Case report

Superolateral subperiosteal orbital abscess complicating sinusitis in a child

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Abstract

Orbital complications of sinusitis in children generally occur as a consequence of ethmoid sinusitis due to preferential spread across the lamina papyracea. A case is presented of a subperiosteal abscess (SPA) in the superolateral orbital wall complicating frontal sinusitis in a 6-year-old female. Congenital bony dehiscences exist in the lateral floor of the frontal sinus, which may allow direct spread of infection through to that region. While the general principles of managing orbital complications of sinusitis are applicable, the surgical approach for a SPA complicating frontal sinusitis differs from that of the typical medial SPA, and the clinician should be mindful of this variation when planning surgical treatment. © 1999 Elsevier Science Ireland Ltd. All rights reserved.

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1. Introduction

Subperiosteal abscess (SPA) complicating sinusitis typically occurs due to ethmoid sinus disease because the thin lamina papyracea is a poor barrier to the spread of infection. A case of a 6-year-old child with a SPA in the superolateral orbital wall complicating frontal sinusitis is reported. The location of the SPA and the apparent origin from the frontal sinus is uncommon, particularly in young children. Recognition of this variation is important in order to identify the sinus responsible and to instigate appropriate surgical management.

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2. Case report

A 6-year-old girl presented with a 3 day history of frontal headache and progressive painful left eye swelling. There was a background of an upper respiratory tract infection in the preceding 2 weeks which had been treated with two doses of oral penicillin. No previous history of significant sinonasal tract symptomatology was noted. Initial examination revealed a temperature of 40.7°C. There was extensive cellulitis involving the left upper eyelid with left proptosis and ophthalmoplegia on upward gaze. Percussion tenderness localized to the left frontal sinus, and a formal ophthalmologic assessment demonstrated 6/6 visual acuity. Computer tomography (CT) revealed pansinusitis and a large SPA in the roof of the left orbit as shown in Figs. 1–3. Hematological evaluation was essentially normal.

After one intravenous dose of cefotaxime and flucloxacillin, the patient was placed under general anesthetic and, via a lateral supraorbital incision, the periosteum was elevated and the superolateral orbital wall abscess drained. Elevation of the periosteum was extended medially to expose the lamina papyracea which was intact. A Penrose drain tube was inserted into the abscess cavity and brought out through the wound. Bilateral antral washouts were performed but no pus was obtained.

A penicillin-sensitive Group A Streptococcus was cultured from the abscess cavity, and the intravenous antibiotics changed to oral penicillin and flucloxacillin for a total of 7 days. The oph-
thalmoplegia slowly resolved over that period and
the drain tube was removed on day 6. On dis-
charge at day 8, the patient received a further
week of oral penicillin and flucloxacillin. She was
well at post-operative review 3 weeks later.

3. Discussion

Orbital infections typically occur as a complica-
tion of acute sinusitis, particularly in children 3
years of age or older. Schramm et al. [7] estimated
this prevalence in children to be 74–85%. Another
10% of these orbital complications had foci from
cutaneous infections such as impetigo or infected
facial lacerations, and the remaining 5% were
related to dacryocystitis, facial fracture, orbital
surgery, penetrating injuries, otitis media, and
dental infections.

The frontal sinus is the only sinus absent at
birth. By the age of 3 years, the cupula of the
sinus appears above the level of the nasion, but
very little growth occurs until the ages of 7 and 8.
From then on, rapid enlargement of the frontal
sinus occurs to reach its mature size at puberty
[2]. Consequently, frontal sinusitis is rare until the
latter half of the first decade, and, even then, the
incidence is relatively low. A study examining the
CT scans of 196 children with rhinosinusitis be-
tween the ages of 3 and 14 years found frontal
sinus involvement at 7% for the 7–8 age group,
increasing to 15% for 11–12 years of age [9]. The
reasons for the low incidence even in older chil-
dren is unclear but may reflect the relatively low
frequency of underlying structural anomalies. Du-
voisin et al. [6] found frontal sinusitis in 85% of
cases with computer tomographic evidence of
frontonasal duct stenosis or obstruction, and
noted a correlation between frontal sinusitis and
frontonasal duct abnormalities.

The prevalence of SPA is approximately 12–
17% of all orbital infections requiring hospital
admission [3,5]. However, this figure must be seen
in the light that many cases of orbital infection
present as mild periorbital cellulitis which does
not require hospitalisation. SPA is most com-
monly due to ethmoid sinusitis alone or in associ-
ation with maxillary sinus disease. Frontal sinus
involvement is uncommon but, when present, it
occurs as part of a pansinusitis or extremely rarely
in isolation [8].

The superolaterally located SPA due to frontal
sinusitis has not been commonly reported in chil-
dren. A 7 year review of 30 patients with SPA in
the Children’s Hospital of Pittsburgh revealed a
purely medial location for SPA [4]. Williams et al.
[3] found 16 children with SPA over an 11 year
period, one of whom presumably had a SPA
associated with frontal bone osteomyelitis and
intracranial abscesses.

The mode of disease spread from sinus to orbit
is by bacterial thrombophlebitis through valveless
veins, direct extension from bony erosion, or via
congenital or acquired bony dehiscences. The
frontal sinus displays three common sites of dehis-
cences in the floor, which were described by
Williamson-Noble [1]:
1. behind the trochlear fossa;
2. behind the supraorbital notch;
3. at the junction of the middle and outer thirds
   of the sinus floor.

The presence of these congenital dehiscences
may predispose to the development of a supero-
lateral SPA following frontal sinusitis.

The radiographs of this patient display a par-
tially opacified frontal sinus, a dehiscence in the
sinus wall and a SPA in the vicinity of the dehis-
cence. It appears likely that the inflammatory
process in the frontal sinus discharged through
the dehiscence and into the orbit. Spontaneous
drainage of the frontal sinus collection into the
orbit may explain why there is partial aeration of
the frontal sinus. Although the central area of
abscess formation does not coincide with the
point of dehiscence, this may be due to the prefer-
ential spread of pus laterally in the orbit. Alterna-
tively, the superolateral SPA may have arisen
from retrograde extension of infection through
venous channels.

Management of SPA requires good quality CT
scanning, ophthalmological assessment, intra-
venous antibiotics, and surgical drainage. Surgical
treatment involves aspiration of the abscess cavity
and a provision for ongoing drainage. Complete
exenteration of the ethmoid air cells is not gener-
ally necessary for SPA occurring as a complica-
tion of ethmoid sinusitis as antibiotic therapy is relied upon to treat the ethmoid disease. However, anterior ethmoidectomy is necessary to allow intranasal drainage of the SPA. Where SPA occurs in a superolateral site, the frontal sinus is assumed to be the source of suppuration. While not specifically drained in this case, management of complicated frontal sinusitis should include frontal sinus trephine and external drainage of the frontal sinus. The position of the surgical incision should also allow access to both the frontal sinus floor and orbital collection. Management by endoscopic surgery is not appropriate.

In conclusion, frontal sinusitis which generally occurs in the setting of pansinusitis can result in a superolaterally placed collection. This is presumably due to disease extension through congenital bony dehiscences in the frontal sinus floor. Clinicians should be aware of this variation of SPA as a different operative approach is required, and surgical attention to the frontal sinus itself is recommended.

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References