

It is possible that 24-hydroxylase activity in the kidney is much more sensitive to the specific metabolic changes of cystinosis than that of  $\alpha$ -1-hydroxylase.

Although the phosphate leak, per se, could account for the pathogenesis of rickets, one cannot rule out that the low concentration of  $24,25(\text{OH})_2\text{D}_3$  could also contribute to the bone disease in this patient.<sup>6</sup>

#### References

<sup>1</sup> Schneider JA, Schulman JD. Cystinosis and the Fanconi syndrome. In: Stanbury JB, Wyngaarden JB, Fredrickson DS, eds. *The metabolic basis of inherited disease*. 5th ed. New York: McGraw-Hill, 1982:1844.

<sup>2</sup> Lemire J, Kaplan BS. The various renal manifestations of the nephropathic form of cystinosis. *Am J Nephrol* 1984;4:81-5.

<sup>3</sup> Bercu BB, Corden BJ, Schulman JD, et al. Circulating somatomedin-C levels in nephropathic cystinosis. *Isr J Med Sci* 1984;20:236-9.

<sup>4</sup> Hendricks SA, Lippe B, Kaplan SA, et al. Differential diagnosis of diabetes insipidus: use of DDAVP to terminate the seven hour water deprivation test. *J Pediatr* 1981;98:244-6.

<sup>5</sup> Nguyen TM, Giullozo H, Garabedian M, et al. Serum concentrations of  $24,25$  dihydroxyvitamin D in normal children and in children with rickets. *Pediatr Res* 1979;13:973-6.

<sup>6</sup> Malluche HH, Henry H, Meyer-Sabellek W, et al. Effect and interactions of  $24\text{R},25(\text{OH})\text{D}$  and  $1,25(\text{OH})\text{D}$  on bone. *Am J Physiol* 1980;238:E494-8.

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## Ophthalmitis in meningococcal disease

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**SUMMARY** We report an infant with meningococcal septicaemia and meningitis who had panophthalmitis at presentation that was unresponsive to standard systemic antibiotic treatment but which responded to topical steroid and mydriatic treatment. The pathogenesis may have been immune mediated.

### Case report

The patient, a 7 month old boy in whom there was no important family or perinatal medical history, had been unwell for three days before admission with cough, poor feeding, and diarrhoea. (On questioning later his mother recalled noting that his eyes were 'blood shot' two days before admission.) On the day of admission he deteriorated and developed a widespread rash. On admission he was ill but not shocked or hypotensive. Axillary temperature was  $39^{\circ}\text{C}$  and he had a widespread purpuric rash but no conjunctival petechiae, although both bulbar conjunctivae were injected. He was very irritable, noticeably photophobic, and had meningism. A clinical diagnosis of meningococcal meningitis was made and the following initial investigations performed: cerebrospinal fluid was turbid with  $4.56 \times 10^9/\text{l}$  leucocytes, glucose  $0.1$  mmol/l, total protein  $2.6$  g/l with raised globulins; Gram staining showed Gram negative diplococci, and both cerebrospinal fluid and blood culture subsequently

confirmed *Neisseria meningitidis* (later reported as Group C) sensitive to benzylpenicillin and chloramphenicol. Peripheral blood count showed: haemoglobin  $110$  g/l, white blood count  $22.8 \times 10^9/\text{l}$  with 57% neutrophils and platelets  $312 \times 10^9/\text{l}$ .

Treatment was started with intravenous benzylpenicillin  $300$  mg/kg/day and his general condition gradually improved. Photophobia persisted as well as low grade fever, however, although his meningism resolved and there were no localising neurological signs. On the seventh day of treatment a repeat examination of the cerebrospinal fluid gave normal results, and a computed tomogram was normal with no evidence of abscess or subdural collection. Antibiotic treatment was stopped on the eighth day.

An ophthalmological opinion was obtained 12 days after admission as his eyes continued to be red, and he was photophobic with a low grade temperature. The appearances were suggestive of uveitis with limbal injection; and he had mised non-reactive pupils, fibrinous exudates in the anterior chamber, and a dull red reflex. Topical treatment with prednisolone  $0.5\%$  drops and cyclopentolate  $1\%$  was started and within two days he had considerably improved, he was not feverish and had minimal photophobia.

An examination under general anaesthetic later confirmed the diagnosis of anterior uveitis; dilated iris vessels and posterior synechia were found in both eyes. The pupils continued to be poorly dilated and phenylephrine  $2.5\%$  drops were added to the

topical regime. The eyes were of normal size and the intraocular tension, measured by applanation tonometry, was in the normal range. He continued to improve and was discharged after 24 days.

Further investigations including screens for auto-antibodies and serology, including herpes simplex, and tests for cytomegalovirus, toxoplasma, toxocara, Reiter protein reagin, and *Treponema pallidum* haemagglutination antibody gave negative results.

On subsequent ophthalmic review the anterior uveitis continued to settle and as the pupils gradually became more dilated it was possible to see that there was also posterior uveitis in both eyes. The media were still clearing after two months and topical steroid treatment was continuing. By six months the vitreous had cleared of all posterior uveitis and the topical steroid was stopped.

## Discussion

Eye disease in acute meningococcal infection is rare but well reported.<sup>1-4</sup> Two examples of primary acute meningococcal conjunctivitis are described by Shuttleworth and Benstead which responded to appropriate topical antibiotic treatment.<sup>1</sup> Cases of eye disease occurring with acute systemic infection (meningococcaemia or meningitis), however, are more common. For example, Koch and Carson in 1958, reported three cases of uveitis in 128 children.<sup>2</sup> In a more detailed description, a 7 year old girl with acute meningococcaemia and concurrent severe endophthalmitis was reported—the response to parenteral penicillin and chloramphenicol and topical steroid treatment was rapid and complete.<sup>3</sup>

In a large study of acute meningococcal infection Whittle *et al* found six cases of 'episcleritis' (defined as inflammation of the sclerae) in 717 patients studied in Northern Nigeria; five of them also had arthritis. Both complications were seen six to nine days after the onset of the illness and were mild, and they resolved completely without specific treatment. Slit lamp examination was not available to these authors. They postulate that episcleritis, arthritis, and cutaneous vasculitis in their patients are 'allergic' complications due to immune complex disease—immunological studies in four patients with arthritis or cutaneous vasculitis showed the presence of

circulating meningococcal antigen at presentation with deposits of antigen, immunoglobulin, and C3 in synovial fluid white cells and skin biopsy specimens in some patients.<sup>5</sup> Meningococcus has been isolated by paracentesis of the eye in patients with meningococcal infection; this supports the likelihood of locally produced immune complexes rather than circulating complexes.<sup>6</sup>

In this child, despite successful treatment of Group C meningococcal septicaemia and meningitis, the ophthalmitis and indeed systemic symptoms, as manifested by low grade fever and general malaise, were unresponsive to standard antibiotic treatment, unlike previously reported cases. The response to topical steroid and mydriatic treatment was dramatic, however, although treatment was needed for six months until resolution was complete. We believe that the ophthalmitis was initiated by primary meningococcal infection but perpetuated by a continuing immunological response due to local immune complex deposition. The severity and persistence of the ophthalmitis in this case, is, we believe, unique and we have no explanation for its occurrence in this child. Clinicians should actively seek evidence of ophthalmitis in cases of acute meningococcal infection: clinical pointers include persistent photophobia, red eyes, and miosed non-reactive pupils.

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