PLASTIC REPAIR OF CONJUNCTIVA WITH PERITONEUM TRANSPLANTATION*

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THE repair of conjunctival defects has always been a difficult problem. From time to time various tissues, such as Thiersch's graft, mucous membrane from the oral cavity (lower lip and cheeks), inferior turbinates of the nose, amniotic membrane, and even skin from the prepuce and labia minora have been utilized. Mucous membrane from the oral cavity is most commonly used for grafting into the conjunctival sac. However, it is difficult to obtain the required extent of mucous membrane from the oral cavity, and, when such a graft takes, it tends to stand out thick and prominent and to differ in colour from the rest of the conjunctiva, so that the cosmetic results are generally unsatisfactory.

In 1954, while working in the general surgical department at Hexham Hospital, Northumberland, England, I was struck with the extreme thinness and transparency of the inguinal hernial sac and with its suitability for transplantation into the conjunctival sac. It was not until late 1956 that I was able to undertake an experimental study of this problem. To date, I have successfully transplanted slips of peritoneum on to palpebral conjunctiva in 23 cases of entropion (modified Webster's operation), and on to bulbar conjunctiva in two other cases. In another case, the whole of the mucous membrane of the contracted socket was dissected out and replaced with peritoneum. The results of these trials are described below.

Case Reports

Case 1, a man aged 45 years, attended the ophthalmic out-patient department of the Willingdon Hospital on September 3, 1956, complaining of watering and irritation in both eyes for a long time.

Examination.—He had advanced trachoma with entropion in both eyes. As an experimental measure the right eye was selected for a modified Webster's entropion operation with peritoneal graft.

Operation.—On September 6, 1956, under local anaesthesia, the upper eye-lid was everted on the straight edge of a divided spatula,† and fixed by three dark silk sutures passed through the lid margin. The silk sutures were pushed into the vertical slits and stretched, so that the lid was maintained in the everted position. A linear incision was made in the sulcus subtarsalis, exposing the orbicularis oculi muscle which should not

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† As no Webster spatula was available, a substitute was devised. A wooden tongue spatula was divided into two equal lengths by cutting it down the middle. At the rounded end of one half, three linear slits were made with a razor blade or with a metal file (such as is used for cutting ampoules). These cuts extended through less than a quarter of the length as shown in Fig. 1 (opposite).

FIG. 1. — Webster spatula devised from a wooden tongue depressor.

be cut. The edges of the tarsus including the two ends, were undermined all round. A rectangular piece of thin peritoneum larger than the size of the incision was cut and placed *in situ* in this prepared bed.

The length of the raw area of the sulcus subtarsalis should be measured with calipers. Much time is saved if the peritoneum is kept stretched by the assistant and a loop is made with a double-armed suture on the smooth side at each end of the intended slip (Fig. 2).

FIG. 2.—Piece of peritoneum stretched by assistant. Slip of peritoneum to be cut is shown by shaded area. Loop of mattress suture is on the side of the peritoneum which is lined with mucous membrane.

The peritoneum is cut with scissors, care being taken not to cut the sutures, and is transferred to the prepared undermined bed, the edges being eased under the edges of the tarsus incision. The two needles at each end are then passed through the thickness of the lid, from beneath the undermined ends of the incision in the sulcus subtarsalis, so as to emerge on to the skin side where the threads are tied. Penicillin eye ointment was applied and the eye bandaged. Bandage and stitches were removed on the fifth day.

Result.—The graft was found to have taken firmly and well, and the entropion was completely relieved with a satisfactory cosmetic effect. The case has been followed for 2 months and the result is quite satisfactory.

The modified Webster operation with peritoneum graft (as described for Case 1) has now become the routine practice for the treatment of entropion in the Willingdon Hospital, and the same technique has been used in 22 similar cases with excellent results.

Case 2, a man aged 56, attended complaining of recurrent pain in the left eye for 6 months.

Examination.—There were degenerative corneal opacities, hypermature cataract,

chronic iridocyclitis, and secondary glaucoma. There was no perception of light. The patient readily agreed to enucleation, but it was decided to retain the eye for experimental purposes and to replace a slip of bulbar conjunctiva with peritoneum.

Operation.—In addition to instillation of local anaesthetic, a retrobulbar injection of Novocain and adrenaline was also given to lower the ocular tension. The superior bulbar conjunctiva was incised in a curve 2 mm. from and concentric with the limbus, and a slip of conjunctiva about 2 cm. long and 0.5 cm. wide was dissected away, removed, and replaced with a peritoneum graft of the same size which was stitched in position. After the peritoneum graft was stitched, a limbal incision was made and a broad iridectomy was done at 10 to 2 o'clock; 20 minutes later, the incision was enlarged with corneal scissors and the calcareous lens was removed with a wire vectis. Side-to-side corneo-scleral stitches were applied, atropine 1 per cent. drops and penicillin ointment were put in, and the eye was bandaged.

Result.—Post-operatively the patient was very grateful at having been relieved of the severe pain. When the bandage was opened on the fifth day, the graft was well in position (Fig. 3). The conjunctivo-peritoneal stitches were removed on the seventh day and the corneal stitches on the tenth day. The graft was white as compared with the rest of the conjunctiva, which was markedly inflamed. The case is still being followed.

FIG. 3.—Slip of peritoneal graft in position lying concentric with the limbus, 20 days after operation. Left eye rotated downwards.

Case 3, a man aged 56, attended on November 7, 1956, for a cataract operation in the right eye. The left eye was blind, with total corneal opacity and convergent squint.

Operation.—The right eye was operated on for cataract on November 15, 1956, and at the same session the whole of the bulbar conjunctiva in the left eye, up to the superior lateral and inferior fornix, except the medial part, was replaced with a peritoneum graft. The peritoneum used in this case had been stored in an ordinary refrigerator at 4° C.

