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Retinal Relieving Incisions

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Summary
Retinal relieving incisions were undertaken during closed microsurgery for the treatment of retinal detachment complicated by retinal shortening as a result of incarceration or irresectable epiretinal membranes. In 16 of 20 eyes the retina remained attached after a minimum follow up of six months. Visual acuity of 2/60 or better was achieved in eleven of the 20 eyes and seven eyes had an acuity of 6/60 or better. Retinal relieving incisions are required in a minority of retinal re-attachment procedures and are compatible with useful visual function.

In complicated retinal detachments the retina is often shortened in relation to the underlying retinal pigment epithelium and outer wall of the eye. This may be a consequence of periretinal membrane contraction and retinal folding (as a result of proliferative vitreoretinopathy or preretinal neovascularisation) or retinal incarceration from penetrating trauma or ocular surgery. In most instances the retina can be re-attached by a combination of removal or division of epiretinal membranes and scleral indentation. When these methods fail, however, the retina can be incised to mobilise it so that at least a portion of the posterior retina can re-attach to the pigment epithelium.

Material and Methods

We reviewed all patients undergoing surgery in the Surgical Vitreoretinal Unit of Moorfields Eye Hospital between November 1983 and October 1986 in whom deliberate retinal relieving incisions were used as part of a retinal re-attachment procedure. Only those cases in which the retina was completely or substantially re-attached at the end of surgery were included. These comprised 20 eyes of 20 patients. Seven eyes had retinal detachments associated with irresectable non-vascularised membranes (proliferative vitreoretinopathy). Five eyes contained irresectable vascularised epiretinal membranes. The remaining eight eyes had vitreoretinal incarceration in a scleral wound. Six of these incarcerations were the result of penetrating trauma, while two were iatrogenic, one from attempted transscleral removal of an intraocular foreign body and one from external drainage of subretinal fluid.

The surgical techniques employed were similar to those described in detail by Machemer, McCuen and deJuan.[1] To avoid bleeding the retina was coagulated with diathermy on both sides of the proposed incision and the retina was cut using intraocular scissors (Fig. 1). In two eyes retinal tacks[2,3] were used to help position the resected retina (Fig. 2). Silicone oil, or a mixture of air and sulphur hexafluoride gas, was used for internal tamponade of retinal breaks and the edges of the retinal incision were treated with argon laser endophotocoagulation or transscleral cryotherapy to promote chorio-retinal adhesion (Fig. 3).

Results

The clinical features of the 20 eyes are summarised in Table I. The operative details and outcome of surgery are shown in Table II. The size of each retinal incision is indicated in degrees of arc using the optic disc as centre.

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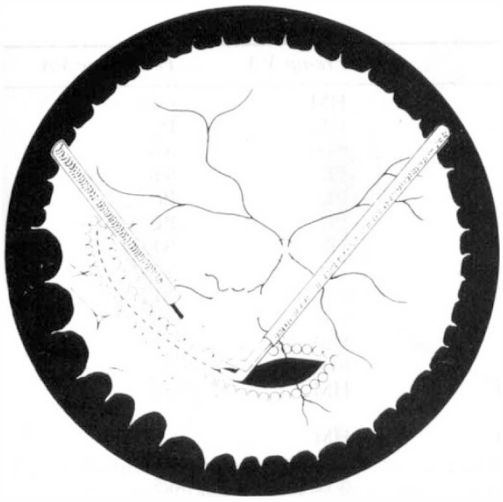

Fig. 1. Both sides of the proposed retinal incision are first treated with endodiathermy. The incision should extend beyond the area of retinal shortening.

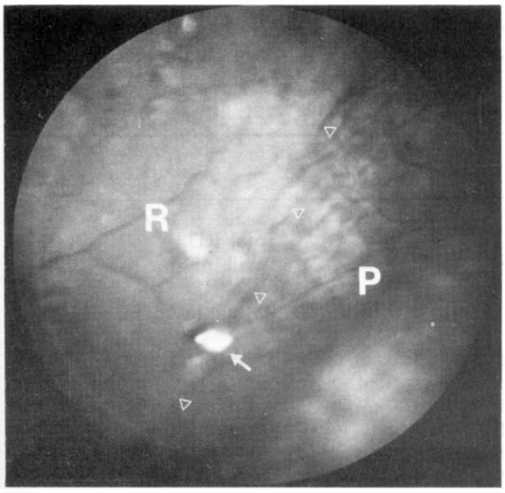

Fig. 2. Attached retina (R) on the left, bare retinal pigment epithelium (P) on the right. The small triangles indicate the cut edge of retina. A retinal tack (arrowed) has been inserted to help position the cut retina.

