CLINICAL STUDY

Pars plana vitrectomy with silicone oil in the management of combined rhegmatogenous retinal and choroidal detachment

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Abstract

Purpose **Rhegmatogenous retinal detachment combined with spontaneous pre-operative choroidal detachment (RDCD) represents a rare but specific entity, which has in the past been associated with a poor prognosis. This study was designed to determine the efficacy of pars plana vitrectomy with silicone oil injection in the management of this very difficult vitreoretinal problem.**

Methods **A retrospective analysis was carried out of 13 eyes of 13 consecutive patients who underwent vitrectomy and silicone oil exchange.**

Results **In a total of 10 eyes (77%) the first procedure produced anatomical success. Two eyes required a further procedure to achieve retinal reattachment, producing a final anatomical success rate of 92%.**

Conclusion **Pars plana vitrectomy with silicone oil exchange is an effective technique for managing RDCD.**

Key words Choroidal detachment, Pars plana vitrectomy, Rhegmatogenous retinal detachment, Silicone oil

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Patients with rhegmatogenous retinal detachment are occasionally found to have concurrent choroidal detachment (CD). These patients often present in an atypical way with pronounced uveitis, posterior synechiae, hypotony, deepened anterior chamber and pain. Patients with blue irides often have an apparent change in iris appearance, the affected eye taking a greenish tinge due to a highly proteinaceous aqueous. Retinal detachment may not be diagnosed if the view of the posterior segment is poor. From the point of view of surgical intervention, the presence of spontaneous CD is an important finding. Cases have in the past been associated with a poor prognosis when treated by 'conventional' (i.e. non-vitrectomy) surgical techniques, due to factors such as poor visualisation, difficult application of retinopexy and proliferative vitreoretinopathy (PVR).[1–3] More recently, however, better results have been achieved using pars plana vitrectomy techniques.[4,5] This study was designed to assess the use of pars plana vitrectomy with silicone oil exchange in the management of this problematic condition.

Materials and methods

A retrospective review was carried out of the case notes of 13 consecutive patients who presented to one surgeon (G.R.K.) with rhegmatogenous retinal detachment combined with CD (RDCD), all of whom were treated with PPV and silicone oil. Patients presented between March 1993 and August 1999.

The diagnosis of RDCD was based on clinical examination, supplemented by ultrasonography in cases where CD was suspected, but not definitively visualised, on ophthalmoscopy. Patients with RDCD presenting with a history in the affected eye of previous retinal detachment surgery, intraocular surgery (apart from cataract extraction) or trauma would have been excluded (in fact there were none). Two patients had grade B PVR at presentation. In 2 patients the RD did not involve the macula. Twelve patients had at least one flap tear. Most patients had several breaks (up to 10 in a single patient) including at least one flap tear. In 1 patient only one atrophic hole was identified (it is unknown whether the vitreous was detached pre-operatively in this case). No patient had a giant retinal tear or retinal dialysis. In 4 patients CDs were present in all four quadrants and in the remainder in between one and three quadrants.

All patients were operated on by or under the care of one vitreoretinal surgeon (G.R.K.). The following basic operative technique was employed in all patients (Fig. 1). A routine

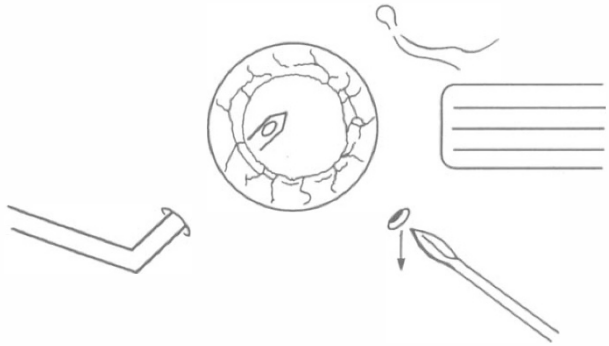

Fig. 1. *Diagram showing a bent 'butterfly' needle, attached to an infusion bag, placed in the upper-left scleral port whilst suprachoroidal fluid exits from that on the upper-right. The ports are of standard design, 4 mm behind the corneoscleral limbus. There is a pre-placed suture for a standard infusion cannula.*

