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Secondary management and outcome of massive suprachoroidal hemorrhage

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PURPOSE. *To present the results of secondary surgical treatment of five patients with massive suprachoroidal hemorrhage (MSCH), which occurred intraoperatively, postoperatively, or following ocular trauma.*

METHODS. *Five patients presenting with MSCH were included in this study during or after phacoemulsification surgery (1 patient), glaucoma surgery (1 patient), combined glaucoma and phacoemulsification surgery (2 patients), and after traumatic sclera rupture (1 patient). Diagnosis was confirmed by ophthalmoscopy and B-scan ultrasonography. Pre-existing risk factors and distance visual acuity were documented. All cases received medical therapy and underwent secondary surgical intervention with radial sclerotomies combined with vitrectomy, use of perfluorocarbon, and silicone oil. Postoperative assessment included visual acuity measurement, ocular examination, and ultrasonography.*

RESULTS. *In all cases, anatomic restoration of ocular structures was achieved. Distance visual acuity improved in all cases (preoperative Snellen visual acuity ranged from light perception to hand motions; postoperative Snellen visual acuity ranged from 0.05 to 0.3).The mean follow-up period was 17 months.*

CONCLUSIONS. *In general, despite the advanced surgical techniques, the prognosis of MSCH remains guarded and the visual outcome poor. However, secondary surgical treatment with combined radial sclerotomies and vitrectomy should be considered in order to minimize the damaging effect and maximize the anatomic and functional restoration. (Eur J Ophthalmol 2006; 16: 835-40)*

KEY WORDS. *Choroidal detachment, Kissing suprachoroidal hemorrhage, Massive suprachoroidal hemorrhage*

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INTRODUCTION

Suprachoroidal hemorrhage (SCH) is a rare event but it can cause devastating loss of vision. It can occur spontaneously, intraoperatively, following trauma, or as a late sequel to surgery (1-4). The potential space between sclera and choroid, the suprachoroidal space, is rather virtual, and normally contains approximately 10 mL of fluid. A SCH is defined as blood within this space and it can be categorized with respect to size, extent of hemorrhage, relationship to intraocular surgery, or precipitating event (1). When a SCH is massive and causes extrusion of the intraocular components forcing the inner retinal surfaces into direct apposition, usually at the centre of the posterior chamber, it is defined as massive SCH (MSCH) with central retinal apposition or kissing SCH (1, 5) as it has a unique configuration with B-scan ultrasonography.

Multiple risk factors have been reported to be responsible for SCH, including ocular factors (high axial length, aphakia or pseudophakia, history of glaucoma or uveitis, recent intraocular surgery, SCH in the fellow eye), systemic factors (advanced age, arteriosclerotic cardiovascu-

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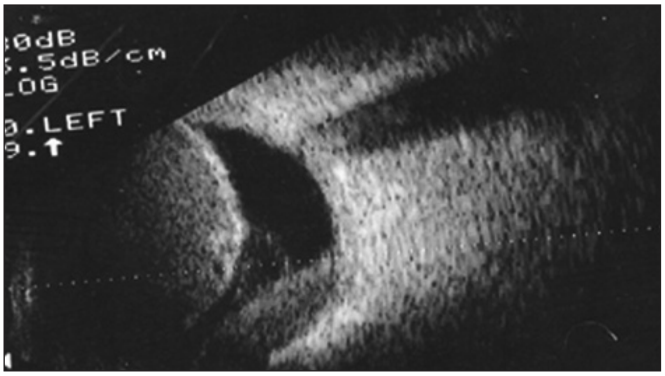

Fig. 1 - *B-scan ultrasonography reveals massive suprachoroidal hemorrhage with central retinal apposition. The macula is spared.*

Fig. 2 - *B-scan echogram of a patient with massive suprachoroidal hemorrhage. Note the typical "kissing" configuration of the detached choroid. The suprachoroidal space is filled with opacities denoting the presence of blood.*

