Wipe-out After Glaucoma Filtration Surgery

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The phenomenon of severe visual loss after surgery, with no obvious cause, is known as 'wipe-out' or 'snuff syndrome'. Wipe-out may affect patients who have very severe glaucomatous damage (Figs 1A and B), and overall is a very uncommon complication but remains an important concern among glaucoma surgeons.

Although, wipe-out was probably more common after full-thickness filtration surgery,¹ it is not known whether patients who had been diagnosed with wipe out had other undetected causes such as macular edema, hypotonous maculopathy or inflammation. With modern surgical techniques this entity is becoming increasingly rare.²⁻⁴ In this review we will discuss the reported incidence of wipe-out, possible mechanisms, and how current practice is helping us to virtually eliminate this problem.

Incidence and Risk Factors

There are a few studies that have evaluated the incidence of wipe out after trabeculectomy. The reported incidence ranged from 0 to 0.95% of surgeries.⁵ A retrospective study of 508 trabeculectomies identified 4 cases of wipe-out, all of which

had retrobulbar anaesthesia.⁵ Older patients with high pre-operative IOP, advanced visual field defects affecting the central field, with split fixation, and postoperative complications would appear to be at increased risk.

Possible Mechanisms and Prevention Strategies

Direct Damage to the Optic Nerve from Anesthetic Technique

Glaucoma is a chronic condition characterized by progressive pressure/ischemic damage to the optic nerve head.⁶ Glaucoma patients with compromised optic nerves may be at futher risk of damage and possibly wipe-out from orbital retrobulbar and peribulbar anesthesia as there is potential for direct trauma, pressure on the nerve, and/or ischemia. Localized pressure to the optic nerve may result from a retrobulbar hematoma, a hematoma within the optic nerve sheath, or simply from the volume of anaesthetic injected.⁷ Even with a low volume of local anesthetic (LA) the injected fluid may become trapped between fascial layers yielding a 'compartment syndrome'.

Figs 1A and B: Visual field and optic disc of a patient with very severe glaucomatous damage who might be susceptible to have wipe-out

Localized pressure may also induce ischemia of the nerve, as may epinephrine (adrenaline) if used in the LA mixture. For patients whose optic nerve is already damaged by glaucoma, this could result in wipe-out.^{6,8}

Additional indirect evidence of the possible effect of local anesthetic was noted in a small series of 3 cases of hyaluronidase-associated orbitopathy, in which the most severe and long-lasting visual loss occurred in the one patient who had glaucoma.⁹ Doppler imaging studies have shown that retrobulbar injections can cause a marked reduction in blood flow in the arteries supplying the anterior optic nerve, particularly if epinephrine is included in the LA mixture.^{10,11} This effect is not seen with anterior placement of LA, for example by sub-conjunctival anesthesia.¹²

The problems described above could potentially occur with retrobulbar, peribulbar or posterior sub-Tenon's LA. Currently, a high index of suspicion for this event has made many glaucoma specialists alter their anesthesia technique in order to avoid injecting retro or peribulbar anesthesia for any surgery on glaucoma patients.¹³ Currently preferred techniques are anterior sub-Tenon's, sub-conjunctival, topical and intra-cameral anaesthesia.¹³ These 'newer' techniques appear to be successful in terms of safety and patient acceptability.⁶

Pressure Spike

Early undiagnosed postoperative IOP spikes could potentially inflict further insult to a very severely damaged optic nerve with end-stage glaucoma. Thus, it seems logical to associate an early and severe pressure spike with the occurrence of wipe-out. Pressure spikes may occur if the scleral flap has been sutured too tightly or the fistula is blocked by iris tissue or a blood clot.

In patients with advanced glaucomatous damage undergoing trabeculectomy IOP should be monitored a few hours after surgery, and also the following day. Thus, if there is an early IOP spike it can be treated accordingly.

Postoperative Hypotony

Postoperative profound hypotony has been associated with "wipe-out", and it seems that this complication was more common when full-thickness filtration procedures were the standard surgeries for glaucoma. In the recent tube versus trabeculectomy study (TvT), choroidal effusion was an independent risk factor for unexplained visual acuity loss after surgery.¹⁴ Choroidal effusion is generally considered a relatively mild problem, but in the TvT study results suggested that this complication may not be always benign in nature.¹⁴

To prevent postoperative hypotony, intraoperative and postoperative control of outflow drainage is essential. During a glaucoma filtration procedure, the surgeon will try to provide sufficient outflow of aqueous thereby lowering the intraocular pressure (IOP) but avoiding complications, specifically

hypotony, flat anterior chamber, choroidal detachment, and pressure spikes. Repeated injections of BSS through the paracentesis or use of an anterior chamber maintainer is recommended to test the outflow after initial suturing of the scleral flap. The flow can then be adjusted as needed.

The possibility of removing or cutting a scleral flap suture allows the surgeon to tightly close the scleral flap intraoperatively to decrease the probability of developing profound hypotony and a flat anterior chamber, especially if mitomycin-C has been used. Permanent and/or releasable scleral-flap sutures can be cut in the postoperative period to enhance the outflow.

Releasable sutures to close the scleral flap have practical advantages as the externalized suture can be easily removed and is effective in cases of a hemorrhagic or thickened bleb making suture-lysis difficult if not impossible. Additionally, the releasable sutures can be removed at the slit-lamp since laser equipment is not required.¹⁵⁻²¹ There are some potential disadvantages of releasable sutures, including some additional operating time, potential discomfort if they are not buried, and ocular infection.^{22,23} If antimetabolites are to be used there may be a risk of an aqueous leak around the suture site.

The timing for cutting/releasing sutures is important. If antimetabolites are not used, it should be done within the first two weeks. Later, fibrosis of the scleral flap may negate any potential increase in outflow. The window of opportunity is expanded when antimetabolites have been associated with the surgery, although the response decreases with a longer interval to suture release.²⁴

Suture release/lysis should be performed in a conservative step-wise manner. Usually only one suture is released at a time to avoid the possible complications of overfiltration, hypotony, and shallow anterior chamber. After the suture is released, if the bleb and IOP were unchanged, ocular massage or focal pressure to the bleb can be applied. If unsuccessful, the surgeon may consider the possibility of releasing a second suture.

In summary, the wipeout syndrome is a rare yet possible consequence after glaucoma surgery in eyes with advanced disease. Precautions such as changes in anesthesia techniques, careful monitoring of perioperative IOP spikes and careful attention to avoid both high and low postoperative pressures will help make this entity a thing of the past.

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