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Choroidal detachment following retinal detachment surgery: An analysis and a new hypothesis to minimize its occurrence in high-risk cases

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PURPOSE. *To determine factors predisposing to the development of choroidal detachment following conventional retinal detachment surgery, to evaluate its clinical course, and to identify possible measures to reduce its occurrence.*

METHODS. *Analysis of 25 consecutive cases of choroidal detachment following retinal detachment surgery out of a total of 510 cases undertaken at a tertiary care referral eye center over a period of 15 months.*

RESULTS. *The incidence of developing choroidal detachment was 4.9%. The mean age was 61 years (range 28 to 76 years) and there was no sex predilection. Hypertension was present in 16% (n=4). A total of 44% (n=11) of patients had myopia and with respect to the lens status, 44% (n=11) were phakic, 36% (n=9) were pseudophakic, and 20% (n=5) were aphakic. Redetachment of the retina was observed in 12% (n=3) of cases. Elevated intraocular pressure developed in 12% (n=3). In one patient with an anterior chamber intraocular lens and "kissing" choroidal detachment, drainage of the choroidals was undertaken to prevent corneo-lenticular touch and corneal decompensation. In two patients with redetachment, anatomic settlement of the retina was achieved only following vitreoretinal surgery.*

CONCLUSIONS. *The following preoperative and intraoperative factors are associated with a significantly increased risk of choroidal detachment following retinal detachment: higher age, myopia, posteriorly placed explants even if its extent is less, anteriorly placed explants whenever its extent is large, drainage of subretinal fluid, and intraoperative hypotony. Choroidal detachment may also occur in patients with only a radial sponge. Designing a notch intraoperatively in the region of the explants overlying the vortex veins may help to reduce the risk of choroidal detachment following conventional retinal detachment surgery. (Eur J Ophthalmol 2004; 14: 325-9)*

KEY WORDS. *Choroidal detachment, Postoperative, Retinal detachment, Risk factors*

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INTRODUCTION

Choroidal detachment is the most common complication during the first 2 weeks after conventional retinal detachment (RD) surgery. The reported incidence varies from 3.8% to 44% and the exact mechanism of its occurrence in human eyes is uncertain (1, 2). In this study we present the results obtained after having analyzed the preoperative and intraoperative variables in 25 consecutive patients who developed choroidal detachment following RD surgery over a 15-month period and also the subsequent postoperative course.

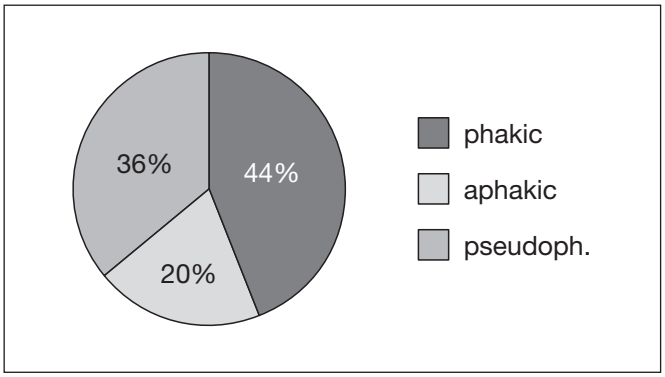

Fig. 1 - *Preoperative status of the lens.*

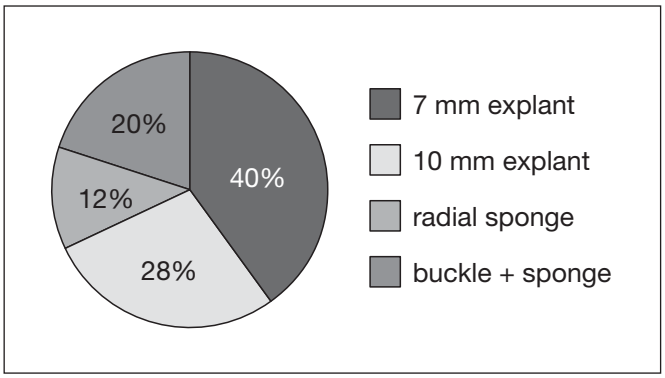

Fig. 2 - *Type of silicone explant used.*

METHODS

After obtaining informed consent, conventional RD surgery was performed in all patients. Surgical steps included localization and cryopexy of the retinal break(s), drainage of subretinal fluid, and buckling. The material used for buckling was either a 7 mm (no. 276) or 10 mm (no. 280) wide asymmetric silicone tyre. Intraocular air was injected through the pars plana when required to counteract hypotony.

