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ADDENDUM

**The Use of Solid Penicillin in a Case of Endophthalmitis
 following Lens Extraction**

BY

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The patient was a man, aged 61 years, who underwent left lens extraction on November 16, 1945, at Moorfields Hospital.

The immediate post-operative course was uneventful, but the section did not close completely at first and gaped slightly for about ten days.

On the 8th day after the operation the cornea became hazy and a 3 mm. hypopyon developed.

Solid penicillin powder (calcium salt) was applied to the line of the section, the total amount being about 20,000 units. The next day the hypopyon was reduced to 1 mm. and the following day the cornea was again clear and there was no hypopyon.

Mild iritis persisted for about 10 days after which time the patient was discharged in a satisfactory condition, the eye being quiet, with normal tension, thickened capsule and good projection of light.

**AN OPERATION FOR POSTERIOR ROUTE
 EXTRACTION OF INTRA-OCULAR
 FOREIGN BODIES***

BY

L. B. SOMERVILLE-LARGE

DUBLIN

RECENT ophthalmic literature has been flooded with the intra-ocular foreign body and its ramifications in relationship to ophthalmic war surgery. It would appear, however, from a study of the literature that the operative procedure for extraction by the posterior route has universally followed an approach advocated first, I think, by H. B. Stallard. The object of this article is to describe a method of posterior route extraction that I have been carrying out while in

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the army during the last few years but that has not, as far as I am aware, been previously suggested. Force of circumstances has often compelled a new method of carrying out a recognised procedure. In the method to be described the force of circumstance was a $6\frac{1}{2}$ mm. length of wire in the vitreous combined with the absence of scleral sutures, diathermy and giant magnet. The success of the resulting procedure induced me to employ a somewhat similar operation in twenty-four intra-ocular foreign bodies (battle casualties and accidents) that I subsequently operated on by the posterior route.

There are three essential differences from the recognised procedure in the operation to be described. The sclera is opened with a trephine, the diathermy coagulation of the choroid is limited to the area of the trephine hole, no scleral sutures are used.

Localisation.—This was carried out by means of the limbal ring X-ray and need not be mentioned in detail as the method used differs little from that already described by others. One antero-posterior and two lateral exposures are taken. The two lateral exposures are made on the same plate, in one of these with the eye looking up and in the other with it looking down. This procedure calls for absolute fixation of the head. As most of the patients were Indians in whom concentration is normally limited to a few seconds an apparatus for fixing the head had to be devised. This was splendidly carried out to the design of Lt. Col. Lawlor, Adviser in Radiology, S.A., India. By means of this rest and with the head clamped the eyes can be directed, and their position observed, by an assistant. Thus rotation and fixation can be assured. The antero-posterior film shows the foreign body in relation to the perfect circle of the limbal ring, and the lateral film shows it in relation to the two rings here seen as lines and almost at right angles to each other with their apices touching. The external diameter of the ring is measured before it is sutured on the limbus. By taking into consideration the difference between this diameter and the diameter of the ring on the X-ray plate exact distances on the latter can be calculated and the position of the foreign body from the ring obtained. As other writers have emphasized it is essential that the ring be a good limbal fit and be sutured firmly in position in exact relationship to the limbus. It must also be emphasized that this method of localisation becomes therefore an operative procedure, and it is often made more definitely so in a severely injured or inflamed eye.

The magnet used for this operation was made in the Indian Institute of Science, Bangalore, from the diagram illustrated in the Medical History of The War, 1922, Vol. 2, page 523. (I am much indebted to the ophthalmic compilers of this volume whose detailed instructions greatly simplified this work). The only fundamental

difference was in the construction of a special point tapered to $1\frac{1}{2}$ mm. This magnet had a stronger pull than a Haab (in the Minto Eye Hospital, Bangalore) and also than the army magnet that arrived some twelve months later. All magnets were tested through their strongest points. The magnet stand was manufactured in the workshops of H.E.H. The Nizam's State Railway, Hyderabad, to the design of its principal, Mr. Ottman (to whom for this and other beautifully executed work I am profoundly grateful). The design is almost exactly similar to that described and illustrated by Lt.-Col. Rycroft. The arm suspending the magnet moves horizontally on ball bearings, and the magnet itself can be raised or lowered on a counterweight which is kept somewhat heavier than the magnet to eliminate the danger of the point being pressed against the globe during the operation. When in use the magnet is wrapped in sterile towels and is manipulated by the surgeon who, while sitting behind the patient's head and allowing fixation of the eye to be carried out by an assistant, can use both hands for the purpose. Thus complete manipulative control of the magnet is readily obtained.

Operation.—As the majority of patients were Indians, from whom co-operation was uncertain, a general anaesthetic was employed. This normally consisted of induction by pentothal followed by intra-tracheal gas and oxygen. Vomiting occurred in one case but was mild and caused no complications.

The operation is carried out with the surgeon seated behind the patient's head. An ample conjunctival flap is cut from before backwards and the episclera completely removed from the trephine site. Conjunctival sutures for the re-apposition of the flap are inserted. A fixation suture is placed through the sclera 2 mm. from the limbus at the apex of the flap. If necessary in order to expose the operation site one of the recti is divided and the distal end retained by a mattress suture. The magnet is now manipulated into exact position in relationship to the area of the sclera to be trephined and then swung away from the operative field. Thus it can be brought back to the correct position immediately it is required. The sclera over the area that is estimated as nearest to the foreign body is trephined with a $1\frac{1}{2}$ mm. trephine. The base of the disc is dissected off the choroid using sac knife and disc forceps and taking great care that the choroid is not injured. The choroid is then coagulated through the trephine hole using the sharp point of the diathermy. Now the magnet is swung into position and the tip of the $1\frac{1}{2}$ mm. point made to enter the trephine hole. The power is switched on for periods of 2-4 seconds. The magnet point must be repeatedly withdrawn while the current is on as the foreign body cannot be seen coming to it. It is unusual to see any bulging of the surrounding sclera before the foreign body makes contact with the magnet point. There may

FIG. 1

Head rest for scleral ring X-ray. Patient shown in position for lateral exposures of left eye. The left side of the face is pressed against the film which is held between the lower horizontal bars. For the right eye the patient sits facing the opposite way.

