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Prevention and Management of Massive Suprachoroidal Hemorrhage

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Prevention and Management of Massive Suprachoroidal Hemorrhage

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Massive suprachoroidal hemorrhage is a devastating complication of intraocular surgery, including vitreoretinal surgery.

Terminology and Definitions

Suprachoroidal hemorrhage is defined by the presence of blood in the suprachoroidal space that most frequently occurs during intraocular surgery and trauma. It characteristically takes the form of a convex, dark choroidal elevation of varying size. Various terms have been used in the literature to describe this entity, such as expulsive hemorrhage [1-3], when intraocular contents are extruded from the eye, and more recently, subchoroidal, suprachoroidal, and massive suprachoroidal hemorrhage (MSCH). Suprachoroidal hemorrhage is a more appealing term than expulsive hemorrhage since it describes the anatomical location of the hemorrhage. In recent literature, the terms expulsive hemorrhage and subchoroidal hemorrhage have been replaced by MSCH. This term was first defined by Welch et al. [4] as a hemorrhage into the suprachoroidal space extensive enough to extrude intraocular contents forcibly from the eye or cause retinal apposition. For simplicity, in this paper we will refer to the above named entities as MSCH and will confine our discussion to MSCH in relation to vitreoretinal surgery (Figure 1).

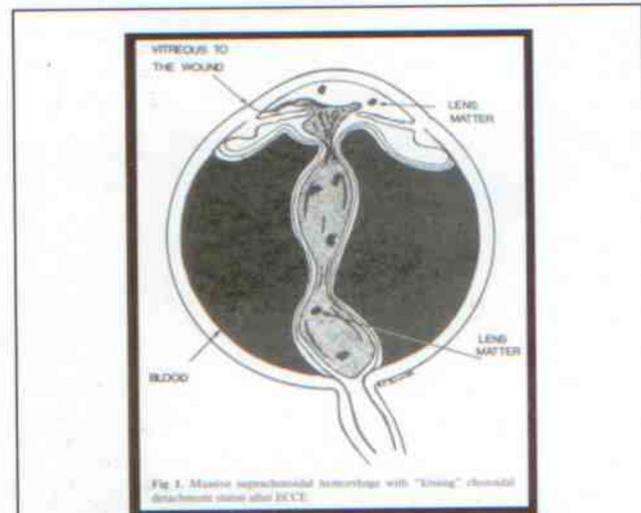

Figure 1 : Representation of Massive Suprachoroidal Hemorrhage (MSCH) Lakhanpal V, Schocket SS, Elman MJ, et al.: A new modified vitreoretinal surgical approach in the management of massive suprachoroidal hemorrhage. Ophthalmology 1989, 96:793800. Reproduced with permission from Ophthalmology.

Localized MSCH is most frequently located anterior to the equator, but more severe cases may extend posteriorly and occasionally involve the entire globe. Marked elevation causing retina-retina contact on opposite sides (appositional MSCH) is associated with the extrusion of intraocular contents. On echography, MSCH appears as a convex elevation with moderate echoes arising from the clotted blood within the elevation. With time, liquefaction of the suprachoroidal blood, as evidenced by partial separation of the serum and the residual clot, may occur, and the movement of the clotted elements within the choroidal detachment may be evident as well. Most frequently, MSCH presents as a serious complication of intraocular surgery associated with marked fluctuations in intraocular pressure (IOP). Reports following cataract surgery [17], glaucoma filtration procedures [5,6,812], keratoplasty [5,6,13,14], and retinal detachment surgery [5,6,1521,22] are well known. It may also occur in association with trauma, subretinal neovascular membrane (spontaneously), laser photocoagulation, blood clotting abnormalities, and Valsalva maneuvers [2328].

Incidence

The overall incidence of MSCH occurring intraoperatively has been reported to range from 0.05% to 4% [5]. In a case-control study, Speaker et al. [5] reported an incidence of 0.16% during cataract surgery (0.19% with intracapsular technique), 0.15% during filtration procedures, 0.56% during penetrating keratoplasty, and 0.41% during vitreoretinal procedures.