A total of 510 cases were operated for RD at our center during the 15-month period. Out of these, 25 cases developed choroidal detachment following the surgery.

RESULTS

There were 14 men and 15 women in the study with age varying from 28 years to 76 years (average 61 years). Four patients were found to be hypertensive and none of the other patients had any systemic illnesses.

In our study the incidence of developing choroidal detachment was 4.9%. Eleven patients were myopic, six of whom had a myopia greater than 3 diopters. Nine patients had undergone intraocular implant surgery (eight posterior chamber intraocular lens [IOL] and one anterior chamber iris claw lens). Five patients were aphakic while the remaining 11 patients were phakic (Fig. 1).

The extent of RD was total in 60% (n=15) and subtotal in 28% (n=7). Of the other three cases, one patient had a temporal detachment and two patients had a superior quadrantic detachment. All patients had normal intraocular pressure before surgery and none of them had a pre-existing clinically identifiable cilio-choroidal detachment.

A 7 mm explant was used in 40% of cases and 10 mm explant in 28%. In 12% of cases (n=3) only a radial sponge having a diameter of 3 to 7 mm was used while in the remaining 20% (n=5), both circumferential buckle and radial sponge had been used (Fig. 2). In addition, all patients received a 2.5 mm wide encircling silicone band.

When the relationship of choroidal detachment with extent of buckle was analyzed, it was found that it covered one quadrant in 20% (n=5), two quadrants in 24% (n=6), three quadrants in 32% (n=8), and all four quadrants in 12% (n=3) (Fig. 3).

In 40% (n=10) of patients air had been injected through the pars plana route during surgery to counter the hypotony following drainage of subretinal fluid. None of the other patients had any other intraoperative complication.

Choroidal detachment at the end of surgery was noted in 12% (n=3) of cases. Postoperatively, choroidal detachment was observed on day 1 in 8% (n=2) and

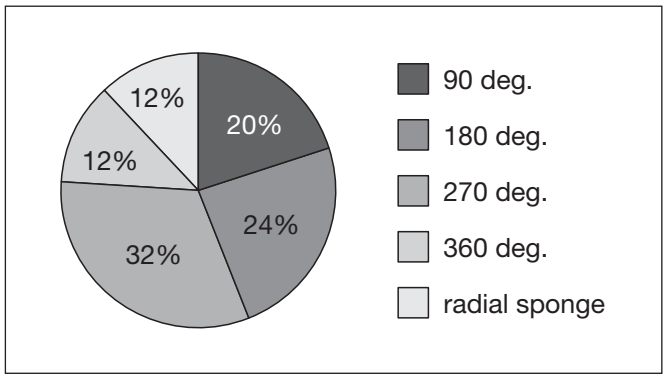

Fig. 3 - *Extent of buckle used at surgery.*

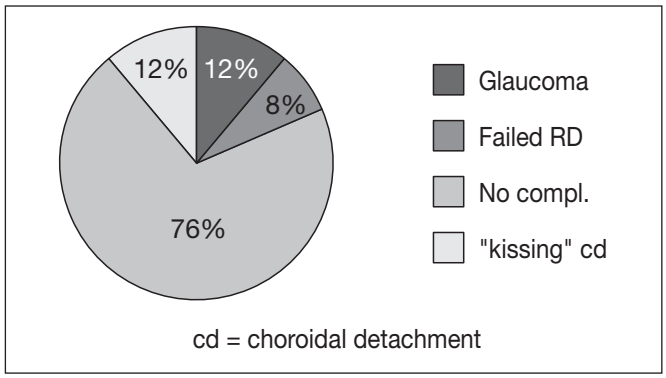

Fig. 4 - *Postoperative course of choroidal detachments.*

between the third and fourth day in 48% (n=12). In the remaining 32% (n=8) of patients it developed between postoperative day 4 and 5.