FIG. 2.

The giant magnet and stand. To avoid obstruction the two legs not under the operating table are shortened. Stops prevent the magnet being swung over these legs. The magnet point illustrated is not the special fine one terminating in $1\frac{1}{2}$ mm.

FIG. 3.

Illustrating position in which magnet is held during operation. The magnet stand should be on the side of the table corresponding to the eye being operated on, the anaesthetic apparatus being on the other side.

be some traction on the tissues as the foreign body comes through the hole. If bulging does occur, or the foreign body is not easily delivered, the trephine hole should be enlarged by a radial incision made through the sclera with a sac knife over the area of the bulge. This procedure is simple and has never failed to render the foreign body easy to remove with but slight traction on the parts. In this series of cases it has, however, seldom proved necessary. If the foreign body does not come to the magnet point when this is in the primary position of right angles to the globe the point must be moved to the 12 o'clock, 3 o'clock, 6 o'clock and 9 o'clock meridians. In each of these positions the power is turned off and on many times. The foreign body can often be delivered by these manoeuvres when the primary position has failed. When no pull resulted from the foreign body with the $1\frac{1}{2}$ mm. point one of the stronger and blunter points was tried. These never succeeded where the finer point had failed. This would appear to suggest that the finer point is brought by this operation so near the foreign body that a stronger point, which by its thickness is of necessity at a greater distance, fails to exert under these conditions a stronger magnetic pull. It was my practice to apply the magnet for a total of 15 mins. before deciding that the foreign body was either non-magnetic or too embedded to be removed. By this time the heat of the magnet was such as seriously to diminish its power. The muscle suture (if a muscle was divided), followed by the conjunctival sutures are then tied, penicillin and atropine are instilled and both eyes bandaged.

After treatment.—Both eyes are kept bandaged for six days. Atropine is instilled after the second day. The patient is allowed up on the tenth day.

Post-operative results.—This operation was carried out twenty-four times. Twenty-two of these cases had been admitted from forward areas and had already passed through two or more hospitals. In none of the twenty-two was this operation carried out until after two months from the time of the injury, and in three the foreign bodies were successfully removed on the 108th, the 246th and the 369th day respectively. In no case were there any post-operative complications. In eight only was the foreign body visible in either vitreous or fundus. In seven the foreign body was removed. In no case was any choroidal or retinal haemorrhage observed post-operatively, nor did fresh vitreous opacities or a recognisable increase in previous vitreous opacities occur. The post-operative choroido-retinal scar was observed in seven cases, in four of these after the foreign body had been removed. This scar was surprisingly small being nearer one quarter than one half a disc diameter.

In the absence of a diathermy apparatus the choroid can be scarred through the trephine hole with the actual cautery. This was

done in the case where a $6\frac{1}{2}$ mm. length of wire was present in the vitreous. A 2 mm. trephine was used and the cautery applied directly to the exposed choroid through the hole. The wire was then withdrawn with a hand magnet. The resulting scar was little more than a quarter of a disc diameter. No fundus haemorrhages or vitreous opacities were produced. This eye was seen eighteen months after operation and the vitreous had remained clear without the production of retinitis proliferans.

The operation can be carried out on the posterior pole of the eye. In one case a foreign body caused by a hand grenade wound could be seen embedded in the fundus less than two disc diameters below the macula. It had been reported "non-magnetic to magnet test." The external and inferior recti were divided. After trephining and diathermic choroidal coagulation the foreign body was easily delivered with the $1\frac{1}{2}$ mm. point of the giant magnet. The periphery of the resulting choroidal scar was seen to overlap the site where the foreign body had been embedded. The operation was carried out 246 days from the date of the wound. No fundus haemorrhages or apparent increase in existing vitreous opacities occurred.

When considering this operative procedure the question must immediately suggest itself "Was not vitreous lost through the trephine hole?" This is an astonishingly difficult question to answer. The vitreous face must be broken in most cases with subsequent tendency for the vitreous to follow the foreign body out of the eye through such a relatively large opening. In two cases only could I be sure of the loss of any vitreous-like substance. In these a thin "watery vitreous" followed the foreign body but as in these cases there were dense pre-operative vitreous opacities obscuring all fundus details the post-operative choroidal result could not be ascertained. No untoward result appeared to occur in either case and the post-operative tension was normal when taken on the tenth day. I do not consider vitreous loss to be a complication of this operation.

Advantages.—It is realised that to advocate any operative procedure on such a small number of cases is unjustifiable. Few surgeons, however, are called upon to remove more than a limited number of foreign bodies by the posterior route so that any simplifying of the operation compatible with safety and minimum trauma is worth suggesting.

It would appear reasonable from the above to claim the following advantages for this operation.

1. The apposition of a powerful magnet point as near the foreign body as is compatible with safety.
2. The production of a minimum choroidal scar.
3. The absence of post-operative fundus haemorrhages and vitreous opacities.