sclerotomy was made 4 mm posterior to the limbus, in either the upper temporal or upper nasal quadrant depending on whether the right or left eye was being operated on. The infusion fluid was attached to a 23 gauge 'butterfly' cannula needle which was then introduced into the centre of the vitreous cavity via this sclerotomy. After checking that the infusion needle was in the vitreous cavity, infusion was commenced, and a routine sclerotomy was then made in the opposite superior quadrant, again 4 mm from the limbus, taking care to extend no further than the suprachoroidal space. The positive pressure within the vitreous cavity permitted easy and complete drainage, via the second incision, of the straw-coloured effusion fluid (the ciliary body is always detached in this condition) (Fig. 2). This manoeuvre resulted in rapid flattening of the choroidal detachments in every case. A 4 mm infusion cannula was then inserted via a routine inferotemporal sclerotomy, and checked for penetration of the pars plana epithelium. The sclerotomy through which the choroidal fluid had drained was then re-entered with the micro-vitreoretinal blade, to penetrate the pars plana epithelium. Standard PPV was then performed using the same upper sclerotomies. Retinal breaks were identified, and marked with endo-diathermy if small. Fluid–air exchange was performed and subretinal fluid drained internally, using a retinotomy if necessary. Retinopexy was then applied, with either trans-scleral cryotherapy, or laser (via an endoprobe or indirect ophthalmoscope). Silicone oil (1300 or 5700 centistokes) was injected to provide internal tamponade. (Later in the study 5700 centistokes oil was used, in keeping with departmental preference.) Nine patients also underwent encirclement with a silicone band.

Post-operatively, all patients were treated with betamethasone/neomycin drops q.i.d., and atropine 1% drops b.d. Three patients received systemic corticosteroid therapy pre-operatively, although 1 patient was treated solely with a single dose of intramuscular methylprednisolone for an erroneous diagnosis of uveitis with secondary exudative retinal detachment. A fourth was on long-term low-dose prednisolone for asthma.

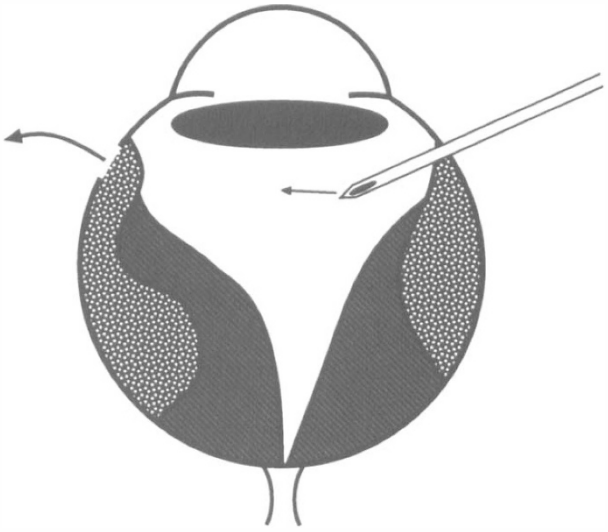

Fig. 2. *Diagram to further illustrate the drainage of suprachoroidal fluid, aided by positive pressure exerted by the infusion in the vitreous cavity.*

Results

Of the 13 patients, 4 were female and 9 male. Age at presentation ranged from 23 to 83 years (mean 59.5 years). Six patients were myopic (range –2 to –22 dioptres). Seven patients were phakic in the affected eye at presentation, 1 was aphakic and 5 were pseudophakic. One patient underwent planned extracapsular cataract extraction (without insertion of an intraocular lens) due to dense pre-existing lens opacity, as part of the primary procedure. A further patient required lensectomy at the primary procedure due to iatrogenic lens opacification ('lens touch'). There were no other intraoperative complications.

The duration of follow-up ranged from 9 to 164 weeks (mean 44 weeks), excluding 1 patient who underwent evisceration (see below). In the other 12 (92%) the retina was attached at last follow-up. Ten patients (77%) had required just one reattachment procedure, and in 8 of these the silicone oil had been removed at between 13 and 22 weeks. Two patients, however, had undergone a second operation. In one, removal of silicone oil at 9 weeks resulted in redetachment, necessitating a further procedure involving re-injection of oil. The other developed inferior recurrent RD due to PVR requiring oil top-up and membrane peel. Neither of these patients underwent subsequent removal of silicone oil; in both the retina remained attached. Oil was left *in situ* in a further 2 as the risk of redetachment was thought to be too high. Patient 9 developed redetachment due to PVR despite the presence of oil. This was felt to be inoperable and the patient went on to develop rubeotic glaucoma. The eye was eviscerated for intractable pain 2½ years post-operatively.

Pre-operative visual acuity was generally very poor, with only 2 patients achieving a pre-operative visual acuity of better than count fingers. At last follow-up 4 patients achieved best-corrected visual acuity of 6/24 or better, and 3 saw 6/60. In a further 5 the visual acuity ranged from 3/60 to hand movements. The last patient

had undergone evisceration. Macular pathology, including epiretinal membranes and a full-thickness hole, accounted for much of the visual handicap, although patient 2 had marked central cornea oedema. It should be noted that 3 patients were awaiting cataract surgery at last follow-up. Their visual acuities at that follow-up examination were 3/60, 6/24 and 6/24 respectively.