During follow-up of the above cases, spontaneous resolution of the choroidal detachment was observed in 88% (n=22) within 2 weeks of surgery. In 12% (n=3) of patients “kissing” choroidals evolved by day 7 postoperatively. One of the patients with “kissing choroidals” had an anterior chamber iris-fixated IOL and in this patient surgical drainage of the choroidal detachment was undertaken early to prevent further shallowing of the anterior chamber and IOL touch to the cornea. In the two other patients with this complication, the retina failed to attach and was subsequently subjected to vitreoretinal surgery (Fig. 4).

Significant elevation of the intraocular pressure was seen in 12% (n=3) of patients. Two of these cases responded to a short course of oral acetazolamide and topical timolol drops. In the third case, intraocular pressure became normal only when the encircling element was loosened.

DISCUSSION

The incidence of choroidal detachment following RD is reported to increase with advancing age (2-4). This is likely to be related to aging changes in the integrity of the choroidal vasculature. In our study, the average age prevalence of 61 years shows an increased predilection in the elderly for developing choroidal detachment following RD surgery. Apart from age, the only other preoperative factor found to be a significant risk factor for the occurrence of a choroidal detachment was myopia.

In our study, preoperative status of the lens did not seem to have a bearing on the incidence of choroidal detachment. A total of 44% (n=11) of patients were phakic, 36% (n=9) pseudophakic, and 20% (n=5) were aphakic.

The risk of choroidal detachment has been shown to increase with an increase in the extent of explant used for buckling. When the extent is less than 90°, the reported incidence is 8% and when more than 270° about 50% (2). In this study it was also seen that when only a segmental buckle was used, the risk of choroidal detachment was 10% and this increased to 28% on using an encircling element in addition to the buckle. In our analysis, of all patients who developed choroidal detachment following RD surgery, 44% had a buckle extending more than or equal to 270° while in 24% of cases the extent was about 180°. In patients who had received a segmental buckle and encircling element, choroidal detachment occurred in 20%. These results are comparable to those reported in the above study. In our study, 12% of patients who developed a choroidal detachment had only a radial sponge along with an encircling element. This association of choroidal detachment in patients with a radial sponge has not been reported earlier in literature to our knowledge. Our observations also revealed that choroidal detachment when a segmental buckle has been used occurs only when the buckle is also placed posteriorly (beyond the equator).

There is a definite but ill-defined relationship between the occurrence of choroidal detachment and venous outflow from the choroid. In one reported study, it was seen that even with no vortex vein damage or obstruction, 22% of patients developed a choroidal detachment. The incidence increased to 27% and 73% when one and two vortex veins respectively were compromised. The increase in incidence of choroidal detachment when-

