

Late onset endophthalmitis associated with intraocular lens: a case of molecularly proved *S. epidermidis* aetiology

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Abstract

A case of severe endophthalmitis after cataract extraction followed by posterior chamber lens implantation is reported. Microbiological cultures from a tap of the patient's aqueous humour prior to lens explantation as well as from the explanted lens and aqueous and vitreous humour during operation yielded *Staphylococcus epidermidis* sensu stricto. Scanning electron microscopy showed massive colonisation of the lens loop by staphylococci. Clonal identity of all isolates was demonstrated by plasmid DNA analysis and sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE) of extracellular products. This is strongly suggestive of the aetiological role of *S. epidermidis* in this case of late onset endophthalmitis.

Coagulase-negative staphylococci – in particular *S. epidermidis* sensu stricto – are the commonest organisms isolated from foreign body infections.¹ The pathogenesis of these infections is characterised by the ability of these bacteria to adhere to and grow on polymer surfaces and to produce an extracellular slime substance which

protects the embedded bacterial cells against the host's immune response and antibiotic therapy.^{2,3} Moreover, *S. epidermidis* is regarded as one of the commonest micro-organisms isolated in late onset endophthalmitis.⁴ However, until now its aetiological role in these infections has not been proved, mainly because of the lack of an adequate animal model.

Here we report a clinical case in which a patient developed a recurrent endophthalmitis after intraocular lens implantation. The *S. epidermidis* strains isolated from the anterior chamber before surgery and isolates from the infected lens, aqueous humour, and anterior chamber after surgery showed clonal identity as determined by molecular methods.

Case report

An 81-year-old man underwent an extracapsular cataract extraction followed by posterior chamber lens implantation in July 1987 in another hospital. On the third day after operation inflammation of the eye with fibrin deposition and hypopyon were diagnosed. The posterior segment was also affected, showing massive vitreous infiltrates; in addition there was a transient corneal oedema. On treatment with steroids and antibiotics (substances and doses not known) all inflammatory signs slowly regressed. Nevertheless, there was continuous inflammation of the entire eye.

In January 1988 the patient was seen in our clinic with severe endophthalmitis and treated again with antibiotics (cefotaxime 2 g three times a day, gentamicin 40 mg/40 mg/60 mg intramuscularly per day), high doses of steroids (prednisolone 150 mg per day), and topical subconjunctival injections of steroids and antibiotics. Paracentesis of the anterior chamber was performed and the aqueous humour submitted for culture and microscopical examination, as inflammation with hypopyon and vitreous infiltration persisted. Two weeks later the intraocular lens was explanted together with the capsular bag, and vitrectomy was performed. The lens, aqueous humour, and vitreous humour were examined by microbiological methods. In the three months following the second operation the inflammation slowly regressed. The final visual acuity was 0.5 in comparison with light perception and intact light projection before surgery.

Microbiological cultures from a tap of the patient's aqueous humour prior to lens explantation as well as from the explanted lens and aqueous and vitreous humour during the operation all yielded coagulase-negative staphylococci.

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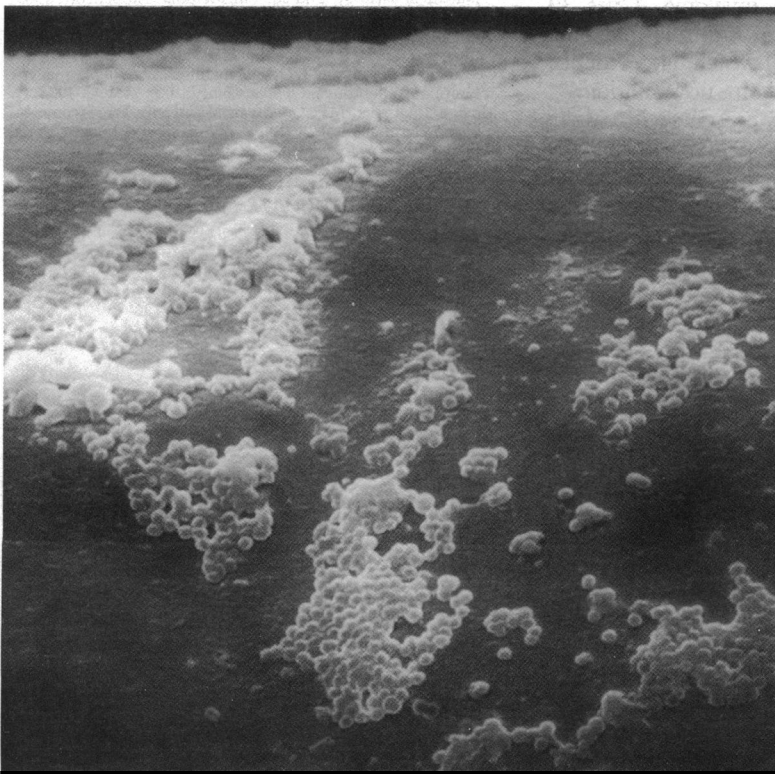


Figure 1 Scanning electron micrographs of the lens loop after explantation. A massive colonisation by staphylococcal cells can be seen.

