SURGICAL TREATMENT OF NECROTIC PANOPHTHALMITIS IN SNAKES

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ABSTRACT

The tendency of trauma to the eye, especially in the cases of infected perforating wounds or of parasitic infections, to involve all structures of the eye, is outlined and the need for surgical treatment is discussed. Difficulties and problems in operative procedures arising from the varied manifestations of panophthalmitis, particularly with regard to anaesthesia, immobilization, excision and resection of tissues, drainage and postoperative dressings, and the methods of overcoming them, are described on the basis of nineteen surgical cases.

INTRODUCTION

This study is based on the surgical treatment of nineteen cases of panophthalmitis in snakes, between the years 1968 and 1974, all in colubrid and elapid species (*Philothamnus s. semivariegatus*, one case; *Psammophis s. sibilans*, two cases; *Dispholidus t. typus*, five cases; *Hemachatus haemachates*, five cases; *Naja haje annulifera*, two cases; *Naja nivea*, four cases) suffering from moderate to severe affection of one eye.

The vast majority of cases were the result of nematode infection, only five being the result of perforating wounds (*Philothamnus*, one; *Naja h. annulifera*, two; *Psammophis*, two and two of secondary tuberculosis (*Psammophis* and *Dispholidus*).

GENERAL PATHOLOGY OF PANOPHTHALMITIS

One of the most important consequences of injury to the eye is the tendency of injury to one part to lead to involvement of all the coats and structures of the eye. When a response of this sort occurs, usually as the result of a pyogenic infection secondary to trauma, the condition is referred to as panophthalmitis.

Panophthalmitis is generally characterized by severe inflammation and degeneration of all the structures of the eye, particularly in the case of infections resulting from perforating wounds such as rodent bites, or when an eosinophilic abscess results from invasion of the tissues by nematodes or nematode larvae. It is sometimes derived from secondary tuberculous lesions, which are small epithelioid collections at first, but which may become massive and caseous, and precursors to a true panophthalmitis. Inflammation in the coats of the eye may become so severe as to occlude the blood vessels and to cause necrotic infarcts or generalized necrosis. The eye in necrotic panophthalmitis is characteristically grossly distended, pinkish in colour, and

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quite obviously filled with caseous and necrotic matter.

The condition develops over a variable period, sometimes over a matter of months, and does not at first seem to cause the snake obvious distress. By the time symptoms have developed noticeably, chemotherapy is of almost no value whatever.

In some cases the eye may be totally destroyed without any other complications whatever developing, but more often sympathetic ophthalmia occurs, and sometimes even a bilateral panophthalmia.

Clear evidence of systemic toxaemia in severe cases has occasionally been observed at post-mortem, and there is no doubt that immediate and effective treatment is essential. In the earlier stages of the disease, excision or enucleation of the primary lesion may suffice, but as a rule the condition is rarely detected in time and a total ophthalmotomy is the only practical method of treatment.

THE SURGICAL SET

I have found the following set to be most useful for performing general ophthalmotomies.

One Bard-Parker scalpel handle with a No. 11 or 12 blade; one medium or small Graefe knife; two Ziegler's knives; one ophthalmic dissecting needle; one small Beaver keratome; one pair of curved lens scissors; one pair of pointed dissecting scissors; one Hartmann's ear hook; two toothed Weiss iris forceps, curved; two grooved 15 cm dissecting forceps; a 1-mm McHardy's curette; six curved ophthalmic artery forceps; six straight mosquito artery forceps; two 1-ml tuberculin syringes with 23G needles; two 5-ml syringes for irrigation and aspiration; 3/0 and 4/0 plain gut sutures on small half-circle, round-bodied atraumatic needles; 000 silk suture thread; an atraumatic ophthalmic half-circle needle with fine silk thread.

Sterilization of instruments for fifteen minutes in Savlon is adequate for ophthalmic surgery, and aseptic, not sterile, techniques are used during operations.

ANAESTHESIA

Volatile anaesthetics such as fluothane (Hackenbrock & Finster 1963), ether (Cooper 1971) or cyclopropane, are not suitable for ophthalmic procedures on snakes, for the anaesthesia produced is of rather short duration, and they cannot easily be administered during the course of such operations.

Sagatal (pentobarbitone sodium) has proved to be the drug of choice for most major procedures, because although both induction and recovery periods are prolonged, it is safe if administered properly and does not generally require premedication to prevent excitation during induction or recovery. No undesirable effects have been observed in any of the cases dealt with.

Sagatal is given intraperitoneally at a dosage level of 20–30 mg/kg, diluted to a convenient bulk in apyrogenic water for injection. About one-quarter of the dose is injected initially, and the remainder given some ten minutes later over a period of at least two minutes. Surgical plane anaesthesia is usually obtained within about forty-five minutes.

IMMOBILIZATION

It is necessary, in most eye procedures, to keep the head and neck as immobile as possible. In most of the cases the head and anterior part of the body were fixed in a fully extended position with the affected side uppermost, with strips of adhesive tape and a little cotton wool padding to protect the tissues from pressure.

