOM; Medial subperiosteal abscess—proptosis, lateral deviation of the globe, visual loss (mild to moderate) |
| b. Intraconal—proptosis, ophthalmoplegia, visual loss (moderate to severe) |
| c. Cavernous sinus thrombosis—proptosis, fixed globe, severe visual loss meningitis, bilateral ocular signs |

No complications were documented and orbital signs resolved completely within 72 h in all cases. Patients were discharged home from 48 to 96 h (mean 52 h) after the procedure. Post-operative endoscopic examination of the operative site was unremarkable. Permanent visual sequelae either as a result of the disease or treatment were not encountered.

4. Discussion

Acute sinusitis is the predominant cause of orbital infections in children. If treated appropriately and early, approximately 75% resolve completely with medical therapy [7]. A full course of a broad spectrum antibiotic for at least 10–14 days should be prescribed, rather than multiple short courses of antibiotics which are likely to lead to inadequate resolution of infection and the emergence of resistant strains. However, orbital complications may arise despite the use of antibiotics or even before antibiotic therapy is started.

The orbital periosteum is an important anatomical barrier preventing the spread of infection from the sinuses into the orbit. It extends anteriorly from the orbital margins into the eye lids where it forms a thin connective tissue membrane known as the orbital septum. This septum separates the superficial portion of the lids from the deeper orbital structures and its erosion leads to post-septal orbital disease. We propose a new clinical staging system of orbital involvement in sinusitis based on the orbital septum (Table 2). A medial SPA is the most common post-septal orbital complication of sinusitis [5]. The physical signs of its presence include lateral proptosis, decreased adduction and varying degrees of visual loss. However, the most common ophthalmological findings in children with a medial SPA are non-specific and only suggest a post-septal suppurative process [8].

The amount of information that can be obtained from the clinical examination is related to the age and co-operation of the child. This can be very limited in a 2-year old with chemosis or be full and extensive in a co-operative 14-year old child. Although visual acuity is important and should be evaluated in any child with suspected post-septal infection, it is not always an accurate guide to therapy [2]. Moreover, certain objective signs such as diminished pupillary reflexes may not be

mucosa of an acute sinusitis can pose technical problems which are compounded by poor visualization. This approach should only be considered when the surgeon is already familiar and comfortable with endoscopic ethmoidectomy in young children, and the CT clearly demonstrates inflammation in the medial orbit adjacent to the lateral ethmoid wall. In the present study, surgery for medial SPA's was performed by attending pediatric otolaryngologists' experienced in pediatric sinus surgery. However, one must always be prepared for an external approach if adequate drainage cannot be achieved intranasally or if the orbital swelling fails to resolve 48–72 h after surgery. This problem was not encountered in any of the patient's in this series.

We conclude that an ophthalmological assessment may be incomplete in a sick, chemotic and unattentive child and cannot suggest when exploration of the sub-periosteal space is imperative. A CT scan is the most specific radiological investigation currently available for the diagnosis of a medial SPA and is an accurate predictor of surgical intervention. Endoscopic intranasal drainage of a medial SPA of the orbit is the surgical procedure of choice in experienced hands. It produces little morbidity and is cosmetically superior to conventional techniques.

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