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Periorbital abscess due to ethmoiditis in a neonate

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Abstract
Orbital complications of ethmoiditis are not uncommon in children. They are, however, much rarer in the very young. A case is presented in which a neonate of gestational age 39 weeks developed a periorbital abscess. The relevant literature is reviewed with respect to embryology, aetiology and treatment.

Key words: Ethmoid sinus; Ethmoid sinusitis; Neonate

Introduction

Periorbital abscess is a well-recognized complication of ethmoiditis in children, but it has not previously been reported in a neonate. Schramm *et al.* (1982), in a series of 303 children with orbital infections, found an increasing incidence of abscess formation with age, the highest being in the age group over 15 years. He found none in children younger than one year old. In two other series (Gellady *et al.*, 1978; Shapiro *et al.*, 1982) the youngest patients with orbital infection were seven and 10 weeks old respectively. We report a case of periorbital abscess in a child of 39 weeks' gestation.

Case report

A female child born at 37 weeks gestation was transferred to the Special Care Baby Unit because of low birth weight (1.56 kg). She was fed via a nasogastric tube for one week, and afer 13 days was discharged home, but was re-admitted two days later with a left periorbital swelling following an upper respiratory tract infection. A diagnosis of periorbital cellulitis was made and she was started on intravenous flucloxacillin and ceftazidime. Over the next six days a left-sided proptosis gradually developed, and she was transferred to the Queen's Medical Centre.

On examination the child was apyrexial and systemically well with a marked proptosis of the left eye. The red reflex was present and there was a full range of eye movements on both sides. Blood cultures were taken and grew no organisms.

A contrast-enhanced axial CT scan of the orbit demonstrated a discrete mass with reduced attenuation within the medial compartment of the left orbit (Figure 1), producing proptosis of the globe and opacification of the left ethmoidal sinus. With the patient under general anaesthesia, a left Howarth's incision was made, revealing a subperiosteal collection of pus in the medial wall of the left orbit. The lamina papyracea was absent. The anterior ethmoidal air cells also contained pus and these were curetted. Pus was sent for microscopy and culture. A corrugated drain was sutured into position.

After discussion with microbiologists, gentamicin was added to the intravenous regime. The pus subsequently grew *staphylococcus aureus.*

The baby completed a 10 day course of antibiotics and made a good recovery.

Discussion

The precursors of the nasal turbinates begin to form at six weeks of fetal life. The ethmoidal sinus begins to develop at four months of intra-uterine life and at birth the ethmoidal and maxillary sinuses are well developed (Fairbanks, 1990). The thin lamina papyracea divides the orbit from the ethmoidal sinuses and permits infection to spread with relative ease. Infection may erode directly through the bone, or pass through small natural defects in it. Alternatively, it may pass through the numerous small valveless veins that perforate the bone.

Paranasal sinusitis is responsible for 66–75 per cent of cases of orbital infection (Schramm *et al.*, 1982; Moloney *et al.*, 1987). Moloney *et al.* (1987) reviewed the many other causes, including facial skin infection, trauma, conjunctivitis, pre-septal cellulitis, dacrocystitis or, more rarely, spread from intracranial sepsis.

Sinus infection may develop as a result of a foreign body in the nasal cavity, or as a complication of the insertion of a nasal tube (Chaffee, 1949). The possibility of sinusitis developing as a complication of an indwelling nasal tube has been suggested not only for nasogastric tubes in adults (Caplan and Hoyt, 1982) and infants (Bos *et al.*, 1989) but also for nasotracheal tubes (Arens *et al.*, 1974). In patients with an indwelling nasogastric tube the

