

Distinguishing features of preseptal and orbital cellulitis

Despite the differential characteristics of preseptal and orbital cellulitis, children may not present with typical signs and symptoms, James Bethel cautions

Summary

The differential diagnosis between orbital cellulitis and preseptal cellulitis is important as is the need to differentiate between an allergic response or infectious cellulitis of the eye. This article will examine the case of a 15-month-old boy who was brought to an emergency department with an oedematous right eye. The research about diagnosis and treatment will be evaluated and orbital cellulitis will be explored in more detail including the symptoms and complications.

Keywords

Accidents and emergencies, allergies, ophthalmology, visual impairment

THE PARENTS of a 15-month-old boy brought him to the emergency department stating that they thought he may be having an allergic reaction. The child had an oedematous right peri-orbit. His parents said that their child had suffered an allergic reaction six months before, but at that time he had not had any peri-orbital oedema; he presented instead with an urticarial (skin) rash.

Further questioning revealed that the child had suffered an upper respiratory tract infection recently and that he woke up that morning with a swollen right peri-orbit. His father had administered a dose of chlorphenamine syrup before bringing the child in. The parents had been advised to keep such medication in the house after the child's previous allergic episode. He was normally fit and well apart from having atopic eczema with lesions over the anterior tibia and patella bilaterally and on both elbows. He had no siblings, was not exposed to second-hand smoke and was fully immunised appropriate to his age. There was a history of atopic illness and allergy in his family with his father and paternal grandfather having eczema, and his father also being allergic to penicillin. Both parents reported that their son's peri-orbital oedema appeared to have improved slightly after the administration of the chlorphenamine syrup.

The boy's notes revealed that he was not tachycardic and that his oxygen saturations were 100 per cent. He had a temperature of 37.2°C and he was not tachypnoeic (panting).

Physical examination identified no respiratory distress: there was no evidence of nasal flaring or use of accessory muscles to assist breathing. Auscultation revealed upper respiratory rhonchi without stridor. Air entry was equal and vesicular breath sounds were found in the lower respiratory tract with no evidence of wheeze. His peripheries were warm and capillary refill time was normal. He was alert and active with a Glasgow Coma Score of 15 (Teasdale and Jennett 1974). Both auditory canals appeared inflamed and congested and the back of the throat was also inflamed. There were no macular lesions which are sometimes associated with allergy. His abdomen was soft and non-tender and his mother reported that he had not had any urinary symptoms, such as excessive passing of urine or pungent urine.

Direct examination of the eye identified a red and swollen upper lid with chemosis. The pupil was normal in size and reacted briskly to light. There was no discharge from the eye and pain in itself would not help in the differential diagnosis.

Figure 1 Preseptal cellulitis: an infection of the tissues surrounding the eye



Figure 2 Orbital cellulitis: Up to 11 per cent of cases result in loss of vision



The author made a provisional diagnosis of otitis media and upper respiratory tract infection in combination with a mild allergic response and elected to observe the child for a period of one hour. During this time the author wanted to gauge any continuing improvement as a result of the chlorphenamine or, conversely, any sign of worsening allergic response, and the possibility that this child was suffering from preseptal or orbital cellulitis, despite the documented history of allergy.

Discussion

The differentiation between allergic reaction and orbital cellulitis is often challenging. Goodyear *et al* (2004) describe the case of a 14-year-old boy presenting with periorbital oedema and a history of allergy to dog hair. This patient was treated with chlorphenamine with a presumptive diagnosis of allergy. On review two days later he was systemically unwell and ultimately received aggressive treatment for what transpired to be orbital cellulitis (Goodyear *et al* 2004). The same authors identify that bacterial orbital cellulitis is primarily a disease of children and in most cases is associated with an episode of sinusitis or infection of the upper respiratory tract. Other authors support this evidence, but also describe the case of a 24-year-old male with unilateral periorbital oedema who was treated initially for allergy by his GP (Armstrong and Nichol 2006). Watkins (2006) also supports that a preceding or co-existing sinusitis or upper respiratory tract infection is a common finding in children with orbital cellulitis and outlines the care of a two year old who had cold symptoms for several days before periorbital swelling became evident. It is estimated that more than 90 per cent of orbital cellulitis cases are associated specifically with ethmoid sinusitis (Harrington 2008). Unsurprisingly, given the antecedents to the illness already outlined, orbital cellulitis shows a marked prevalence in winter (Harrington 2008).

