HEALAflow

APPLICATIONS

A quick guide to the proper application and clinical benefits of using the Healaflow® injectable drainage implant

Key messages

- Healaflow® provides additional support for favourable and lasting outcomes during the surgical treatment of glaucoma, including penetrating and non-penetrating techniques in adults, particularly when the target intraocular pressure (IOP) cannot be achieved with anti-glaucoma medications alone.
- By preserving the subconjunctival filtration space (filtering bleb) after surgery, Healaflow® helps maintain the volume of this space, thereby supporting the reduction, control, and long-term management of intraocular pressure.
- When applied correctly under the scleral flap and within the subconjunctival space, Healaflow® enhances the success rate of glaucoma surgeries and reduces the need for secondary interventions.
- Healaflow® can be easily incorporated into standard surgical protocols.
- Clinical, in vitro, and animal model studies have confirmed its safety and effectiveness across various types of glaucoma surgeries, as well as its potential in treating ocular hypotony or acting as a vitreous substitute following pars plana vitrectomy.

SAAG HA

Healaflow in **Trabeculectomy**

OVERVIEW

INDICATIONS

Primary Angle Closure Glaucoma (PACG), Primary Open Angle Glaucoma (POAG), Normal Tension Glaucoma (NTG), Pseudoexfoliative Glaucoma (PXG), Pseudophakic glaucoma, Iridocorneal Endothelial (ICE) syndrome, Anxfeld/Rieger syndrome, Secondary glaucoma

ADMINISTRATION SITE

Under the scleral flap, Under the conjunctival flap (between the sclera and the conjunctiva)

INJECTED AMOUNT

<0.05 mL under the scleral flap
0.1-0.4 mL under the conjunctival flap

TECHNIQUE

Dissect the tenons and the conjunctiva as posteriorly as possible. Pay attention to creating a scleral flap of proper size and thickness.[1]

Close and suture the scleral flap before injecting Healaflow®. Apply Healaflow® to all areas under the tenons and the conjunctiva – as posteriorly as possible.[1]

Make sure to close the conjunctiva properly.[1]

BENEFITS

- Healaflow® **helps maintain filtration channel** smoothness, shape, and function. The height and extent of filtering blebs are superior to when Healaflow® is not used.[2]
- It **effectively reduces, controls, and stabilises intraocular pressure (IOP) levels**. Patients treated with Healaflow® experienced greater IOP reduction than those in the control group.[2-4]
- Healaflow® is an **innovative alternative to mitomycin-C (MMC**) and can be successfully used as an adjunct in trabeculectomy.[5]
- It effectively **inhibits angiogenesis and has anti-inflammatory properties**.[2,6]
- **At 5 years, the complete success rate is higher with Healaflow® compared to without it.**[3]
- Additionally, there is a **significant reduction in medication use after surgery**.[3]
- The **complication rate is low with Healaflow® — lower** than in the absence of the treatment — with no complications directly related to its use.[3-5]
- Its **application is simple**.[4]
- Healaflow® is an efficient and safe option for glaucoma patients and can improve the prognosis of patients with glaucoma.[3]

CLINICAL PROOF

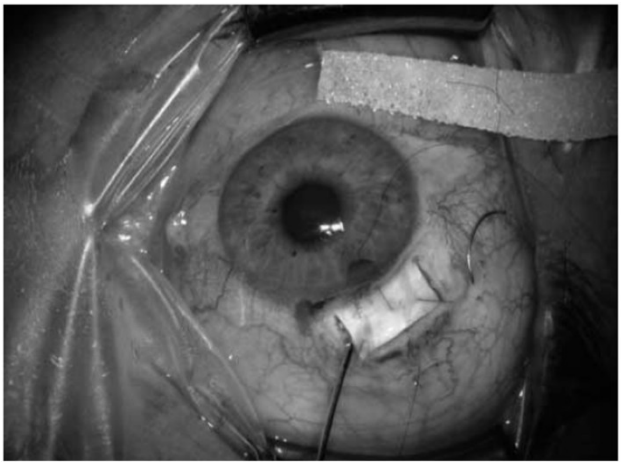

Figure 1 Injection of Healaflow® under the scleral flap. A small amount (maximum 0.05 ml) is injected under the flap using a 25G cannula. Care should be taken to ensure that no Healaflow® gets into the anterior chamber (observe the shape of the iridectomy!), as otherwise, pressure peaks are to be feared.[4]