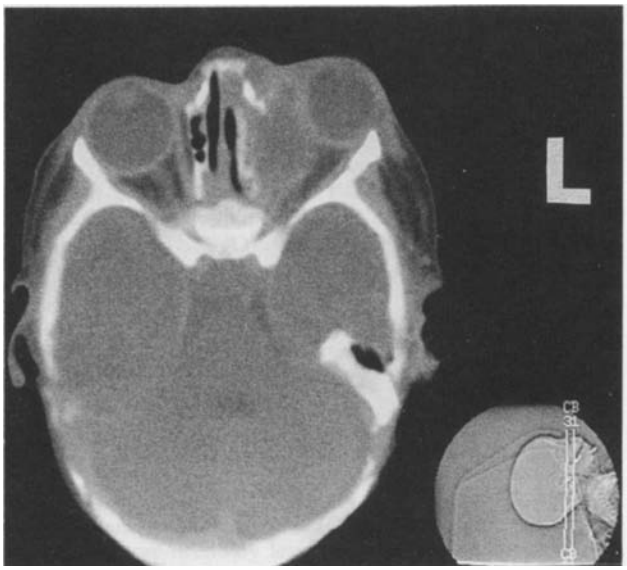

FIG. 1
Contrast-enhanced CT showing left orbital mass.

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incidence of sinus inflammation as detected by plain radiography may be as high as 50 per cent (Desmond *et al.*, 1991). The authors suspect that in addition to the increased risk of infection in neonates who are premature and of low birth weight (Pearse and Roberton, 1986), the use of a nasogastric feeding tube may have predisposed to sinus infection in the case reported above. The most widely accepted classification remains that of Chandler *et al.* (1970), who divided orbital infections into five types:

(1) Inflammatory oedema of the eyelids, with or without oedema of the orbital contents.
(2) Periorbital cellulitis without discrete abscess formation.
(3) Subperiosteal abscess, where the collection arises between the periorbita and the bony wall of the orbit.
(4) Orbital abscess, with pus localizing within the orbital tissues.
(5) Cavernous sinus thrombosis.

Haemophilus influenzae is the commonest causative organism identified in orbital infection. In the 96 per cent of cases in which an organism was isolated from any of the cultures taken, this organism was *H. influenzae* in 66 per cent (Gellady *et al.*, 1978). In a paediatric series (Shapiro *et al.*, 1982), the organism was found in 82 per cent of the cases in which blood cultures were positive (34 per cent). *H. influenzae* is not, however, implicated in type 3 and 4 infections; in the series by Schramm *et al.* (1982) and Moloney *et al.* (1987) the commonest organisms isolated were either staphylococcus, streptococcus, or a mixture of both, with culture of abscess material resulting in no growth in 40 per cent of cases (Schramm *et al.*, 1982). In these two series and those of Gellady *et al.* (1978) and Watters *et al.* (1976), local swabs such as those from the eye, oropharynx and nose appear to be of little value. Schramm *et al.* (1982) note that positive blood cultures were commonest in the very young: 33 per cent of patients under 4 years old but only 5 per cent of adults.

With respect to antibiotic metabolism the newborn differs from the adult in a number of ways including enzyme system immaturity, relatively greater extracellular fluid volume and renal immaturity. Both the β-lactam antibiotics and gentamicin depend largely on glomerular filtration for their excretion in the neonate and decreased glomerular filtration rate in the newborn may lead to high sustained drug serum concentrations and prolongation of half-life values, so that regular estimations of renal function are required in prolonged administration. Fortunately adverse reactions to β-lactam antibiotics are rare in neonates and, moreover, when the correct dosage regime is adhered to there appears to be no special risk of gentamicin ototoxicity (McCracken and Nelson, 1983).

Before CT and ultrasound were widely available, the indications for drainage of a suspected collection, as described by Chandler *et al.* (1970), were failure of pyrexia to respond to antimicrobial therapy and, more urgently, a decrease in the visual acuity on the affected side. The introduction of CT has made it possible to demonstrate orbital or subperiosteal collections of pus. It is primarily on the basis of the CT findings that a decision to proceed with surgery is made (Schramm *et al.*, 1982; Maloney *et al.*, 1987). The authors concur with this view, particularly in the neonate in whom it is impossible to assess visual acuity accurately.

Summary

Although it is widely known that ethmoiditis can lead to orbital complications in the older child and the adult, this case serves to emphasize the fact that ethmoidal sinuses are present at birth, and that therefore all the complications of ethmoid infection may potentially occur in the neonate.

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