Ophthalmic *Pseudomonas* infection in infancy

E M Boyle, J R Ainsworth, A V Levin, A N Campbell, M Watkinson

Abstract
Four infants developed invasive *Pseudomonas aeruginosa* ophthalmic infections between 5 and 90 days of age. Three died from septicaemia, and the fourth required enucleation of one eye. Absent red reflexes or other eye signs in a septicaemic infant merit urgent ophthalmological assessment for endophthalmitis, in particular, *Pseudomonas*.

Keywords: *Pseudomonas aeruginosa*; eye; endophthalmitis; bacteria; infection

Invasive eye infections are rare in neonates but occur in the presence of multisystem disease with a high mortality.1,3

Case reports
Infant 1 was born at 29 weeks after six days prolonged rupture of the membranes (PROM). At birth he needed ventilation, cardiac massage, and adrenaline. He was ventilated for respiratory distress syndrome. Gentamicin and benzylpenicillin were given, and therapeutic levels of gentamicin were achieved. Initial swabs and blood culture were negative, but on day 3 *Pseudomonas aeruginosa*, sensitive to gentamicin, was isolated from airway secretions and eye discharge. He improved and was extubated. On day 7 he appeared septicaemic. Red reflexes were absent, and a white ring was visible around each pupil. Purulent vitreous fluid was aspirated and he was treated with intravitreal and intravenous ceftazidime. He died the same day. *P aeruginosa* was cultured from the vitreous fluid, and the lungs and heart were very necrotic. Autopsy showed proptosis, absent red reflex, corneal clouding, and no hypopyon. She was thought to have a conjunctival/conveal infection. Gentamicin eye drops and intravenous cefotaxime were started. After 24 hours, *P aeruginosa* was cultured from blood and cerebrospinal fluid. Treatment was immediately changed to ceftazidime and gentamicin. She died that day. Autopsy was declined.

Infant 4 was born at 30 weeks after 3 days PROM. She was well, but received intravenous benzylpenicillin and gentamicin for 48 hours. Initial cultures were negative, although *P aeruginosa* was grown from a maternal high vaginal swab. On day 5 she developed crust ing around the right eye. A conjunctival swab, which later grew *P aeruginosa*, was obtained, and chloramphenicol drops instilled. Within 24 hours, a central corneal perforation developed. Ciprofloxacin eye drops and intravenous gentamicin were started, but the perforation enlarged. Later the lens protruded and the ocular contents were lost. Two years later she had had no further problems and wore a cosmetically acceptable artificial eye.

![Figure 1](http://fn.bmj.com/Arch Dis Child Fetal Neonatal Ed: first published as 10.1136/fn.85.2.F139 on 1 September 2001. Downloaded from)

---

**Neonatal Unit, Birmingham Heartlands Hospital, Birmingham, UK**
M Watkinson

**Department of Ophthalmology, Birmingham Heartlands Hospital**
J R Ainsworth

**Department of Ophthalmology, The Hospital for Sick Children, University of Toronto, Canada**
A V Levin

**Paediatric Department, Royal Preston Hospital, Preston, UK**
A N Campbell

Correspondence to:
Dr Watkinson, Neonatal Unit, Birmingham Heartlands Hospital, Birmingham B9 5SS, UK WatkinM@heartsol.wmids.nhs.uk

Accepted 19 January 2001

www.archdischild.com
**Discussion**

Endogenous endophthalmitis results from hematogenous spread to the eye secondary to septicemia. In exogenous endophthalmitis, the infection develops initially in the eye as a result of corneal infection, perforating injury, or intraocular surgery. Infant 4 had exogenous endophthalmitis whereas in the others it was endogenous. *P aeruginosa* has been identified as a causative organism in more than 75% of invasive neonatal eye infections. It was not isolated from the discharge of the patient in case 3, but we feel that the corneal infection and orbital cellulitis were almost certainly pseudomonal. An association between pseudomonal conjunctivitis and meningitis has been reported. Although the neonatal unit is a high risk area for nosocomial infection, three of our patients were infected before admission. Infant 3 was infected on admission, and infants 1 and 4 had PROM, with a positive high vaginal swab in one. Two babies received intravenous gentamicin for at least 48 hours from birth, but still developed infections. This may reflect the virulence of the bacterium.

Diagnosis is confirmed by microscopy and culture of aspirated vitreous fluid. Culture of the purulent discharge is useful but less reliable in identifying the causative organism, being found in only two of our four cases. Nevertheless, growth of *P aeruginosa* from discharge from an eye in a sick child should alert the clinician to the risk of a sight threatening and life threatening illness.

The most appropriate treatment for endophthalmitis is a combination of intravenous ceftriaxone and aminoglycoside,—for example, cefazidime 50 mg/kg every 12 hours and gentamicin 4 mg/kg every 24 hours. As intraocular accumulation of intravenous antibiotics is poor, the use of intravitreal antibiotics is essential—for example, cefazidime 2.25 mg in 0.1 ml. Topical treatment may be used, but not as sole treatment.

Morbidity and mortality in pseudomonal endophthalmitis are high despite early diagnosis; the deaths of three of our four infants reflect this. For survivors, the usual result is blindness of the affected eye, with enucleation sometimes being necessary.

**Key messages**

- Loss of red reflex, a change in the appearance of the iris, or purulent eye discharge can be clues to a life threatening ocular and systemic infection
- Bilateral endophthalmitis can complicate neonatal pseudomonal septicemia, and is a grave prognostic sign for survival
- Treatment of neonatal endophthalmitis should include intravitreal and intravenous antibiotics

We are grateful to Dr H P Roper and Dr S J Rose for permission to report cases under their care.