Discussion

The incidence of spontaneous CD in patients with rhegmatogenous RD has been estimated to be between 2% and 4.5%.[1,2] Cases are characterised by hypotony, uveitis, excessively deep anterior chamber, greenish iris hue and CDs in one to four quadrants.[1–3] Differential diagnosis includes CD following cataract or glaucoma surgery, scleritis, uveal effusion syndrome and malignant melanoma.[1] It is generally accepted that the choroidal effusion occurs secondary to the RD, but the precise aetiology is unclear. Jarrett[3] suggested that ocular inflammation secondary to detachment of the retina was the first stage, with hypotony occurring secondarily. Most authors, however, agree that hypotony induced by the RD is likely to be the initial step.[2,4,5] Hypotony is quite commonly seen in cases of RD, and may be due to diminished aqueous production as a result of ciliary body oedema, or possibly to increased outflow via the retinal pigment epithelium. The fall in intraocular pressure could lead to vasodilatation in the choroid, breakdown of the blood–ocular barrier and transudation of fluid into the extravascular space. Resulting choroidal and ciliary body detachment would lead to a further reduction in aqueous production, and thus a vicious cycle is produced.

When RDCD has been treated by 'conventional' (non-vitrectomy) procedures, reattachment rates of 35% to 62% have been reported, usually with very poor visual outcomes.[1–3] Poor success has been attributed to factors such as delay in surgery (waiting for CD, uveitis and hypotony to improve), poor visualisation, difficult application of retinopexy and PVR.[1–3]

Pars plana vitrectomy confers a number of benefits over conventional surgery. The ability to control per-operative intraocular pressure facilitates the drainage of suprachoroidal fluid via the sclerotomies, early in the procedure. This enhances both visualisation and treatment of retinal breaks, and also obviates the need to wait for steroid-induced resolution of CDs, with the attendant increased risk of pre-operative PVR. We argue that these factors enhance the probability of success of the primary procedure. We use silicone oil to ensure prolonged post-operative tamponade, because of the high potential failure rate. Other authors have recently advocated the routine use of pars plana vitrectomy in cases of RDCD. Yang[4] described a series of ten patients (9 of whom were pseudophakic) in whom pars plana vitrectomy, encirclement and tamponade with C_3F_8 gas was performed, using a 6 mm infusion cannula. CDs were drained per-operatively 'around the vitrectomy instruments'. Most patients received pre- and post-operative systemic steroid. In 9 of 10 patients the retina was reattached with one procedure; the other patient required a further procedure with silicone oil; the ultimate reattachment rate was 100%. Visual acuities were very limited, however, only 1 patient achieving an acuity of better than 20/200. Sharma *et al*.[5] reported on 21 cases. All patients were treated with pars plana vitrectomy, encirclement with or without additional buckling, and gas tamponade with SF_6 or C_3F_8. Pre-operative systemic steroids were also routinely used. In 17 of 21 patients (81%) retinal reattachment was attained with one procedure; in a further 2 patients anatomical success was achieved with a second procedure, giving a final reattachment rate of 90%. Visual outcomes were relatively good, with 8 patients achieving 20/80 or better.

Possible disadvantages of pars plana vitrectomy for this condition include the possibility of sub-retinal or sub-choroidal placement of instruments or infusion cannulae, although our technique was specifically designed to avoid such complications, and possible lens trauma from the use of a long sharp infusion cannula at the start of surgery. We encountered no such problems (although 1 patient suffered from lens trauma caused by the vitreous cutter). All other complications of pars plana vitrectomy also appertain, such as post-operative cataract. Three of our patients were awaiting cataract surgery at last follow-up.

We feel that vitrectomy is superior to conventional surgery in this group of patients, achieving higher reattachment rates compared with the published series mentioned above,[1–3] supporting the studies of Yang[4] and Sharma *et al*.[5] Our results indicate that silicone is an effective form of tamponade in eyes with RDCD. We utilised silicone oil in all our patients (and encirclement in all but 4) because of anticipated PVR. The studies of Yang and Sharma *et al*., detailing the use of gas tamponade together with encirclement, would suggest that the use of oil, with its attendant need for removal and/or development of intraocular complications, may not be necessary. However, our clinical impression is that this group of patients, especially those with myopic eyes with severe uveitis, are at considerable risk of surgical failure. Two of our myopic patients required further surgery for RD due to PVR, and in one of these redetachment occurred despite the presence of oil. A third had inferior retinal elevation due to a sub-retinal band. We therefore suggest that the use of silicone oil tamponade should be considered in cases of RDCD, especially in myopic inflamed eyes.

Although it would be hard to perform considering the low incidence and variable nature of this condition, a randomised controlled trial would be required to establish which of silicone oil, SF_5 or C_3F_8 is the best agent for tamponade.

The authors acknowledge that the method of suprachoroidal fluid drainage described in this article was first observed by G.R.K. when it was performed by Mr Zdenek Gregor of Moorfields Eye Hospital, London, UK.

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