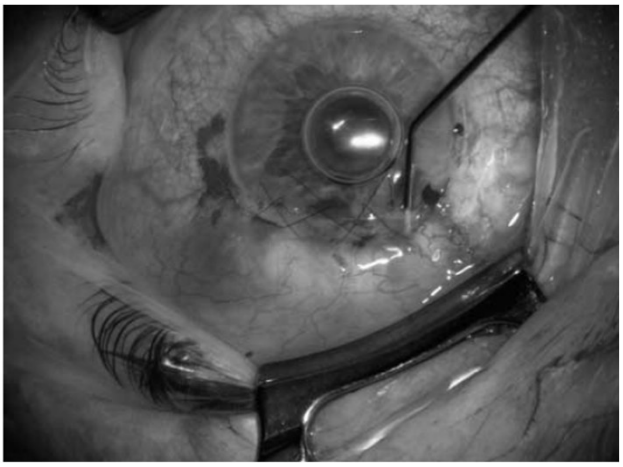

Figure 2 Injection of Healaflow® under the conjunctiva. A larger amount (0.2 to 0.4 ml) is injected under the conjunctiva after complete wound closure in order to generate space for the formation of the filter cushion.[4]

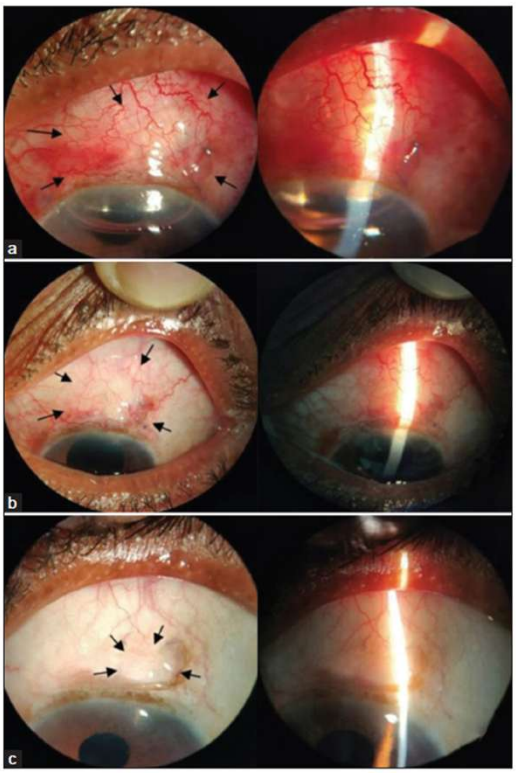

Figure 3 Studies on trabeculectomy demonstrated that well-visualized, diffuse blebs, loculated with thinner walls with good bleb height and extent, were mostly formed with sodium hyaluronate. Healaflow® prevents postoperative scarring and fibrosis at the filtration site and helps maintain its function, significantly lowering and sustaining the IOP. Bleb morphology is indicated with black arrows (a) 1 week, (b) 1 month and (c) 1 year after surgery.[7]

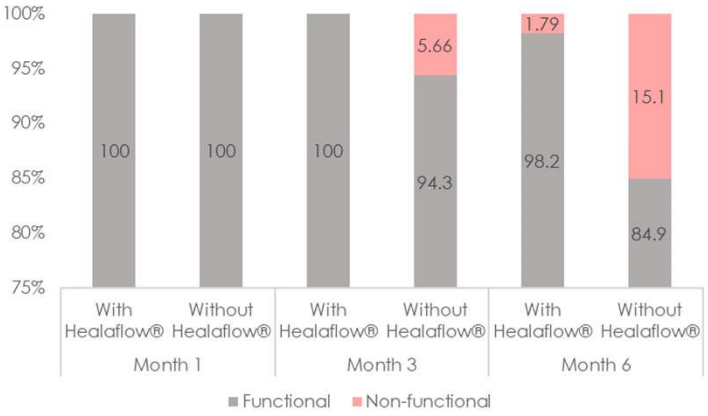

Figure 4 Comparison of the percentage of functioning filtering blebs after surgery with and without using Healaflow®.[2]