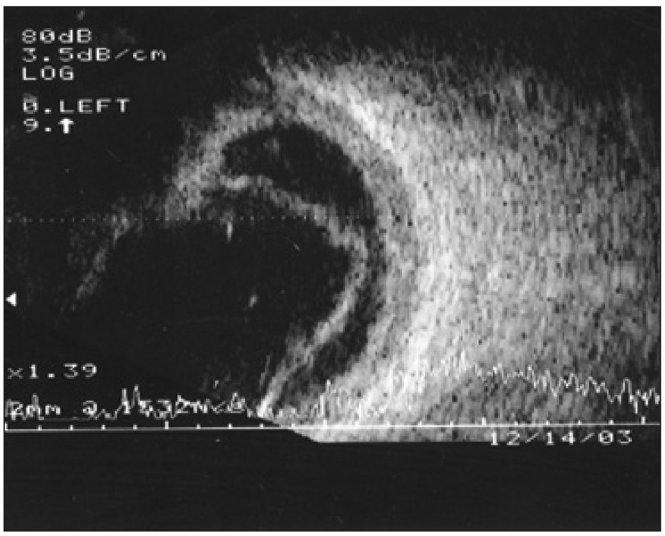

Fig. 3 - *B-scan ultrasonography of Patient 5 a week after drainage with radial sclerotomies. Note that the hemorrhage has been cleared from the suprachoroidal space but the retina is detached.*

lar disease, diabetes), and perioperative (retrobulbar anesthesia without epinephrine, acute drop in intraocular pressure (IOP), vitreous loss, systemic hypertension) or intraoperative conditions (ocular hypotony, Valsalva maneuvers) (1). However, it is uncertain which risk factors are significant according to most studies (6-9). Moreover, there is only limited information regarding the risk factors for kissing SCH. Recently, Moshfeghi et al (10) reported that the main risk factors for kissing SCH include previous vitrectomy and older age.

Most patients have poor final visual acuities after SCH. Secondary surgical intervention, although controversial, should be considered in cases with retinal detachment, central retinal apposition, retinal or vitreous incarceration in the wound, persistent flat anterior chamber, uncontrolled elevated IOP, inability to reposit intraocular contents, or extreme pain (2, 11, 12).

However, most of these factors (a 360∞ SCH, the presence of retinal detachment at presentation, and vitreous incarceration in the wound) are associated with a poor visual outcome (11, 13).

Most of the previous studies mainly evaluated the risk factors for SCH and only a limited number of them reported on its surgical management as described previously. Our study presents the secondary surgical management of kissing SCH and the results, both anatomic and functional, in five cases.

METHODS

This is a retrospective study of five patients (five eyes) who were referred with massive SCH to our department between February 2003 and March 2004 and underwent secondary surgical management.

Medical records were reviewed. Demographic characteristics of the cases (sex and age), the presence of risk factors for SCH (surgical or not), the time after surgery or trauma, and any given initial conservative therapy were recorded. Information regarding clinical evaluation preoperatively (before secondary surgical intervention) included measurement of distance visual acuity, clinical features from ocular examination, and B-scan ultrasound. The secondary surgical procedure followed was recorded in all cases.

Postoperative assessment included recording of distance visual acuity, evaluation of anatomic status, and documentation of possible complications.

RESULTS

All included patients were men, with age range 47 to 82 years, who were referred to our department from other hospitals. The SCH was noted intraoperatively or within 48 hours after surgery or sutured traumatic scleral rupture. Specifically, in three cases the MSCH occurred intraoperatively and in the remaining two cases within 48 hours after surgery. They all had at least two known risk factors in their preoperative ophthalmic history and they all were referred to our department within 72 hours from the onset of MSCH. The patients' demographics and clinical features are presented in Table I. They all received medical treatment with steroids and local installation of atropine and dexamethasone drops at the time of referral.