This method tended to interfere with the breathing and the circulation, but such problems were efficiently overcome by using a grooved polystyrene foam block with thick cotton padding as a head and neck rest, in conjunction with adhesive tape.

SURGICAL PROCEDURE

The ophthalmotomy itself is essentially straightforward, but complications requiring more extensive procedures for treatment frequently arise in severe cases.

The tissues of the orbit are infiltrated with a 1 : 1 000 solution of adrenaline hydrochloride to reduce haemorrhage, and the brille is removed after cutting through its juncture with the skin. Any necrotic material in the intraconjunctival space is removed with swabs.

The eye is partly freed and the depths of the orbit are approached by cutting through the fornix conjunctivae and retracting. Bleeders are easily controlled by clamping and twisting. As many as possible of the major vessels to the sclera are exposed by rotation and retraction of the eyeball, clamped and divided. Small vessels are too fine to deal with and may usually be safely ignored.

Any adhesions between the sclera and adjacent tissues should be divided, using a fine ophthalmic needle. When the eye has been sufficiently freed, it is sometimes possible to retract it enough to bring the insertions of the eye muscles into view. In such cases the muscles may be tied off or clamped, and divided. Usually, however, this is not possible, and the muscles, nerves and blood vessels in the depths of the orbit can only be divided without preliminary preparation, and tied off when the eye has been removed. Given speed and a little skill on the part of the operator, this is not as hazardous a procedure as might be supposed, and is generally to be preferred.

The stumps of the nerves, especially that of the optic nerve, should be deadened with a small drop of alcohol. Any other diseased tissues within the orbit are dissected out, if necessary, or small foci of infection curetted, and antibiotic powders may be applied.

Minor bleeding is easily controlled by packing the orbit with fine gauze and waiting a full five minutes, timed by the clock. When all oozing has stopped a dressing may be applied.

The small size of the average snake orbit, and the rather restricted working conditions tend to make such procedures rather difficult. If the supraorbital skin is cut free and retracted, the operating field is considerably enlarged and the approach to the deep structures greatly facilitated.

This procedure can be followed very closely in most cases of panophthalmitis, but severe cases present problems that may require very different approaches.

It not infrequently happens that the brille, cornea and sometimes even portions of the

conjunctiva are gummed together in a solid necrotic mass that makes infiltration of the orbit very risky, and removal of the eye intact all but impossible. In such cases one can only remove as much as possible of the necrotic tissue with a curette and aspirate the fluid contents of the eye before dissecting the remaining parts free. The use of an antibiotic irrigation solution is essential in such procedures, when flushing out small pieces of necrotic tissue.

In more typical cases the problems that arise are more those of technique than of procedure, but the range of instruments listed should be adequate for most individual preferences. A fine, long-handled single-hook retractor is generally most suitable for manipulating the eye, but in some cases silk traction sutures grasped in artery forceps permit a freer operating field.

RESECTION OF TISSUES

The majority of structures within the orbit are usually removed as a matter of necessity during the course of an ophthalmotomy, but the fatty and connective tissue surrounding the eye and covering the deep structures of the orbit is normally left intact. It is rarely seriously affected by the disease, and small foci of infection are best treated with a powdering of a suitable antibiotic before dressing the orbit. Very rarely it may be necessary to remove part of the floor of the orbit and to reconstruct it surgically.

DRESSINGS AND DRAINAGE

In most cases there was little appreciable drainage of fluids from the orbit after surgery, but dressings were always left slightly loose at one point so that the nature and quantity of any discharge could easily be examined.

On completion of surgery the orbit was well dusted with Iodoform powder and a paraffin-wax gauze dressing applied and lightly taped into place. This dressing was usually removed after a week to ten days, and replaced with a plain gauze dressing for a further week, after which the wound was permitted to heal without any other dressing.

In the last case treated, that of a large boomslang, a piece of skin was taken from the neck and grafted into the orbit in an attempt to provide a natural dressing. The graft was held in place with a central suture through the optic pedicel, and with several peripheral sutures through the remaining conjunctiva. In the two weeks that the snake was in captivity the eye seemed to have healed rapidly and without complications, but it was released before the final outcome was certain.

POSTOPERATIVE CHEMOTHERAPY

All the snakes treated were routinely given antibiotic and Vitamin B complex therapy for an average of two weeks after surgery.

Streptomycin sulphate (Solustrep, Hermes (and Streptosol), CAPS) or Oxytetracycline

HCl (Oxycline, Panvet) were given intramuscularly every second day at dosage levels recommended by the manufacturers, and Vitamin B complex given either orally as tablets, or subcutaneously.

In all cases recovery was satisfactory.

SUMMARY

Pyogenic infections of the eye secondary to perforating wounds or parasitic infections may lead to degeneration and necrosis of the entire eye. Snakes may be anaesthetized with pentobarbitone sodium administered intraperitoneally and the eye removed surgically in order to prevent possibly fatal complications.

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