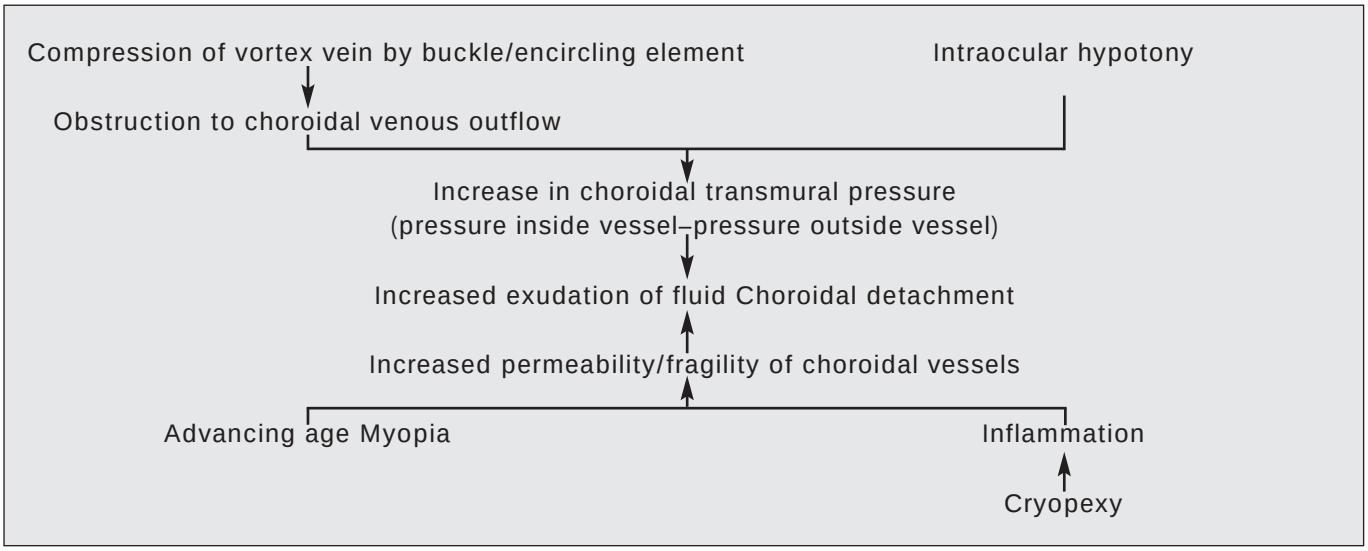

Fig. 5 - *Probable pathomechanism in the development of choroidal detachment following retinal detachment surgery.*

TABLE I - PRESSURE DYNAMICS IN THE DEVELOPMENT OF CHOROIDAL DETACHMENT FOLLOWING RETINAL DETACHMENT SURGERY

Venous pressure	Situation A	Situation B	Situation C
Extrascleral	7.0	10.0	13.0
Intrascleral	8.0	11.0	14.0
Uveal	15.5	15.5	18.0

Values are mmHg.
Situation A (normal eye) = Uveal venous pressure practically equal to intraocular pressure (IOP) (15 mmHg);
Situation B = Small change in extrascleral vortex vein pressure does not increase uveal venous pressure unless there is a decrease in IOP;
Situation C = Large rise in pressure in extrascleral/intrascleral part of vortex vein (e.g., compression by buckle in detachment surgery) increases uveal venous pressure and increases risk of choroidal detachment

ever there is an increase in the extent of buckle and when an encircling element is used is probably related to a concurrent increase in the risk of vortex vein damage or obstruction.

There is a reported incidence of 5% to 7% for the development of choroidal detachment even in patients in whom no drainage of the subretinal fluid has been undertaken (2, 3, 5). In our study, however, all patients had undergone drainage of the subretinal fluid. Injection of air into the vitreous cavity had been carried out following drainage of the subretinal fluid in 40% of patients. We have not seen choroidal detachment in cases of non-drainage surgery. This may be because we generally perform non-drainage surgery only in cases where only a small and anterior buckle placement is required.

No correlation was evident with regard to the amount of cryopexy, presence of lattice degeneration, severity of postoperative inflammation, and the use of periocular steroids.

In the majority of our patients, the postoperative course and duration of choroidal detachment was similar to that described in literature (2-4). There were, however, two important observations. First, 12% (n=3) of patients in whom a choroidal detachment occurred developed an anatomic failure and in two of these patients there was rapid evolution of proliferative vitreoretinopathy. Second, large choroidal detachment that develops in patients with an anterior chamber IOL has to be drained early to prevent corneo-lenticular touch and endothelial decompensation.

