Foreign bodies as a cause of conjunctival pseudomembrane formation

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There are certain pathological features common to all forms of conjunctivitis. Essentially these are the fundamental characteristics of inflammation: hyperaemia, stasis, cellular exudate, and a fibrin-rich oedematous fluid, added to the reaction of the conjunctival tissues themselves. However, when a fibrin-rich exudate is formed on the surface of the conjunctiva, a pseudomembranous conjunctivitis results. This pseudomembrane consists of a close network of fibrin including leucocytes and other exudative products. It is easily peeled off but may soon recur.

In membranous conjunctivitis, the exudate is poured onto the surface but also permeates the superficial layers of the epithelium, and it may actually penetrate the conjunctival tissue down to the tarsal plate, with some obliteration and thrombosis of vessels. Later, organization of the membrane may take place with neovascularization and fibroplasia. In pseudomembranous conjunctivitis, the exudate is more superficial and there is no organization of the fibrin matrix.

The formation of conjunctival membranes and pseudomembranes may be evoked by a variety of factors, including common bacterial organisms such as various streptococci and, less commonly, mycobacteria and actinomycetes. Viruses have also been implicated, as in epidemic keratoconjunctivitis. Other aetiological factors are allergic, as in vernal catarrh; toxic, as in erythema multiforme; and chemical irritants, such as acids and alkalis, as well as various vegetable and animal irritants (Duke-Elder, 1965).

The three following case reports exhibit a common factor which is new in our experience as a possible cause for the formation of conjunctival membranes. This factor is a foreign body, found in the membrane itself, with attendant foreign-body cellular reaction demonstrated on histopathological examination.

Case reports

Case 1, a 65-year-old white man, presented with the complaint of burning and redness in both eyes of 2 to 3 weeks' duration.

EXAMINATION

The palpebral conjunctivae were injected, with scanty mucopurulent exudate in the inferior cul-de-sacs and a few conjunctival follicles. Gram and Wright stains of conjunctival scrapings showed some polymorphonuclear cells and scattered Gram-positive cocci.

TREATMENT

The patient was placed on polymyxin-bacitracin-neomycin drops four times a day.

PROGRESS

He was seen again one week later; there was not much improvement symptomatically and no significant change on ocular examination.

Cultures were taken with a cotton swab from the cul-de-sacs, and a KOH preparation for fungi was negative. All medication was stopped and the patient was asked to return in 5 days. At the next visit he was found to have a pseudomembrane in the left inferior cul-de-sac which was easily stripped away and was submitted for histopathological examination. A conjunctival biopsy specimen which was also submitted showed only chronic inflammatory changes.

Microscopical examination of the pseudomembrane showed numerous acute and chronic inflammatory cells. In addition, birefringent foreign bodies identified as cotton fibres were noted, together with occasional foreign-body giant cells. Special stains for fungi, bacteria, and acidfast bacilli were negative. The culture produced a moderate growth of *Staphylococcus aureus*. A topical chloramphenicol preparation was prescribed and the patient's condition subsequently improved.

Case 2, a 58-year-old white man, received a foreign body in the right eye while working with some welding slag. He did not seek medical attention immediately but a few days later noted a dry sensation and a whitish plaque in the inferior cul-de-sac.

EXAMINATION

At the clinic this membrane was easily peeled off from the conjunctiva and was submitted for histopathological study. Microscopical examination revealed an eosinophilic granular material with acute and chronic inflammatory cells. Also present was a granulomatous infiltrate with numerous foreign-body giant cells containing birefringent foreign bodies. Cultures were negative.

Case 3, a 62-year-old white woman, came to see an ophthalmologist because her left eye had been red and irritable for one week.

EXAMINATION

A tenaciously attached yellowish-grey membrane was seen upon eversion of the left upper lid (Figs 1 and 2).

FIG. 1 Pseudomembrane on palpebral surface of upper lid

This was removed with some difficulty, leaving numerous bleeding sites, and was submitted to the pathology laboratory. It was found to be a pseudomembrane, consisting of an eosinophilic fibrillar matrix in which numerous acute and chronic inflammatory cells were embedded (Figs 3 to 6). Several foreign-body giant cells with birefringent foreign-body particles were noted. Special stains for bacteria and fungi were negative. Cultures revealed a moderate growth of *Staphylococcus aureus*.

FIG. 2 Clear palpebral surface after removal of pseudomembrane and topical administration of antibiotic for one week

Comment

In each case, histopathological examination revealed a pseudomembrane. Under low-power magnification the specimens showed marked cellularity with no blood vessels (Fig. 3).

FIG. 3 Low-power photomicrograph of pseudomembrane, demonstrating its marked cellularity and absence of blood vessels. Haematoxylin and eosin. $\times 10$

Higher magnification revealed many polymorphonuclear leucocytes and mononuclear inflammatory cells (Fig. 4), embedded in an acellular eosinophilic fibrillar matrix. Special stains showed this matrix to have the histochemical characteristics of fibrin (Fig. 5). In addition, numerous foreign-body giant cells containing birefringent foreign bodies could be demonstrated with partial polarized light (Fig. 6).

FIG. 4 Numerous polymorphonuclear leucocytes and mononuclear inflammatory cells in a meshwork of eosinophilic fibrillar-like material. Note the large foreign-body giant cell. Haematoxylin and eosin. $\times 375$

FIG. 5 Eosinophilic fibrillar meshwork stains positive for fibrin. Mallory's phosphotungstic acid-haematoxylin. $\times 260$

FIG. 6 Birefringent foreign bodies embedded in a foreign-body giant cell demonstrated with partial polarized light. Haematoxylin and eosin. $\times 375$

The question arises as to the relevance of these findings in view of the positive *Staphylococcus aureus* cultures. These organisms are among the commoner causes of conjunctival membranes. However, four points support the thesis that foreign bodies can either directly cause conjunctival pseudomembrane formation or act as inciting agents superimposed upon underlying pathogens:

- (1) There are innumerable cases of conjunctivitis due to *Staphylococcus aureus* that do not form any membrane.
- (2) No membrane was found in Case 1 until after a cotton swab was applied to the conjunctiva, and then the foreign bodies were identified microscopically as cotton fibres.
- (3) Cultures for pathogens were negative in Case 2.
- (4) All three cases clearly demonstrated the common factor of numerous foreign-body giant cells surrounding birefringent foreign bodies.

The final histological diagnosis of all three specimens was pseudomembrane of the conjunctiva secondary to foreign bodies.

References

DUKE-ELDER, S. (1965) "System of Ophthalmology", vol. 8, pt. 1, pp. 89-95. Kimpton, London