Preoperative distance Snellen visual acuity ranged from hand movements to light perception. Clinical examination revealed anterior segment pathology (corneal edema with anterior chamber reaction). Evaluation of the posterior pole showed that only in one case (Patient 1) the hemorrhage spared the macula (Fig. 1). The rest of the patients had a SCH with macula involvement (Fig. 2). B-scan evaluation in all cases revealed a massive SCH with the characteristic kissing configuration of the inner retinal surfaces mainly in the center of the posterior chamber.

Secondary surgical intervention was performed under general anesthesia within 8 to 12 days after the onset of the MSCH (mean 10.4 days) and the surgical procedure followed was similar to all patients. Initially, isolation and suturing of recti muscles and insertion of BSS infusion canula in the anterior chamber to maintain a stable IOP (range 15–25 mmHg) was performed. Subsequently, three to four radial full-thickness sclerotomies (depending on the number of involved quadrants) of 6 to 8 mm behind the limbus were performed at the quadrants of the highest retinal detachment. Then, a pars plana long infusion canula (7 mm) was placed inferotemporally (3.5 mm from the limbus). Two more sclerotomies were opened and a three-port pars plana vitrectomy (PPV) was performed. All vitreous was removed and perfluorocarbon liquid (PFCL, D.O.R.C. International) was instilled. Tamponade was achieved with silicone oil. Finally, the infusion was removed and the pars plana sclerotomies were closed with 7x 0 Vicryl sutures. All radial sclerotomies were kept open. The drainage was completed in all cases.

As mentioned in Table I, Patient 4 had a history of retinal detachment repair surgery with scleral buckle. Because of the increased possibility for redetachment it was decided to maintain the buckle. In the rest of the cases a 360∞ prophylactic argon laser photocoagulation was performed during PPV.

Some modifications in the surgical procedure were only mandatory in Patient 5. As can be seen in Figure 3, the B-scan suggests combined retinal and choroidal detachment. Thus, this case was the only one in which four posterior sclerotomies were performed 8 days after the onset of MSCH, followed 1 week later by a PPV procedure. During pars plana vitrectomy vitreoretinal incarceration occurred. Then, a 90∞ retinotomy was performed, in order to relieve any retinal traction. Despite the complete drainage of subretinal fluid and the retinal flattening, the patient developed a retinal detachment 3 months later due to proliferative vitreoretinopathy (PVR) (Fig. 3). Reoperation was performed and finally anatomic restoration was achieved.

During the postoperative follow-up period, silicone oil was not removed from any of the patients. The mean postoperative follow-up was 17 months (range from 16 to 20 months).

No phthisis bulbi occurred and no hypotony was observed in any of the cases during the follow-up period. A list of complications is included in Table I. More specifically, Patient 1 had increased IOP postoperatively, which was finally controlled with cryotherapy and topical treatment (betaxolol 0.5% and brimonidine 0.2%). Patient 4 had also increased IOP and developed hemorrhage in the anterior chamber, which was managed with topical steroid (prednisolone 0.25%) and brimonidine (0.2%) drops. Patient 2 developed retinal detachment 2 months after the first surgery and required further surgery, where a combined PPV with the use of a scleral buckle was performed and anatomic restoration was finally achieved.

Postoperative distance Snellen visual acuity was 0.05 in three eyes, 0.1 in one eye, and 0.3 in one eye. The latter case with the best visual rehabilitation was the one that had no macula involvement (Tab. I). Anatomic restoration of ocular features was achieved in all cases as judged by ophthalmoscopy and recorded by color photographs.

DISCUSSION

We reviewed the management and final outcome of five consecutive cases with MSCH treated with secondary surgical intervention.

All patients had a history of known risk factors associated with the development of SCH (systemic, ocular, or a combination of the two) such as hypertension, diabetes mellitus, myopia, aphakia, or glaucoma (Tab. I) (1, 5, 8). It is well reported that in such cases all prophylactic measures should be taken to control all these conditions, where possible, before planning surgery to lower the chance of MSH or even minimize its extent when it occurs (1).