Most incisions were circumferential in orientation although some had radial extensions or involved areas of retinectomy. The retina was completely attached at the end of surgery in 19 of the 20 eyes. In one eye (patient number 4) the nasal retina rolled up following retinal incision (Fig. 4) but the temporal retina, including the macula, remained attached. Following surgery total retinal detachment occurred in four eyes. In 16 eyes (80 per cent) the macula remained attached. Eleven out of 20 eyes (55 per cent) retained a visual acuity of 2/60 or better. Epimacular membrane proliferation and contraction (macular pucker) contributed to the limited visual improvement in three eyes. In two of these the epimacular membrane was removed surgically together with the silicone oil, with improvement in vision in one case.

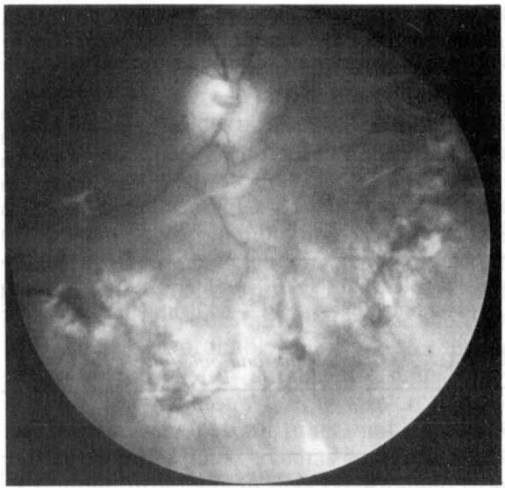

Fig. 3. Argon laser scar along the edge of a retinal incision inferior to the optic disc.

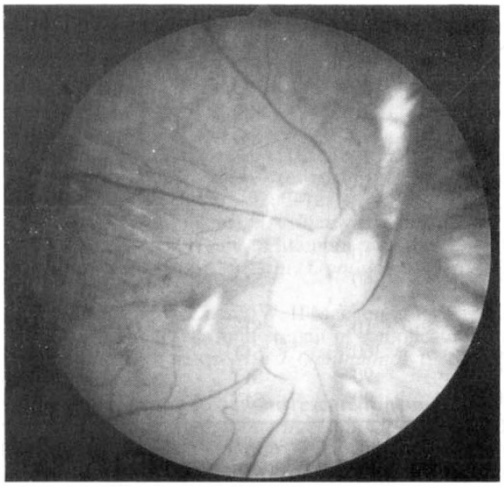

Fig. 4. Patient number 4, right eye. The temporal retina is attached. The nasal retina has rolled up and covers the optic disc. Retinal tacks (Fig. 2) can help to prevent this.

Table I. *Summary of clinical features*

Patient	*Age*	*Pathology*	*Pre-op VA*	*Fellow eye VA*
1	67	PVR	HM	6/12
2	52	PVR	HM	PL
3	54	PVR	6/60	6/6
4	57	PVR	PL	6/6
5	82	PVR	PL	PL
6	26	PVR	PL	PL
7	37	PVR	CF	NPL
8	26	Diabetes mellitus	PL	6/12
9	53	Diabetes mellitus	HM	NPL
10	39	Eales' disease	6/24	6/5
11	43	Eales' disease	HM	CF
12	38	Sarcoid vasculitis	6/60	6/5
13	27	Retinal incarceration (SRF drainage)	HM	6/6
14	40	Retinal incarceration (IOFB removal)	HM	6/5
15	36	Penetrating trauma	6/12	6/5
16	39	Penetrating trauma	CF	6/6
17	7	Penetrating trauma	HM	6/6
18	46	Penetrating trauma	PL	NPL
19	24	Penetrating trauma	6/36	6/5
20	25	Penetrating trauma	HM	6/4

VA—visual acuity, PVR—proliferative vitreoretinopathy, HM—hand movements, PL—light perception, CF—counting fingers, NPL—no light perception, SRF—subretinal fluid, IOFB—intraocular foreign body.

Table II. *Surgical details and outcome*

Patient	*Retinal incision*	*Tamponade*	*Pre-op VA*	*Present VA*	*Follow-up (months)*	
1	180°	SO	HM	6/36	8	
2	70°	SO	HM	PL	36	Total RD
3	30°	SO	6/60	6/36	13	Small inferior RD
4	200°	SO	PL	3/60	7	Nasal RD
5	270°	SO	PL	5/60	7	Retinal tacks, macular hole
6	180°	SO	PL	PL	6	
7	180°	SO	CF	1/60	20	Total shallow RD
8	80°	SO	PL	PL	8	Total RD
9	30°	SO	HM	3/60	39	
10	270°	SO	6/24	HM	14	SO removed, retina attached
11	90°	SO	HM	6/60	29	Macula hole
12	40°	SF_6	6/60	6/12	10	
13	30°+90°	SF_6	HM	2/60	12	Macula ERM, untreated
14	200°	SO	HM	6/24	9	SO removed, macular ERM removed
15	30°	SF_6	6/12	6/12	8	
16	60°	SO	CF	CF	11	SO removed macular ERM removed
17	10°	SF_6	HM	NPL	6	Total RD
18	360°	SO	PL	PL	6	Retinal tacks
19	90°	SO	6/36	6/60	8	
20	90°	SF_6	HM	CF	12	