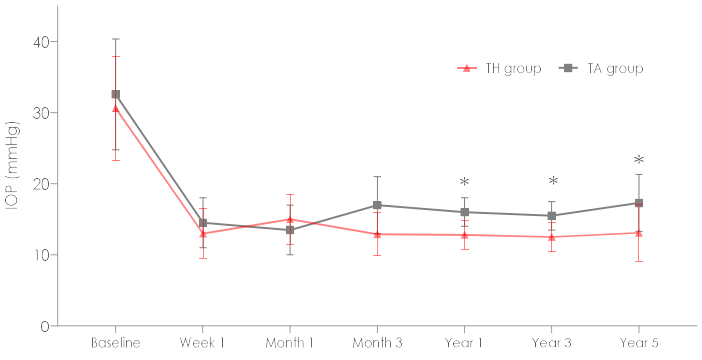

*Figure 5 Reduction of IOP in the TH and TA groups. The advantage of Healaflow® is remarkable in the long term. *P<0.05; TA: Trabeculectomy alone; TH: Trabeculectomy with Healaflow®.[3]*

Healaflow in **Deep Penetrating, Non-Penetrating (NPDS)** and **Microinvasive Non-penetrating Deep Sclerectomy (MNPDS)**

OVERVIEW

INDICATIONS

Primary Open Angle Glaucoma (POAG), Primary Angle Closure Glaucoma (PCAG), Normal Tension Glaucoma (NTG), Pseudoexfoliative Glaucoma (PXG), Chronic angle-closure glaucoma (CACG), Pigmentary glaucoma, Uveitic glaucoma, Juvenile glaucoma, Glaucoma with Marfan syndrome, Traumatic glaucoma, Congenital glaucoma, Glaucoma with penetrating keratoplasty

ADMINISTRATION SITE

Under the scleral flap, Under the conjunctival (between the sclera and the conjunctiva)

INJECTED AMOUNT

<0.10 mL under the scleral flap
0.2-0.5 mL under the conjunctiva

TECHNIQUE

Inject about 0.1 mL of Healaflow® into the scleral bed.[8]

Reposition the superficial scleral flap over the Healaflow® and loosely suture it using 2 to 4 10-0 nylon stitches. You can inject some additional Healaflow® until it oozes from the free sides of the flap.[8-10]

Close the conjunctiva and the Tenon layer with two 8-0 resorbable sutures and inject about 0.3-0.5 mL of Healaflow® underneath the conjunctiva to form the bleb. If conjunctival leakage is detected, add further stitches to the limbus until the wound is sealed. [8-10]

BENEFITS

- The Healaflow® implant preserves the linear and volumetric parameters of the formed drainage zone and **ensures the formation of intra- and extrascleral outflow pathways.**[11]
- Healaflow® during deep sclerectomy is well tolerated, with a low rate of postoperative complications. Not only is IOP controlled, but patients have also seen a **dramatic decrease in their need for antiglaucoma medications**.[8]
- Healaflow® **ensures long-term maintenance of a low IOP** because it acts as a drainage device and limits postoperative fibrosis.[10]
- The hypotensive effectiveness of the Healaflow® drainage implant allows for persistent normalisation of IOP levels with or without hypotensive therapy in 86% of patients during the first 2 postoperative years.[12]
- The new surgical technique can **increase the efficacy and safety of filtering surgery** without requiring major changes in the procedure.[8]
- The concept of using a space-occupying substance in the intrascleral space has been proven to improve success rates in NPDS.[13]