Result.—The bandage was opened after 5 days, and it was found that the graft had taken well, except in the inferior part where it had been dislodged by a haematoma and rubbing of the graft by the lower lid. The colour was changing and merging with the rest of the conjunctiva (Figs 4 and 5).

FIG. 4.—Left eye before operation.

FIG. 5.—After peritoneum has been grafted into the superior and lateral part of the inferior bulbar conjunctiva.

Case 4, a man aged 60, attended the out-patient department on November 30, 1956, with cataract in the right eye. The left socket was contracted. The right eye was operated on for cataract on December 6, 1956, and, as the patient was very glad to regain his vision, he was coaxed into agreeing to an experimental operation on the contracted left socket.

Operation.—On December 20, 1956, the conjunctiva of the whole of the contracted socket was removed, and the socket was deepened to the required size, particular care being taken to deepen the inferior fornix. The fibrous scar tissue underlying the conjunctiva was also dissected away, and complete haemostasis was obtained. A negative mould of the prepared and enlarged cavity was made with dental casting material. Peritoneum (which had been stored for 18 days in the refrigerator at 4° C.) was cut roughly to the required size and shape of the raw area of the socket. The inferior edge of the prepared piece of peritoneum was stitched to the conjunctival edge of the lower lid, taking care that the raw surface of the peritoneum when in position would lie in contact with the raw surface of the socket. Now this piece of peritoneum was placed on the mould, the cavity was sprinkled with crystalline penicillin powder, and the mould was placed in position into the socket. No lid stitches were applied. A bandage was applied firmly and procaine penicillin injections were given for 4 days.

Result.—The bandage was opened on the eleventh day after the operation, when the mould was removed from the cavity. The socket was clean, and the inferior fornix was deep and the socket as large as on the day of operation. The peritoneo-conjunctival stitches were removed, and the peritoneal graft was found to be perfectly in position (Figs 6, 7, and 8, overleaf).

FIG. 6.—Left contracted socket before operation.

FIG. 7.—Socket 36 days after grafting operation.

FIG. 8. — View from above to show the line of junction. The inferior fornix is as deep as in any normal case.

Discussion

Peritoneum from hernial sacs and tunica vaginalis from hydrocoele sacs are readily available in large amounts, and can be stored for up to 18 days in normal saline at 4° C.

In attempting to graft peritoneum, great care is needed to see that the endothelial surface of the peritoneum is kept flush with the rest of the conjunctiva. The raw surface of the peritoneum is easily identified as it has a fibrous appearance and is rough to the touch. If the very thin portion of the hernial sac is not available, the fibrous tissue should be peeled off from the mucous lining of the peritoneum so as to secure a graft as thin as the conjunctiva.

Suggested Indications in Ophthalmology

I. Trauma

(i) *Repair of Contracted Socket.*—The whole of the socket can be repaired at one session as was done in Case 4. The advantages as compared with Thiersch's graft are very obvious, because there is no discharge, irritation, or sodden appearance. The cavity is always clean, as is any cavity lined with mucous membrane, and the colour is rather similar to the normal appearance of the conjunctiva.

(ii) *Repair of Bulbar Conjunctiva.*—This may be necessary after removal of tumours, contractures, fixation of the globe after pterygium operations, removal of dermolipoma, all kinds of burns, and other extensive injuries. The sclera shines through the transparent peritoneum and therefore matches closely the rest of the conjunctiva.

(iii) *Recurrent Pterygium.*—After having dissected the head of the pterygium off the cornea and cut it away, a small slip of peritoneum may be placed along the edge of the cornea. This procedure is now being studied.

(iv) *Symblepharon of any Origin*

II. Inflammation

(i) Trachoma

- (a) In the sequelae of trachoma—particularly entropion, symblepharon, and pannus.
- (b) It is suggested that the course of trachoma may be arrested by replacing the affected conjunctival surface with peritoneum. In the treatment of pannus, a slip of peritoneum may be stitched in position after doing a partial or total peritomy.

(ii) *Essential Shrinkage of Conjunctiva*

(iii) *Other Vesicular Conditions*

III. Neoplasm

To replace the conjunctiva when this tissue has to be sacrificed during the treatment of new growths, by operation or radiology. I have seen fixation of globe even after the removal of a dermolipoma, when no portion of the conjunctiva was removed.

IV. Degenerations and deficiency and metabolic disorders of the conjunctiva

Xerosis and acne rosacea

V. Operations

To act as a support in various surgical operations on the cornea and iris such as keratoplasty and iris prolapse.

Summary

(1) The results of transplantation of peritoneum on to the conjunctiva to fill gaps in the conjunctival sac are described in four cases. Excellent results were achieved in 23 cases of entropion, and this method is now used as routine in the surgical treatment of entropion in the Willingdon Hospital, New Delhi.

(2) On the basis of the successful results obtained, it is suggested that replacement of conjunctiva by peritoneum may be undertaken in trachoma and other inflammatory diseases of the conjunctiva and after surgical removal of the conjunctiva in the treatment of neoplasms.

(3) This new transplantation material is particularly useful for socket reformation, lid repair, or new lid formation, and for repair of the bulbar conjunctiva.

(4) Because of the similarity of peritoneum and conjunctiva in thinness, colour, and transparency, the cosmetic results have been encouraging. It is not yet possible to say whether in the long run the transplanted peritoneum will merge imperceptibly with the surrounding normal conjunctiva. Cases are being followed-up over a long period in order to study this point.

(5) A further study of the pathological, bacteriological, and other aspects of this transplantation technique is now being made.

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