

Bilateral Scheie's procedure with Ophthalmic Viscoelastic Device and 5-Fluorouracil

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Abstract

Introduction The surgical management of glaucoma has evolved over time.

Case report This report describes the first ever case, to our knowledge, of bilateral Scheie's procedures performed with retention of an ophthalmic viscoelastic device and intraoperative and post-operative 5-fluorouracil injections.

Discussion These procedures have now successfully controlled the intraocular pressure in both of the patient's eyes for more than 17 years.

Keywords Scheie's procedure · 5-Fluorouracil · Ophthalmic viscoelastic device · Intraocular pressure · Glaucoma surgery

Introduction

Glaucoma causes two per cent of global visual impairment [1, 2]. The surgical management of glaucoma has evolved over more than a century and continues to be discussed fervently [3].

In the early part of the 20th century, trephination and iridencleisis were the most common filtration techniques [4–6]. The former was associated with thin-walled blebs, which predisposed to infections that were particularly devastating during the pre-antibiotic era. The latter was associated with a higher than expected incidence of sympathetic ophthalmia [4].

In 1923, Luigi Presiozi described a technique to create a fistula between the anterior chamber and the subconjunctival space using electrocautery [4, 7]. This technique was modified by Harold Scheie, who first described it in 1958 as sclerectomy and cautery with peripheral iridectomy [8]. Scheie's modification was to use a scalpel to enter the eye and cauterise the external sclera to gape the wound. The main complications of Scheie's modified procedure were hypotony associated with a flat anterior chamber, cataract formation, and damage to the corneal endothelium [9].

Eventually, guarded trabeculectomy, involving the creation of a channel through the sclera under a superficial scleral trapdoor, became the operation of choice. The trapdoor provided resistance to outflow and was associated with a lower incidence of hypotony and flat anterior chamber [10]. In the 1980s, the trabeculectomy was further enhanced by the

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availability of an ophthalmic viscoelastic device (OVD) and use of antimetabolites to reduce post-operative scarring [11].

However, Scheie’s procedure has never been re-evaluated in association with retention of an OVD and peri-operative use of antimetabolites. This case report illustrates that Scheie’s procedure, used in combination with 5-Fluorouracil (5-FU) and OVD, can be safe and successful revision procedure for glaucoma surgery.

Case report

In 1997, 24-year-old female patient presented with uncontrolled IOPs, worse in the left. Her visual acuity was 20/20 in each eye. The left eye had a large peripheral iridectomy, posterior synechiae, and a cataract. Her discs displayed significant glaucomatous damage associated with visual field loss (Fig. 1—baseline visual field). The treatment included betaxolol, brimonidine and latanoprost to each eye, phospholine iodide to the left eye only, and oral acetazolamide 250 mg twice daily. Despite this, the

IOP remained at 20 mmHg in the right eye and 38 mmHg in the left eye.

Her past medical history was extensive. It included juvenile chronic arthritis and severe uveitis, complicated by secondary glaucoma. She had undergone multiple glaucoma operations—in both eyes at age 10, a further procedure to the right eye at age 19, and another to the left eye at age 20. The specifics of these procedures were unknown to the author during the initial consultations.

At age 25, she was planned for the author’s routine surgical approach of a left limbal-based flap, combined trabeculectomy, and cyclodialysis with retained Healon™ and augmented by 5-FU [12]. Intraoperatively, her conjunctiva was found to be exceedingly thick and densely scarred. It was carefully pushed forwards and backwards from the limbal-based incision by the flat sole of a 57 Beaver blade. The full mobilisation of conjunctiva required more than 20 minutes of meticulous dissection to avoid button-holing. Her episclera and tenon’s capsule were dissected cleanly off sclera as single layers, anteriorly from the incision line to the limbus and posteriorly as far back as the superior rectus insertion. Two drainage