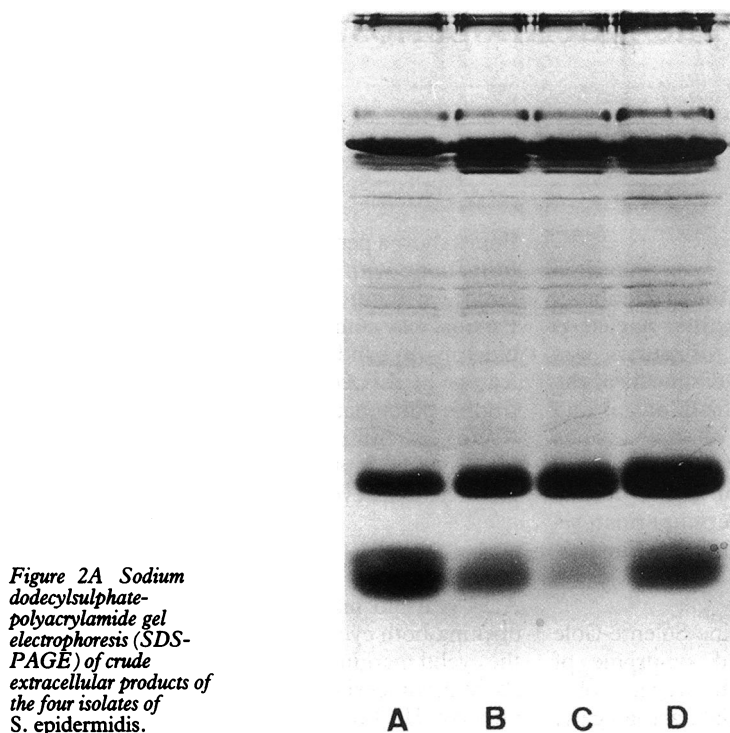


Figure 2A Sodium dodecylsulphate-polyacrylamide gel electrophoresis (SDS-PAGE) of crude extracellular products of the four isolates of *S. epidermidis*.

Scanning electron micrography of the lens loop (Prolene) showed massive colonisation by staphylococcal cells (Fig 1). Identification by the method of Kloos and Schleifer⁵ showed in all four cases *S. epidermidis* sensu stricto. The antimicrobial resistance pattern was also identical for the four isolates, showing resistance of the strains to penicillin, ampicillin, cotrimoxazole, and tetracycline. To demonstrate identity at the molecular level sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE, Fig 2A), and analysis of plasmid profiles (Fig 2B) were performed, showing identical patterns for the four isolates with both methods.

Discussion

There are a number of reports of intraocular infections presumably caused by *S. epidermidis* after intraocular lens implantation following cataract surgery.⁶ In addition, the ability of *S. epidermidis* to adhere to and to colonise synthetic polymers has been demonstrated.^{7,8} Recently, it was also shown that *S. epidermidis* can adhere to intraocular lenses.⁹ However, it has not yet been proved that it can cause this type of infection, mainly because of the lack of an adequate animal model. Furthermore, coagulase-negative staphylococci are normal colonisers of skin and mucous membranes and often found as contaminants in clinical material. The clonal identity of coagulase-negative staphylococcal strains obtained from different sites (such as infected lens, aqueous humour, anterior chamber) and at repeated intervals has not been demonstrated in any of the studies published so far.

In the case presented here we isolated *S. epidermidis* from the explanted lens and demonstrated by scanning electron microscopy

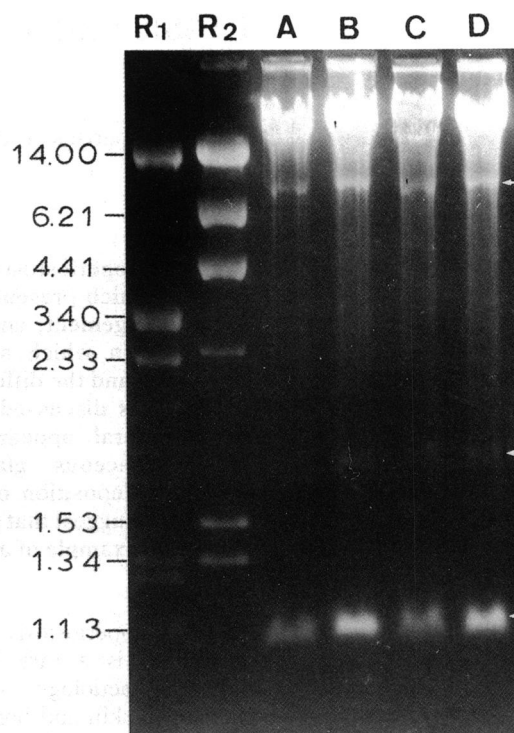


Figure 2B Agarose gel electrophoresis of plasmid DNA of the four isolates of *S. epidermidis* (molecular mass markers in megadaltons).

that staphylococcal cells were adherent to the lens loop embedded in a matrix of extracellular slime (Fig 1). All the *S. epidermidis* isolates cultivated from the lens, aqueous, and vitreous humour showed identity on the molecular level as shown by plasmid DNA analysis and SDS-PAGE. To our knowledge this is the first report in which the clonal identity of *S. epidermidis* obtained from different sites and at repeated intervals could be demonstrated in a patient with intraocular infection after lens implantation. The findings are strongly suggestive of the aetiological role of *S. epidermidis* in this case of intraocular lens-associated late onset endophthalmitis. Thus this entity may be characterised as a chronic polymer-associated *S. epidermidis* infection.

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