Intraoperatively, MSCH forces intraocular tissues to extrude through the surgical incision. Every globe penetration, surgical or not, causes a severe and sudden reduction in the IOP. This hypotony induces a limited suprachoroidal effusion in almost every case. Rarely a massive effusion can be complicated with an artery rupture (mainly the posterior ciliary arteries which are more vulnerable) resulting in a severe hemorrhage in the suprachoroidal space (1). At that time the most important management is the closure of the wounds in order to avoid expulsion of the intraocular contents or their entrapment into the wound which could lead to severe complications such as retinal detachment (rhegmatogenous or tractional) and/or vitreous hemorrhage. In these cases secondary surgical intervention should be considered.

There is some debate in the literature whether MSCH is an absolute indication for surgical intervention. Some authors suggested that retinal areas in apposition can become fixed (14) and therefore early surgical intervention is indicated (11), while others found no evidence of retinal adherence even if it lasted for 25 days (5). Scott et al found no difference in final visual acuity between patients who underwent secondary surgical intervention versus

TABLE I - PATIENTS' DEMOGRAPHICS AND CLINICAL FEATURES

Patient no.	Age, yr/ sex	Risk factors	Onset of MSCH	Extent of MSCH* and associated features	Secondary surgery†	Pre-op VA	Surgical procedure	Complications	Post-op VA
1	82/M	HBP aphakia	48 h after scleral rupture	III Vitreous loss	12 d	HM	3 posterior sclerotomies + vitrectomy+ PFCL + 360 degrees laser + silicone oil	Increased IOP use of anti-glaucoma drops	0.3
2	64/M	DM glaucoma	During combined phaco and trabeculectomy	IV	8 d	HM	4 posterior sclerotomies + vitrectomy+ PFCL + 360 degrees laser + silicone oil	Retina detachment/ new surgery for anatomic restoration	0.1
3	73/M	HBP DM glaucoma	During combined phaco and trabeculectomy	IV	12 d	LP	4 posterior sclerotomies + vitrectomy+ PFCL + 360 degrees laser + silicone oil	None	0.05
4	52/M	24 h after phacoSB	DM	IV Vitreous loss and hemorrhage	2 d 1	LP	4 posterior sclerotomies + vitrectomy+ IOL removal + PFCL + silicone oil	IOP elevation hemorrhage in AC/AC lavage	0.1
5	47/M	Aphakia Glaucoma High myopia	During trabeculectomy	IV Retinal detachment	8 d	LP	4 posterior sclerotomies vitrectomy + retinotomy + use of PFCL + silicone oil	(7 days later)	0.05

*The extent of MSCH referred to detached quadrants; †The time of secondary surgery referred from the onset of MSCH
MSCH = Massive suprachoroidal hemorrhage; VA = Visual acuity; HBP = High blood pressure; HM = Hand motions; PFCL = Perfluorocarbon liquids; LP = Light perception; IOL = Intraocular lens; AC = Anterior chamber; IOP = Intraocular pressure; DM = Diabetes mellitus; SB = Scleral buckle

observation. At the same study worse visual acuity was observed in all cases in which the appositional configuration lasted more than 14 days. Whereas limited SCH has a relatively good prognosis and may spontaneously be absorbed, MSCH (extended behind the equator and occupying more than two quadrants) is usually accompanied by additional pathology such as vitreoretinal traction, retinal detachment, and/or dislocated lens fragment and often requires secondary surgical intervention. These eyes have increased possibility to become phthisical (4, 15).

We believe that in cases with kissing MSCH secondary surgical management not only can prevent dramatic ocular complications such as phthisis bulbi but at the same time offers the most promising treatment for some visual recovery.