CLINICAL PROOF

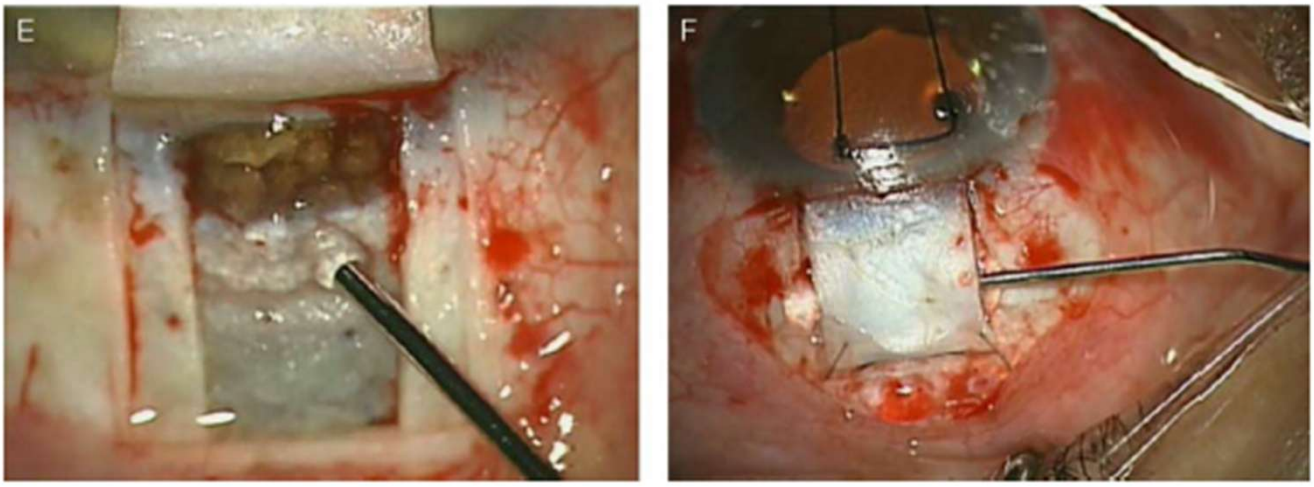

Figure 6 (a) Healaflow® *is used as a space maintainer to fill the scleral space. (b) After closing and suturing the superficial flap, some* Healaflow® *is injected under the flap to act as a space maintainer and to prevent fibrosis.*[13]

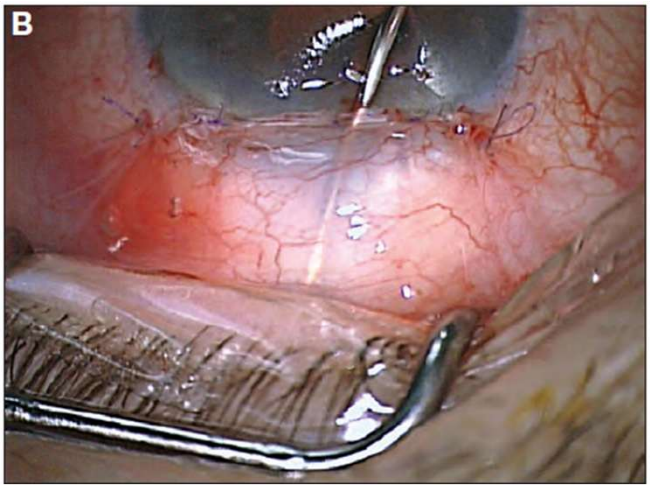

Figure 7 Injection of 0.2-0.3 mL of Healaflow® under the conjunctiva.[8]

Figure 8 (a) On the first day post-operation, no signs of inflammation or allergic reactions were observed. Filtration pads in all eyes were moderate in height and diffuse in area. (b) After 3 months, the filtration pads remained diffuse, and by 1 year, most eyes showed a flat, diffuse bleb. (c) Two years after the procedure, the filtration pads remained moderately diffuse in 72% of eyes, and no cystic filtration pads were observed in any case.[12]

Healaflow as an adjuvant for glaucoma drainage implants

OVERVIEW

INDICATIONS

Severe glaucoma, Advanced pseudoexfoliation (PXF) glaucoma, Neovascular glaucoma (NV), Glaucoma with Sturge-Weber syndrome