Fig. 1 Baseline and serial post-operative visual field tests over 17 years

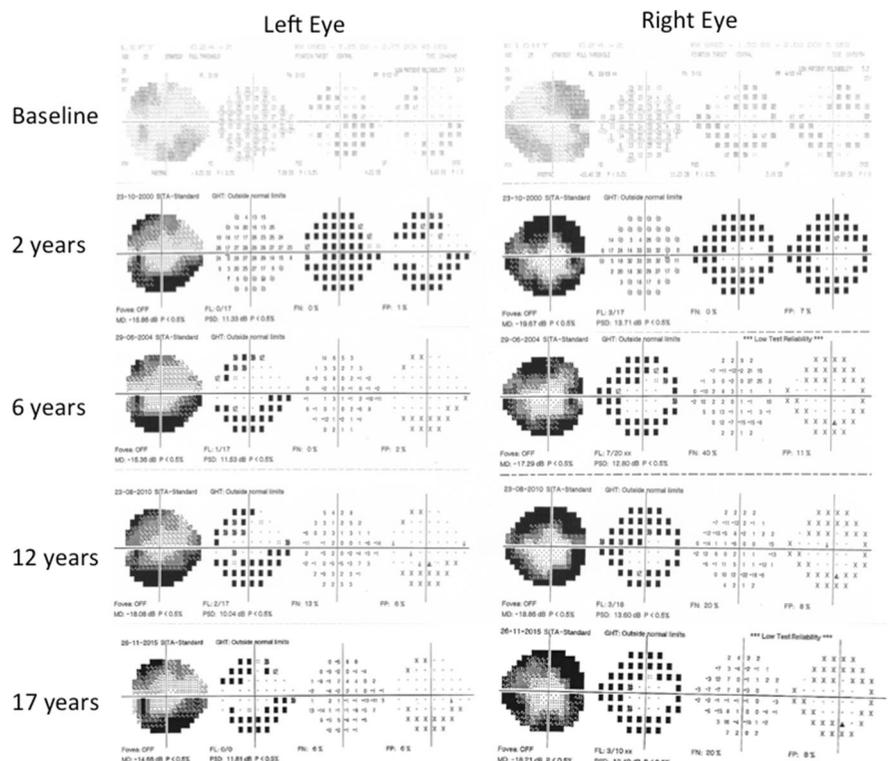


Table 1 IOP readings following sequential bilateral Scheie's procedure with 5-Fluorouracil

Years post-op	RE IOP (mmHg)	LE IOP (mmHg)
1	13	7
3	11	11
5	13	9
7	11	9
9	12	10
11	11	10
13	10	9
15	9	9
17	12	13
Last reading (following bilateral cataract surgery)	13	14

tunnels were created posterior to the incision line on each side of the superior rectus muscle, beyond the equator of the globes, indeed as far back as the Westcott scissors would allow. The anterior sclera was blue and too thin to safely cut a trap door. Hence, the patient underwent Scheie's procedure with retained HealonTM and received a subconjunctival injection of 5-FU. Post-operatively, she received a further eight 5-FU injections over the first 4 weeks. Her anterior chamber appeared slightly, but safely shallow for the first 5 days before re-deepening fully without intervention.

Subsequently, her notes from her prior ocular procedures were found. It was discovered that the patient had in fact already undergone bilateral Scheie's procedures at the age of 10, as well as further Scheie's procedures augmented by 5-FU (number of injections unknown) to the right and left eyes, at ages 19 and 20, respectively.

The post-operative course in the left eye was uneventful, but right-sided IOP rose to 32 mmHg despite maximal medical therapy; this rise could be due to worsening of her trabecular dysfunction over time. She consequently underwent a further Scheie's procedure to her right eye with retained HealonTM and intraoperative 5-FU 9 months later, at age 26. On this occasion, she received a further seven 5-FU injections in the 4 weeks post-operatively. Similarly to the left eye, her anterior chamber appeared unalarming shallow for the first 5 days, but again recovered fully without requiring further intervention.

Seventeen years following the procedure to her left eye, the cataract had slowly deteriorated, resulting in a best-corrected Snellen visual acuity of 20/40. A routine cataract surgery was performed at age 42 with intraoperative 5-FU and a very slow wean of topical

steroids post-operatively. A similar routine cataract surgery was performed on the right eye 4 months later due to intolerable anisometropia and her non-suitability for contact lenses. Following the right cataract surgery, both blebs in the patient's eyes have remained functioning with low IOPs, albeit slightly higher than previously (last reading 13/14 mmHg OD/OS), off all topical steroid and IOP-lowering drops. These pressures have now remained at these levels for 10 months OS and 6 months OD after her cataract surgery.

