THE ALL-TANTALUM CUTLER UNIVERSAL INTEGRATED IMPLANT*

A modified technique for its introduction: Case Reports

BY

JAMES R. HUDSON

London

THE gradual development and improvement of orbital implants, designed to impart to the ocular prosthesis a full range of movement, has been accompanied by the repeated disappointment of the rejection of the implant by the orbital tissues.

From the old types of buried implants—glass, ivory, and more recently plastic, globes—there has developed the integrated implant, in which the front surface is left exposed for direct contact with the back surface of the prosthesis (Reudemann, 1945; Hughes, 1948).

The Cutler ring implant (Cutler, 1947), of which a limited number has been used in Great Britain, has been followed by the "universal" type, a plastic ball of which the anterior convex surface is covered with a fine mesh of tantalum wire (Cutler, 1949). There is now in use in Great Britain an all-tantalum implant, in which the solid plastic ball has been replaced by a hollow tantalum shell. The advantage of this most recent type is that, as far as is known, tantalum is completely inert in the tissues, whereas cases of sensitivity to plastic materials have been recorded.

The "universal" type of implant was originally designed to be introduced following eviscero-enucleation, in which a scleral ring is left *in situ* with the four recti attached. The implant is introduced through a radial incision in the conjunctiva and Tenon's capsule, and is then sutured to the scleral ring (Cutler, 1947).

It is, however, relatively infrequently that an eye is removed in circumstances in which an implant might be used, when an evisceration is to be preferred to an enucleation. The former operation is usually reserved for cases of panophthalmitis, in which division of the optic nerve in the presence of infection is better avoided. In such instances, the introduction of any type of implant would probably be accompanied by considerable tissue reaction.

The commoner indications for enucleation include malignant neoplasms, injuries with gross disorganization of the globe, and secondary glaucoma. In all these cases complete removal of the eye is desirable.

Having used the all-tantalum implant on two or three occasions, and having observed that there is a tendency for the structures attached to the tantalum wire slightly to retract, I devised the method about to be described, in which the scleral ring of the

* Received for publication October 18, 1949.

original operation as described by Cutler (1947) is replaced by a ring of muscular tissue. This is designed to make it physically difficult for the implant to be extruded. Even if the muscle is replaced by fibrous tissue at a later stage, it will continue to serve its function.

The operation is carried out under general anaesthesia, 1 in 1,000 adrenaline drops having been instilled into the conjunctival sac

FIG. 1.—The socket immediately after the removal of the globe, showing catgut sutures through the tendons of the four recti.

pre-operatively, and 3 minims of 1 in 1,000 adrenaline in 1½ cc. of saline given by retrobulbar injection.

A Lister's speculum is used. The conjunctiva is divided around the limbus, and separated back by blunt dissection, avoiding as far as possible disturbance of Tenon's capsule. Each of the recti is then cleaned sufficiently to allow of easy identification of the tendon, and a single-ended 4/0 chromic catgut stitch on a No. 6 needle is passed through one side of the tendon, and looped through to secure a good hold. Care is taken not to clean the muscle belly. The muscles are then divided at their insertions, and the catgut retaining stitches are held back out of the way by clips (Fig. 1). It is convenient to use mosquito forceps for the vertical recti, and "bulldog" clips for the horizontal muscles, or some other simple method to avoid confusion at a later stage. The oblique muscles are next divided, and the eye is excised.

Haemostasis is secured as far as possible at this stage of the operation, but there is usually very little bleeding when retrobulbar saline and adrenaline solution have been used.

A double-ended No. 1 silk suture on No. 4 needles is now introduced into the tantalum mesh, parallel with and slightly behind its front edge. The implant is then dropped into place, and the

FIG. 2.—This diagram shows the internal rectus turned back, with its retaining suture of No. 1 silk threaded through the tantalum mesh. The inferior rectus has the stitch drawn through the belly of the muscle and the overlying Tenon's capsule. The external rectus has the suture tied and cut. The superior rectus shows the appearance after dividing the tendon in the line of its fibres, the medial division of the muscle being held aside by the catgut stitch placed in position at the beginning of the operation.

two ends of the silk stitch are passed through the belly of the superior rectus muscle (from its scleral to its subconjunctival surface), about 5 mm. behind the tendon, and then through the overlying Tenon's capsule. This stitch is then securely tied, and cut short. The bellies of the remaining three recti are attached to the tantalum mesh in a similar manner (Fig. 2).

The next step is to identify the tendons of the recti and to divide them in the line of their fibres, to a point just short of the securing silk stitches. Each muscle now presents two tendon slips, in one of which is the catgut stitch introduced at an earlier stage of the operation. This stitch is now passed through the mesh between its own muscle and the adjacent one, through the free slip of the

latter muscle, and finally includes the edge of Tenon's capsule between the two muscles before being tied. Each of the four catgut stitches is dealt with in a similar manner, forming on completion a continuous ring of muscle around the neck of the implant (Fig. 3).