The benefit of performing surgical drainage acutely at the time the MSCH occurs is rather debatable (1, 16, 17). We advise against it because of the possibility for recommencing a new hemorrhage, which is in accordance with previous reports (1, 16). We tend to perform secondary surgical management only after clot lysis (usually 8 to 14 days after the onset of MSCH). During this time, treatment with topical and oral steroids can be used to control the inflammation. At the same time the features of MSCH should be observed by ultrasonography, which permits the detection of liquefaction of the blood clots and help us in making decisions about the proper time for secondary intervention.

The combined PPV with radial sclerotomies becomes a popular secondary surgical management in cases with MSCH, especially when complicated with retinal detachment, vitreous traction, vitreous hemorrhage, and/or dislocated lens fragment (1). Several modifications have been suggested regarding the surgical procedure. Drainage sclerotomies are usually performed just after anterior chamber infusion placement. Some authors (18) prefer to perform sclerotomies more anteriorly (4 mm from the limbus) and some others more posteriorly, between the pars plana and the equator (19). In our study, we performed the sclerotomies 6 to 8 mm posterior to the limbus as we believe that a more anterior location of the sclerotomies is not so useful in cases with MSCH, particularly when a PPV procedure is indicated. We observed drainage from the pars plana sclerotomies in all cases, not only after incisions made but also during the PPV procedure. Whereas some surgeons prefer to suture the sclerotomies (19) we left them all open, thus the drainage continues. In Case 5, because of the presence of retinal detachment according to B-scan results, we initially performed only drainage sclerotomies, followed 7 days later by a three-port PPV procedure.

In our cases the complete removal of vitreous was mandatory and relief of the anterior vitreous traction was performed very carefully to avoid vitreous incarceration. In cases where not only the vitreous but also the retina is incarcerated, the surgeon must consider the possibility of further management (use of relaxing retinotomy) as in Case 5. While perfluorocarbon (PFCL) was instilled in the vitreous cavity, more blood drained from the radial sclerotomies as it sank to the posterior pole of the eye and forced all other fluids anteriorly (such as blood within the suprachoroidal space). Therefore, we always use PFCL to flatten the retina and choroid as other authors have suggested (18). Then, gradually, both the retina and the choroid flattened and silicone oil was instilled. Tamponade with silicone oil was used in all cases. We prefer silicone oil in order to achieve immediately good visualization during vitrectomy procedure. Furthermore, silicone oil provides not only a sufficient tamponade but at the same time has anti-inflammatory action (even protecting against PVR). Maintenance of normal IOP is another advantage of silicone oil use as several studies (4, 13) report aqueous insufficiency and persistent hypotony in cases with MSCH. Despite the lack of such cases in our study we believe that silicone oil can prevent this complication in long-term follow-up.

Most of the previous studies report poor outcomes in cases with MSCH, even with secondary surgical management (13, 20). However, there are reported cases with visual acuity outcome of 20/200 or better (2, 11). As suggested previously, complex SCH, as in cases with retina incarceration and retinal detachment in presentation, are strongly associated with poorer visual outcome (2, 11, 12). In our series, we had no cases with retinal incarceration but only one case with RD in presentation, which although complicated with vitreoretinal incarceration during PPV, was finally treated successfully. As Wirostko et al reported, improvement in reattachment rates may reflect the advantages in the use of PFCL and silicone oil (12). Overall, both anatomic and functional results were satisfactory in our patients. The best postoperative acuity was observed in Patient 1, where the SCH spared the macula and only three retina quadrants were involved, which indicated that decreased SCH severity and less anatomic disruption especially at the macula was associated with better visual outcome.

SCH is a rare but devastating complication of intraocular surgery and every effort should be made to control all risk factors before performing surgery. However, when SCH do occur, secondary surgical treatment with posterior sclerotomies combined with PPV should be considered in some cases selectively. The surgeon must decide not only the proper timing for the surgical intervention but also must plan separately all the necessary surgical steps for each case, in order to achieve clear surgical goals. Further studies are necessary to prove the promising outcome of secondary surgical management for cases with MSCH.

None of the authors has a proprietary interest.

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