SO—Silicone oil, RD—retinal detachment, SF_6—sulphur hexafluoride, ERM—epiretinal membrane.

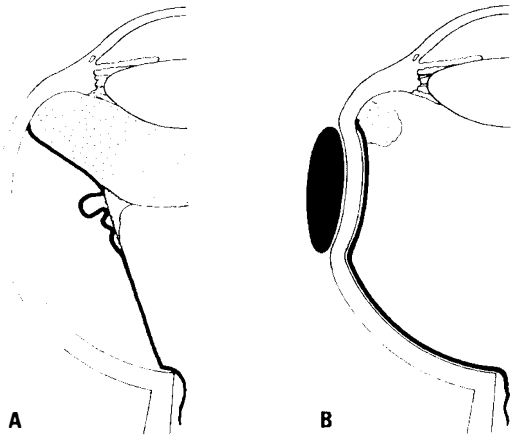

Fig. 5. Proliferative vitreoretinopathy (A) treated by vitrectomy, membrane removal and scleral buckling (B).

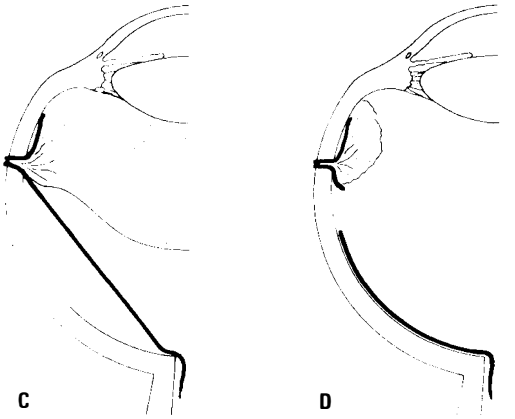

Fig. 6. Vitreoretinal incarceration resulting in gross retinal shortening (C) treated by vitrectomy and retinal relieving incision (D).

Discussion

The role of retinal relieving incisions in retinal re-attachment surgery is still the subject of debate. Machemer suggests that relaxing retinotomies should be considered as a last resort[1] and Charles feels that the need for retinotomy should seldom be determined pre-operatively. In his algorithm for the management of proliferative vitreoretinopathy Charles includes retinal incisions in a sequence of operative procedures performed as necessary in order of ascending risk.[4] Haut, on the other hand, sees a more central role for retinotomy or extensive retinectomy in isolating the posterior retina from the effects of traction transmitted from the vitreous base.[5]

Most cases of retinal detachment with proliferative vitreoretinopathy can be treated without deliberately cutting the retina (Fig. 5). The decision to make a retinal relieving incision for proliferative vitreoretinopathy is usually made intra-operatively when membrane removal and scleral buckling prove inadequate. Where there is significant retinal incarceration, on the other hand (Fig. 6), the need for retinal relieving incisions can often be anticipated pre-operatively on the basis of ophthalmoscopy or B-scan ultrasonography. Retinal shortening from irresectable membranes or incarceration does not, however, necessarily require to be treated in every case. Traction which does not distort the macula and does not prevent closure of a retinal break can often be ignored.

Machemer[1] obtained a visual acuity of 5/200 (1.5/60) or better in only three of 18 eyes with attached retinae following relaxing retinotomies. The visual results in our series, with eleven of 16 eyes retaining a visual acuity of 2/60 or better, probably reflect a difference in case selection for surgery. Visual acuity measurements alone are, however, a poor measure of the overall functional success of surgery. If the fellow eye has good vision, for example, little benefit may be obtained from the operated eye owing to diplopia or sensory confusion. Nevertheless in five of the 20 eyes in our series the final visual acuity was better than that in the fellow eye and the patients obtained considerable benefit.

References

[1] Machemer R, McCuen BW, II de Juan E, Jr: Relaxing retinotomies and retinectomies. *Am J Ophthalmol* 1986, **102:** 7–12.

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[5] Haut J, Larricart JP, Van Effenterre G, Pinon-Pignero FL: Some of the most important properties of silicone oil to explain its action. *Ophthalmologica* 1985, **191:** 150–3.