In addition to the differentiation from allergy (Table 1) several authors highlight the need to

distinguish orbital cellulitis from preseptal cellulitis (Givner 2002, Pathai and McNaught 2003, Sadovsky 2003, Goodyear *et al* 2004). Preseptal cellulitis involves the external structures of the eyes, such as the lids, and is usually prevented from spreading to the globe itself by the orbital septum, though untreated preseptal cellulitis (Figure 1) may breach the septum and initiate orbital cellulitis (Pathai and McNaught 2003). The prognosis in preseptal cellulitis is much better than in orbital cellulitis (Figure 2) and most patients are treated on an outpatient basis with oral antibiotics. Patients with orbital cellulitis should be treated as an emergency admission and be given intravenous antibiotics (Pathai and McNaught 2003, Goodyear *et al* 2004). However, the challenges of differentiation are such that a high index of suspicion for orbital rather than preseptal cellulitis should be maintained – particularly in infants and children when history taking – and clinical examination may be difficult (Givner 2002, Pathai and McNaught 2003, Sadovsky 2003, Walker *et al* 2005, Armstrong and Nichol 2006).

Complications of orbital cellulitis which underlie its classification as an emergency include: orbital abscess, corneal damage and loss of vision, meningitis, cavernous sinus thrombosis and intracranial abscesses (Pathai and McNaught 2003, Goodyear *et al* 2004, Armstrong and Nichol 2006, Harrington 2008) (Table 2).

Case review

A diagnosis for this child was challenging: a personal history of allergy and atopic illness made an allergic response a likely diagnosis and this was compounded by a familial history of a similar illness profile (British Association of Dermatologists

Table 1 Main differences between allergy and infection

Allergy	Infection
Sudden onset	Gradual onset
Apyrexial	Pyrexial
Bilateral	Unilateral
Pruritic (itchy)	Non-pruritic
Normal visual acuity, pupil reaction and eye movement	Altered visual acuity and painful eye movements
Blepharitis (inflammation of the eyelid)	Chemosis (swelling of the white of the eye) and proptosis (protrusion)
History of allergy	No specific history of allergy

(Goodyear *et al* 2004)

2008, Clinical Knowledge Summaries 2008). Additionally, the child's parents said they thought the swelling around the right eye had improved after administering chlorphenamine. Other signs associated with allergy were, however, absent. There were no pruritic macular lesions or hives on the skin, and there was no evidence of systemic ill-health, such as nausea, vomiting, noisy breathing or reduction in level of consciousness (associated with anaphylactic reaction) (Bryant 2007). Swelling around the orbit was confined to the right eye, and allergic reactions causing such oedema would tend to be bilateral (Goodyear *et al* 2004). The boy's temperature of 37.2°C was an equivocal finding as a normal temperature in a child may be anywhere between 36°C and 37.5°C (NHS Choices 2009). The right eye did show some evidence of chemosis and onset of the oedema had been gradual rather than sudden. This accorded with the parents' description of worsening swelling during the course of the morning after the child had been unwell with an upper respiratory tract infection in the previous days. Both of these factors are associated with infection rather than allergy; that the parents reported reduced swelling subsequent to administration of chlorphenamine contradicted this. Preceding upper respiratory infection and chemosis of the eye pointed towards orbital rather than preseptal cellulitis, yet the 15-month-old boy was well outside of the average age of 12 years for such cases and nearer to the average age of 21 months associated with preseptal infection (Givner 2002, Sadovsky 2003) (Table 2).

Orbital cellulitis is a medical emergency, the complications of which may be life-threatening. Up to 11 per cent of cases result in loss of vision (Harrington 2008); infection may spread causing orbital abscess, cavernous sinus thrombosis or meningitis (Sobol and Hutcheson 2008). In view of this, the practitioner should be cautious in making differential diagnosis of preseptal cellulitis particularly in infants and children. Despite the

Table 2 Principle differences between preseptal and orbital cellulitis

Preseptal cellulitis	Orbital cellulitis
Antecedent trauma or bacteraemia	Antecedent sinusitis
Periorbital erythema, warmth, tenderness	Proptosis, chemosis, ophthalmoplegia, decreased visual acuity
Mean age 21 months	Mean age 12 years

(Sadovsky 2003)

documented differential characteristics of preseptal and orbital cellulitis, patients – especially children – may not present with typical signs and symptoms. A history of allergy may complicate assessment though practitioners should be aware of relevant differences in history and presentation that assist in diagnosis.

The author explained to the parents that he was referring their child to the on-call paediatric team because he was not confident in the allergy diagnosis and would like the team's assistance in excluding an infective cause for the illness. Both parents were happy with this plan of care. The child was admitted to the children's unit for a short period. The paediatric team concluded that the most probable diagnosis was that of a preseptal infection as the child had responded well to initial oral antibiotic therapy.

Conclusion

Children's and emergency nurses need to be aware of the differences and similarities between orbital cellulitis and preseptal cellulitis. They should also know the differentiation between infective and allergic presentations.

Nurses should be aware of the risks associated with orbital cellulitis and should treat any presentation with these symptoms as a medical emergency. Treatment of preseptal infection should include oral antibiotics and the child should be monitored for any changes.

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This article has been subject to open peer review

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