In vitreoretinal surgery, Hawkins and Schepens [16] reported MSCH as a complication in 15 (1%) of their 1500 scleral buckling cases; all cases followed the onset of ocular hypotony after transchoroidal drainage of subretinal fluid. The MSCH involved the same quadrant as the perforation site in 73% of cases. Machemer and Laqua [17] reported two cases (4.3%) of intraoperative MSCH in 47 patients undergoing pars plana vitrectomy (PPV) and scleral buckle procedure for complicated retinal detachment with proliferative vitreoretinopathy. Lakhanpal et al [18] described a case series of 7 eyes in 7 patients who developed MSCH after undergoing PPV for complicated retinal detachments. Piper et al. [20] noted an incidence of 1.9%, and their study included 10 cases (1.5%) noted intraoperatively and three cases (0.44%) first identified during the early postoperative period. The authors suggested the inclusion of postoperative MSCH as the explanation for the increased incidence compared with other reports. Sharma et al. [21] reported 12 cases of MSCH occurring during PPV and found an overall incidence of 0.17%.

Pathophysiology & Risk Factors

Acute intraoperative ocular hypotony gives rise to an abnormal transluminal vascular pressure in surgical procedures that involve free communication between intra and extraocular spaces. In the setting of low IOP, the short or long posterior ciliary arterial branches may rupture, giving rise to MSCH [2931] (Figure 2).

Prolonged hypotony is usually not a predominant feature in PPV. However, marked fluctuations in IOP occur during the aspiration of subretinal fluid and preretinal blood, phacofragmentation, scleral depression with subsequent relaxation, and globe manipulation for placement of a scleral buckle. Also, vitreoretinal procedures often involve direct or indirect surgical trauma to the choroidal vasculature. Internal subretinal fluid drainage under sub-optimal visualization may cause direct trauma to the choroid. Inadvertent needle perforation has been reported to occur in up to 5% of the eyes undergoing scleral buckle procedure [32] and is frequently associated with a localized area of choroidal hematoma. In patients undergoing PPV in conjunction with scleral buckling procedure, globe manipulation and fluctuations in IOP may result in further bleeding and extension of the hemorrhage into the suprachoroidal space. Another mechanism for injury to the choroidal vasculature is excessive cryotherapy and resultant cryofracture of the choroid resulting from premature removal of the cryoprobe from the sclera. Trauma to and obstruction of vortex veins by a large scleral explant may also be associated [33].

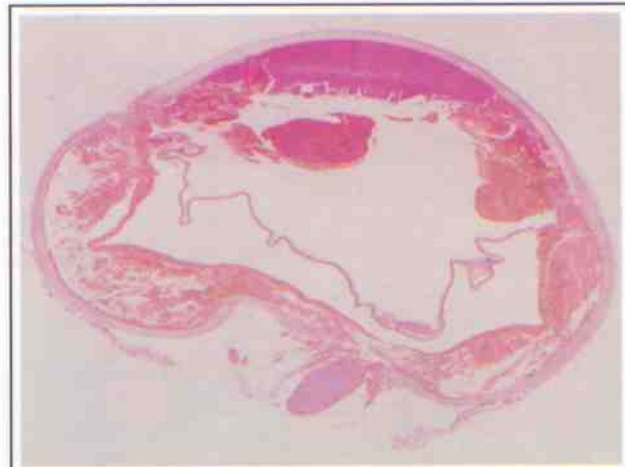

Figure 2 : *Low power photomicrograph of a rabbit eye with hyphema, vitreous hemorrhage, retinal detachment and MSCH. (Lakhanpal V: Experimental and clinical observations on massive suprachoroidal hemorrhage. Trans Am Ophthalmol Soc 1993, 91:545652. Reproduced with permission requested.*

Reported risk factors for the development of MSCH during intraocular procedures include elevated preoperative IOP, history of glaucoma [3,5,20,34], axial length greater than 25 mm [5,10,35], aphakia, and pseudophakia [10,20,36,37]. Systemic risk factors include hypertension, atherosclerosis, diabetes, advanced age, and intraoperative tachycardia [3,5,9,20]. General anesthesia has been implicated by some reports [1,38] and not by others [5]. Our group [18] examined additional MSCH risk factors during PPV, finding that MSCH developed late in the procedure following PPV, fluid-air exchange, endolaser, cryopexy, and scleral buckling in five of seven eyes. Placement of a broad posterior scleral buckle with intraoperative hypotony and cryopexy were important precipitating factors. In a case-control study of a series of 13 perioperative MSCH cases, Piper et al. [20] identified advanced age, elevated preoperative IOP, retinal detachment, aphakia or pseudophakia, and scleral buckling as risk factors. Similarly, in a series of 12 cases of MSCH associated with PPV, Sharma et al. [21] found myopia, aphakia or pseudophakia,