PTERYGIUM REMOVAL*† A TECHNIQUE TO PREVENT RECURRENCE

BY

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PTERYGIUM varies in incidence, in clinical presentation, and in frequency of recurrence after various techniques of surgical removal, with geographical, climatic, meteorological (Cameron, 1965), and occupational (Saad, 1966) conditions. A recurrence rate as high as 50 per cent. (Kamel, 1946; D'Ombrian, 1948) has been reported (Duke-Elder, 1965), but the true rate is more probably about 30 per cent. (Fasanella, 1960). The value of Thiotepa (triethylene-thio-phosphoramidate), which appears to offer an important contribution to the post-operative management of this condition by its antimitotic effect (Liddy and Morgan, 1966), has not yet been proved by clinical trials (Cassady, 1966; Joselson and Muller, 1966).

In the last 4 years we have used a modified Desmarres-MacReynolds transplantation-bare-sclera technique (Duverger and Velter, 1939; Arruga, 1962), followed immediately by irradiation with 2,000r beta rays, in 32 cases, including three recurrent pterygia and one second recurrence. They have now been observed for from 1 to 3 years and none has recurred.

FIG. 1.—Dissected head, neck, and body of pterygium.

H. Inferior half of pterygium to be excised.

FIG. 2.—Superior half of pterygium to be transplanted.

U. Undermined conjunctiva (shaded area).

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Operative Technique

The superficial corneal layer is cleared by superficial splitting with a Bard-Parker blade until no opacity is left in the area previously occupied by the head of the pterygium. Two straight incisions are made in the conjunctiva, upwards and downwards, up to a point 1 mm. from the semilunar fold (Fig. 1).

The conjunctiva is then undermined above the upper and below the lower incision for 3 to 4 mm. along the entire length of each incision. A pocket is formed 5 to 7 mm. deep vertically downwards from the limbus at 5 o'clock for the right eye and 7 o'clock for the left eye (Fig. 2).

The neck of the pterygium is dissected up to a distance of 6 to 7 mm. from the limbus and Tenon's capsule is also removed, thus leaving a bare sclera extending 5 to 6 mm. from the limbus. The body of the pterygium is dissected up to 1 mm. from the semilunar fold; at this stage only the conjunctival portion of the pterygium is dissected off, taking care not to damage the insertion of the medial rectus muscle. The head of the pterygium is held with a 4-0 black silk suture, and the inferior half of the triangle of the pterygium is cut out (Fig. 1). The upper half of the pterygium is then transplanted to the inferior subconjunctival pocket (Fig. 2).

One 5-0 black silk suture is inserted through the episclera 4 mm. from the limbus and 3 mm. *above* the level of the horizontal geometrical altitude of the bare area triangle; the inferior edge of the undermined *superior* conjunctival flap is then anchored to the episclera. A similar suture is inserted 4 mm. from the limbus and 3 mm. *below* the level of the altitude of bare scleral area to the undermined *inferior* conjunctival flap (Fig. 3), where the inferior conjunctival flap is also anchored. Four or five conjunctival sutures are inserted along a line from the semilunar fold to a point 6-7 mm. from the limbus (Figs 4 and 5).

FIG. 3.—Anchoring upper and lower conjunctival flaps to episclera 3-4 mm. from limbus and 5-6 mm. apart.

C. Six to eight superficial cauterizations in an arc 3 mm. from and parallel to the limbus.

FIG. 4.—Bare sclera. After tightening the two episcleral conjunctival sutures, the beta applicator is set in position.

A. Beta applicator.

FIG. 5.—Bare sclera ready for beta ray application as soon as the surgical procedure is concluded.

The bare scleral area is cleaned with the back of the Bard-Parker blade and haemostasis is attained with very superficial and minute applications of a battery-cautery (Dixey cautery or similar) to the bleeding points. This area is then dried with gauze, and an additional barrage of six to eight superficial and minute cauterizations is applied in an arc 3 mm. away from and parallel to the limbus. The object of this procedure is to provide an absolutely clear scleral area to which beta irradiation will be applied.

Whilst the patient is still on the operating table, the beta ray plaque is applied long enough to give a surface dose of 2,000r, which means an application time of $3\frac{1}{2}$ minutes with the strontium-90 plaque which we are now using (Fig. 6). This is followed by daily dressings of cortisone and antibiotic ointment. All sutures are removed on the seventh or eighth day.

FIG. 6.—Cross-section of irradiated area (after Kestenbaum).

S. Sclera. C. Cornea. L. Limbus. C.P. Ciliary process.
 0.6 mm. = Thickness of sclera at corneo-scleral border.
 1.5 mm. = Average depth of anterior chamber in front of iris root (0.5 mm. being $\frac{1}{2}$ of an average depth).
 1.1 mm. = Average thickness of cornea towards the limbus.
 0.8-1.0 mm. = Height of a ciliary process.
 0.5 mm. = Distance between equator of lens and ciliary body processes.

Technique of Beta Irradiation

The earlier cases in the series were irradiated with a radium-B plaque made from an asbestos sheet on to which radium has been deposited covered with a thin sheet of mica, the whole surface being sealed with a thin foil of monel metal which is soldered at the edge to seal the radium. These applicators give a low gamma-ray emission; the surface dose is less homogeneous than that of a modern strontium-90 plaque, and we are therefore now using a 20 millicurie strontium-90 plaque with an active area of 1 square centimetre. Strontium-90 is an isotope with a half-life of 28 years which, in its decay to Yttrium-90 and Zirconium-90, emits β particles of maximum energy 0.54 meV and 2.25 meV respectively; there is no gamma-ray emission.

Comment

If we take into consideration (Kestenbaum, 1963) the data shown in Fig. 6, we can assume that between the beta ray applicator and the lens there is a distance exceeding 2.4 mm.:

Average $0.6 + 1.5 + 0.8 + 0.5 = 3.4$ mm.
 Minimum $0.6 + 0.5 + 0.8 + 0.5 = 2.4$ mm.

According to Wilson (Haye, Jammet, and Dollfus, 1965), at a distance of 3 mm. from the applicator (strontium-90), the dose will be 8 per cent. of the surface dose, that is 160r, and at 2.4 mm. it will be 12 per cent. of the surface dose, that is 240r. Using a surface dose of 2,000 in a single application to the equator of the lens, the radiation will therefore be well below the cataractogenic dose.*

Summary

A technique for the removal of a pterygium is described, in which surgery is followed immediately by a single application of beta irradiation. In 32 cases so treated there have been no recurrences in a period of 1 to 3 years.

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* At the time of the writing of this paper we read the article of George M. Haik (1966) which our small number of cases supports.