Gas gangrene panophthalmitis

Report of a case

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Gas gangrene panophthalmitis is a rare complication of penetrating injury to the globe. Leavelle (1955) reviewed 53 cases of gas gangrene panophthalmitis reported since 1904 and added three cases of his own. Since then four other cases have been reported (Arnold, 1955; Oehring and Jütte, 1963; Walsh, 1965; McEntyre and Curran, 1968). Because of its rarity and gravity, the following case is reported to contribute to our understanding of this disease.

Case report

A 40-year-old Caucasian man was struck in the right eye in April, 1967, by a chip of steel from a punch he was hammering while installing an automobile spring.

Examination

5½ hours later the uncorrected visual acuity was 6/60 in the right eye and 6/7·5 in the left. The right eye was slightly red. A sealed perforating wound of the cornea was present in the lower nasal quadrant. A wedge of the pupillary portion of the right iris was missing between the 4 and 5 o'clock meridians. There was a moderate flare and many floaters in the anterior chamber.

An opacity was present in the lower nasal portion of the lens. Slit-lamp examination of the lens with the pupil dilated revealed an opacity in the lower nasal quadrant with a tract extending inferiorly, through which the foreign body had evidently passed, and a fine haze across the posterior capsular area.

Ophthalmoscopic examination was obscured somewhat by the lens opacity, but a small pool of blood and numerous white flecks could be seen in the vitreous just anterior to the retina. No foreign body was seen with either the ophthalmoscope or three-mirror contact lens and slit lamp.

X rays demonstrated a linear foreign body, 2 mm. in its greatest diameter, located in the 6 o'clock meridian 1 or 2 mm. below and 4 to 5 mm. posterior to the inferior limbal marker of the Comberg lens.

Course in Hospital

As part of his initial emergency care, the patient had received procaine penicillin 600,000 units, streptomycin 0·5 g., and tetanus toxoid 0·5 ml. intramuscularly 3 hours after injury. The foreign body was extracted with a hand magnet through a scleral incision over the pars plana 9 hours after the injury. The operation was performed under general anaesthesia and mannitol was administered intravenously pre-operatively. There were no operative complications. One per cent. atropine and 10 per cent. sodium sulphacetamide were instilled into the eye at the end of the procedure.

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Post-operatively the patient was given procaine penicillin 600,000 units and streptomycin 0.5 g intramuscularly twice daily.

On the first post-operative day the eye was red, painful, and chemotic. The peripheral cornea was hazy and gas bubbles were present in the anterior chamber. A culture was taken of the conjunctival discharge. Smears were reported as showing probable *Staphylococci*. Intramuscular cephalothin and methicillin were begun, but 24 hours after the operation the appearance of the peripheral cornea had progressed to a grey ring. An additional culture was taken. 12 hours later there was a frank ring abscess of the cornea, and the wound of entry was draining blood-tinged aqueous with fine particulate matter. An air bubble persisted in the anterior chamber. Cultures were repeated, and at this time the smear revealed Gram-positive rods with spores. Cephalothin was discontinued.

The cornea became completely opaque, and there was copious sanguinous discharge from the wound. Despite subconjunctival injection of penicillin and streptomycin, massive intravenous dosage of penicillin (20 million units/24 hrs), and nasal oxygen, there was progressive worsening of the panophthalmitis. An evisceration was performed 60 hours after the first operation and the sclera was left wide open with a drain. The final bacteriological identification of the organism grown on culture was *Clostridium perfringens*, type A.

Post-operatively the intravenous penicillin and intramuscular methicillin and streptomycin were continued for 3 days. The patient was then switched to intramuscular penicillin. He had considerable general malaise and discharge from the eye, but by the fourth day after the evisceration he was feeling well and only slight oedema of the lids remained.

Result

He was discharged from hospital the following day on oral penicillin, and his subsequent course was uneventful.

Pathological Findings

Histological examination of the excised cornea (Fig. 1) revealed a thickened corneal stroma with loss of its lamellar structure. Throughout the stroma there was an intense polymorphonuclear leucocytic infiltrate (Fig. 2). Large areas were honeycombed with small round and oval empty spaces.

FIG. 1 Thickened cornea excised from eye of patient with gas gangrene panophthalmitis. Epithelium and endothelium are absent. Note loss of lamellar pattern of stromal architecture. Masson. $\times 17$

(Figs 2 and 3). These differed somewhat from the spaces frequently seen in oedematous corneae or after artificial separation of stromal lamellae. Many of the spaces were surrounded by a thin layer of compressed tissue. It is possible that these spaces contained minute gas bubbles.

FIG. 2 Corneal stroma densely infiltrated with acute inflammatory cells and honeycombed with small round and oval empty spaces. Masson. $\times 87$

FIG. 3 Higher magnification of corneal stroma showing large number of inflammatory cells. Many of empty spaces which possibly contained minute gas bubbles are lined with inflammatory cells such as those indicated by arrows. Haematoxylin and eosin. $\times 420$

The iris was thickened and necrotic and intensely infiltrated with acute inflammatory cells. A purulent exudate lined all the uveal fragments. Parts of the choroid contained large masses of inflammatory cells. Numerous plump Gram-positive rods were present in the vitreous. A few could be identified in the cornea.

Comment

This case demonstrated the classic course of gas gangrene panophthalmitis. The infection followed a penetrating injury of the globe with implantation of a foreign body into the vitreous. Within 24 hours there was pain, marked lid oedema, and chemosis. The most arresting sign was the presence of gas bubbles in the anterior chamber. A ring abscess of the cornea developed and there was a coffee-coloured discharge from the wound. Antibiotics were ineffective in stopping the rapid deterioration of the eye, but the patient recovered completely after the eye was removed.

Multiple tiny empty spaces seen histologically within the corneal stroma suggested the presence of intracorneal gas, although no bubbles had been observed in the cornea clinically. Pringle (1919) saw large gas bubbles in the corneal substance of a patient with keratitis secondary to an ulcer due to exposure after a gunshot wound of the inner canthus and lower eyelid. Microscopic sections showed separation of the fibres by vacuoles.

Once signs of gas gangrene infection of the eye have become evident, no treatment has ever been reported to have saved an eye. The typical course of gas gangrene in the eye, resulting in loss of the eye but recovery of the patient, contrasts sharply with uterine gas gangrene such as may occur as a postabortal infection. Infection of the latter cavity with gas-forming bacilli has a fatal outcome in many cases (Douglas, 1956).

Summary

Within 24 hours of the implantation of an intraocular ferrous foreign body in a 40-year-old patient, classic signs of gas gangrene infection developed. Prophylactic antibiotics had been administered and the foreign body had been removed surgically. Gas bubbles were observed in the anterior chamber clinically and empty spaces which had possibly contained minute gas bubbles were seen histologically in the corneal stroma after the eye was eviscerated. Although the systemic prognosis of this condition is good, all reported attempts to save an eye with established gas gangrene panophthalmitis thus far have failed.

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