Penicillin drops are instilled into the wound at this stage, and the conjunctiva is stitched to the front edge of the mesh. This is done with a 4/0 chromic catgut suture on a No. 4 needle, care

FIG. 3.—This shows the implant in position, with the four muscles sutured in position, and the catgut stitches between them holding Tenon's capsule and neighbouring divisions of the recti on to the wire mesh.

being taken to invaginate the margin of the conjunctiva at the same time (Fig. 4).

The operation is now complete, and the socket is carefully packed with tulle gras to maintain gentle pressure between the closed lids in front and the implant behind. The lids may be loosely stitched together to ensure that the packing remains in place.

The eyes are double-padded, the outer dressing being changed after 48 hours. At the first dressing, the unoperated eye may be left unpadded if the socket of the other side is comfortable. If the movement of the eye should cause discomfort in the socket, then double padding is continued for a period of up to 7 days. For three days following the operation intramuscular penicillin is given in the dosage of 200,000 units 6-hourly.

The tulle gras is removed from the socket after seven days, and

the retainer shell of plastic material is immediately put in position. This is not removed except for fitting the prosthesis. The socket is irrigated three times a day for a few days with 1 in 8,000 oxy-cyanide of mercury, and thereafter once or twice daily with saline lotion. The retainer shell is not removed for this purpose.

After the final fitting, the prosthesis is left in position continuously unless there is some positive indication for its removal.

FIG. 4.—The continuous catgut suture for the conjunctiva has been partly completed.

Any slight discharge can be dealt with by irrigation, or by the use of 30 per cent. albucid drops, leaving the prosthesis in place.

The advantages of the operative technique described are these:

1. It is relatively simple.
2. The implant is retained by a complete muscular ring. Even if this becomes converted into fibrous tissue at a later stage, it will still fulfil its function.
3. There is a relatively large surface area of each muscle in contact with the tantalum mesh.
4. There are no stitches to be removed after the operation.
5. Packing the socket prevents chemosis and also the appearance of bruising during the first week, after which the retainer shell serves the same purpose.
6. Double padding allows some consolidation of the tissues attached to the implant before movement is permitted.

FIG. 5.—Photographs of Case 1.

FIG. 6.—Photographs of Case 2.

Case histories.—Included in these is one (Case 1) in which the plastic cylinder type of implant with gold ring was used. In Case 2 the earlier rather heavy all-tantalum implant was used, and in the remaining cases the most recent hollow all-tantalum implant. Cases 5 and 6 were the first in which I used the technique described.

Case 1. J. G. Female—aged 21 years. Right excision for melanoma of the choroid. Operation on 6.7.49. Good movements. (Fig. 5.)

Case 2. R. J. Male—aged 25 years. Right excision following rupture of globe due to injury. Operation on 13.7.49. There is slight retraction of the tissues around the front margin of the tantalum wire in this case, but the implant appears to be firmly in position. Good movements. (Fig. 6.)

Case 3. T. G. Male—aged 41 years. Left excision for blind, irritable eye—history of injury 20 years previously. Operation on 16.8.49. In this case marked retraction of the tissues occurred above the implant, and there was little upward movement. The patient was re-admitted and the superior rectus and surrounding tissues were re-attached to the implant. Operation 7.9.49. There is still some limitation of upward movement. It was on account of the failure in this case that the modified technique described in the foregoing paragraphs was devised.

Case 4. M. B. Female—aged 4½ years. Left excision following penetrating injury with an arrow. Operation 23.8.49 (11 days after injury). Movements good. Some retraction of tissues around front margin of implant.

Case 5. I. M. Female—aged 52 years. Left excision for melanoma of choroid. This was the first case in which the modified technique was used. Operation 13.9.49. Good movements—plastic shell placed in socket on 8th post-operative day.

Case 6. P. P. Male—aged 12 years. Right excision following penetrating wound and retention in globe of lead airgun pellet. Operation 11 days after injury, which occurred on 6.9.49. In spite of some chemosis before the operation, the socket was very satisfactory when dressed 7 days after the operation. Retainer shell put in immediately after removal of dressing. Good movements.

Four further cases have been operated upon more recently than those described, and the results have been encouraging.

Summary

A technique for the introduction of the Cutler universal implant (all-tantalum), following enucleation of the eye, is described. The author considers that, by the use of the tendons of the recti to form a complete ring around the neck of the implant, attachment of the muscles to the tantalum mesh is more secure, and the possibility of later extrusion of the implant is greatly lessened.

I should like to express my thanks to members of the staff of the Moorfields Branch of the Moorfields, Westminster and Central Eye Hospital, for their permission to operate on the cases described, and for their kindness in allowing me to publish the results. I should also like to thank Dr. Peter Hansell of the Department of Medical Illustration, Institute of Ophthalmology, for the photographs of Cases 1 and 2.

REFERENCES

- CUTLER, N. L. (1947). *Arch. Ophthalm., Chicago*, **37**, 73.
 — (1949). *Amer. J. Ophthalm.*, **32**, 253.
 HUGHES, W. L. (1948). *Ibid.*, **31**, 303.
 REUEDEMAN, A. D. (1945). *Trans. Amer. ophthalm. Soc.*, **43**, 304.