Following the bilateral Scheie's procedures more than 17 and 18 years ago, the patient has not been on any topical treatment for glaucoma. Years of monitoring demonstrate a consistently good IOP control (Table 1). There has been no evidence of progressive visual field loss since the surgeries (Fig. 1), or any more recent optic nerve damage, as evidenced by stable optical coherence tomography scans of the retinal nerve fibre layers since 2010. The blebs are still of good morphology today (Fig. 2). The authors have not since performed any such procedure and have no other cases for comparison.

Discussion

We believe that this is the only case described of a patient with glaucoma who has undergone bilateral Scheie's procedures augmented with 5-FU and OVD. The 5-FU was administered by injection intra- and post-operatively, and the OVD (HealonTM) retained in both the anterior chamber and in the posterior subtenon tunnels created on each side of the superior rectus muscle.

The management of this patient was complex given her initial high IOPs and incomplete past surgical

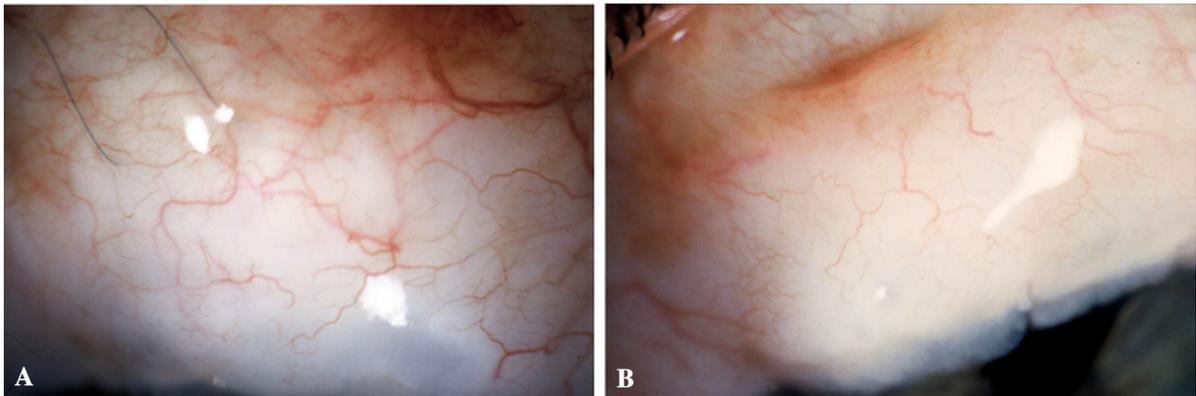


Fig. 2 **A** Right and **B** left bleb morphology today, 17 years post-operatively. The right bleb is free of ring-of-steel scarring; the left bleb has ring-of-steel scarring restricted to the area of the anterior part of the insertion of the superior rectus muscle and

history. However, there are several critical contributory factors, which resulted in her successful management that are worth noting. First is the method of conjunctival dissection with posteriorly directed tunnels on each side of the superior rectus muscle; second is the minimisation of scarring of the fistula by intra- and post-operative use of 5-FU injections; third is retained HealonTM, which helped reduce the chances of a flattened anterior chamber and hypotony by remaining in the anterior chamber for up to 4 days post-operatively, and it also aided posterior flow through the tunnels on each side of the superior rectus muscle. The developers of HealonTM explained to the author (HRL) circa 1986 that “Healon in its molecular structure resembles chicken wire, and that water molecules pass freely through the openings of the chicken wire”.

This case demonstrates that Scheie’s procedure, while generally being considered inferior to guarded trabeculectomy, can be considered when the sclera is found to be too thin intraoperatively to safely dissect a partial thickness flap [13].

Furthermore, we believe that Scheie’s procedure, combined with modern technological advances such as OVD and antimetabolites, may have a select role to play in redo or complicated surgical glaucoma cases. We propose this method to be indeed a safe alternative to other glaucoma surgeries.

did not extend to either side of that insertion, where the posteriorly directed tunnels had been filled with HealonTM. These tunnels remained unhindered despite the fact that this was a third time procedure in a bed of densely scarred conjunctiva

Compliance with ethical standards

Conflict of interest There is no conflict of interest for the authors.

Informed consent Informed consent was obtained from the patient for the use of this case report. All data are de-identified.

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