Choroidal detachment has been produced experimentally

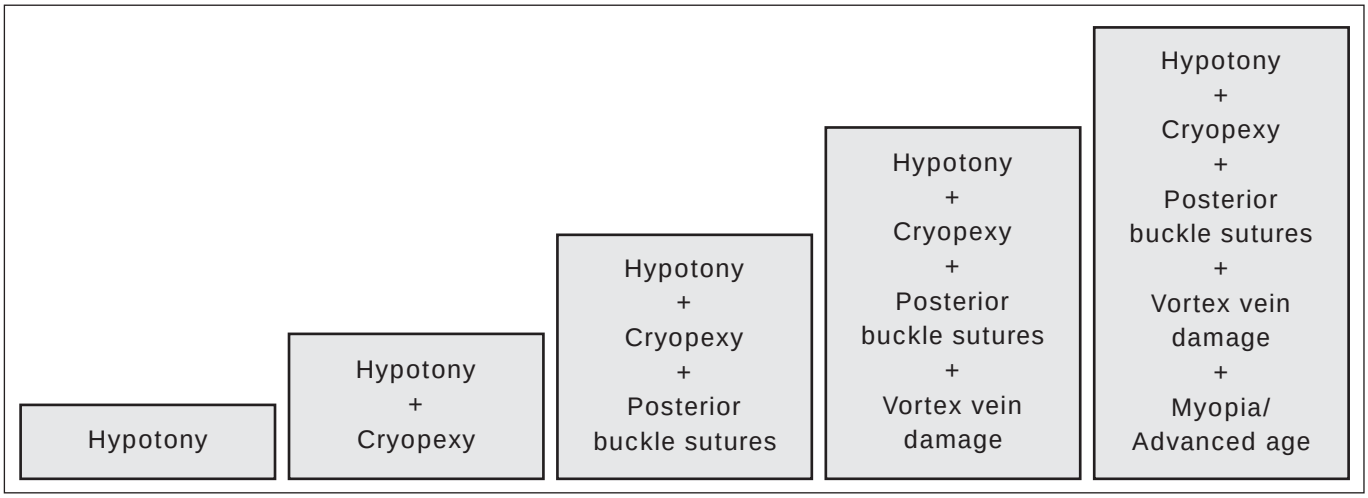

Fig. 6 - *Risk factors in the development of choroidal detachment following retinal detachment surgery.*

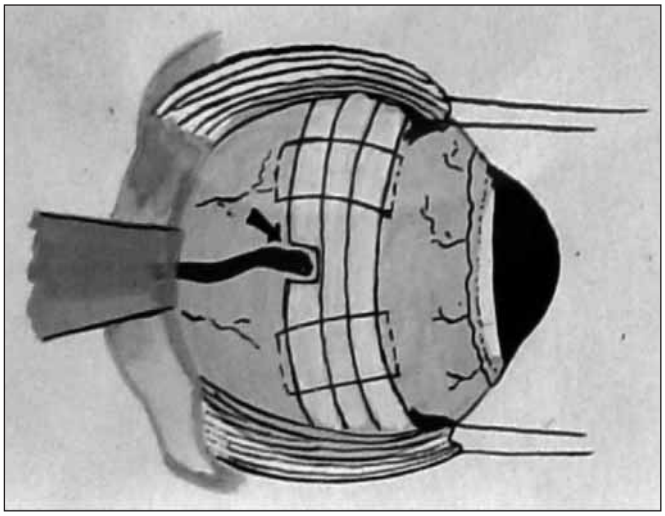

Fig. 7 - *Notch created in the buckle segment (black arrow) overlying the vortex vein to decrease the risk of compression.*

by inducing hypotony, intraocular inflammation, vortex vein compression, and injection of substances into the suprachoroidal space. However, the exact mechanism of its occurrence in human eyes is uncertain and as shown by our analysis it is possible that the interaction of several factors is involved. The probable interaction of the various factors and the pressure dynamics contributing to the development of choroidal detachment following RD surgery is shown in Figure 5 and Table I. As the number of contributory factors increases, there seems to be a corresponding increase in the risk of developing choroidal detachment after retinal detachment surgery (Fig. 6).

Of all the factors, compression of the vortex vein appears to be the most significant. We propose that redesigning of the buckle intraoperatively by creating a notch (Fig. 7) in the region overlying the vortex vein may help in reducing the relative risk of developing choroidal detachment following RD surgery.

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