ADMINISTRATION SITE

Between the glaucoma drainage implant (GDI plate; Molteno3, Baerveldt) and the Tenon capsule.[14]

Under the conjunctiva, between the limbus and the previously injected mitomycin-C (MMC) in case of micro-invasive glaucoma surgery (MIGS) and XEN45 implantation.[15]

INJECTED AMOUNT

GDI implant: 0.5 mL
XEN45 implant: 0.1 mL

TECHNIQUE

Before closing the conjunctival incisions with an interrupted 8-0 silk suture, inject Healaflow® between the GDI plate and Tenon capsule using a 25-G cannula.[14]

Insert the XEN45 implant under intracameral anaesthesia via an ab interno approach. Inject 0.1 ml of Healaflow® subconjunctivally, positioned between the limbus and the previously injected MMC. Introduce the preloaded XEN injector needle through a 2.4 mm cornea paracentesis incision located supratemporally. Carefullly guide the needle across the anterior chamber, and implant the XEN device, ensuring that its subconjunctival portion is positioned within the Healaflow® bleb. Finally, leave the eye partially filled with a viscoelastic material.[15]

BENEFITS

- No complications resulting from the reticulated hyaluronic acid therapy itself were observed.[14]
- In eyes with severe glaucoma, Healaflow may **improve the efficacy of GDI surgery** by maintaining a functional filtration bleb.[14]
- Healaflow was used as **a spacer by implanting the XEN45 gel** stent within a subconjunctival Healaflow "bubble." At 6 months postoperatively, intraocular pressure remained on target. There was no need for additional topical medications, and no change in visual acuity was observed.[15]
- Healaflow can **reduce the risk of XEN implant exposure and extrusion**, acting as a barrier, thus reducing the risk of serious complications, i.e., endophthalmitis. (Villareal 2023)
- Healaflow can be a beneficial and effective addition to the procedure, **preventing short-term scarring and fibrosis.**[15]
- The incorporation of subconjunctival Healaflow into the XEN implantation procedure may potentially decrease failure rates and complications.[15]

CLINICAL PROOF

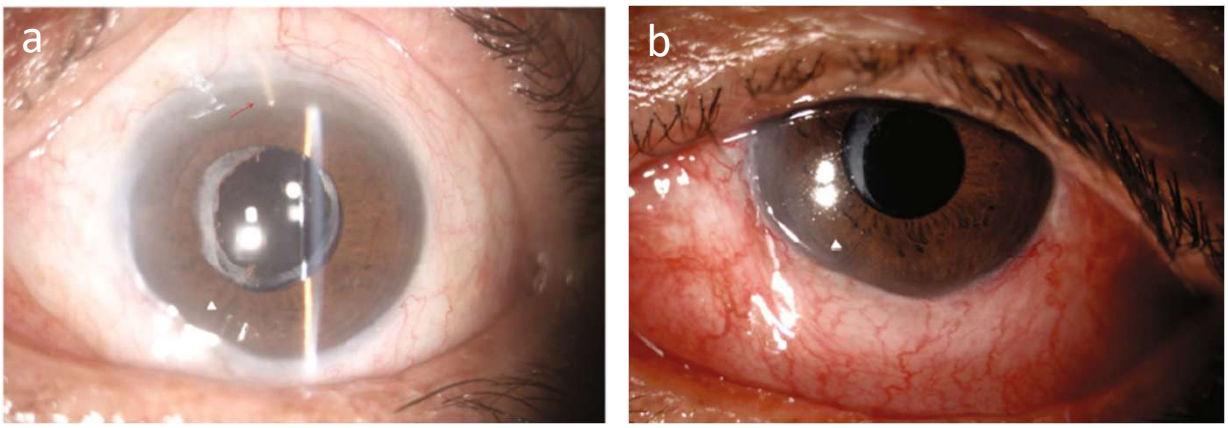

Figure 9 (a) Superior express shunt (red arrow) with adjacent superior scarred conjunctiva. Inferonasal XEN stent (white triangle). (b) Inferonasal XEN stent (white triangle) with inferior elevated functional bleb.[15]

Patient no.	Age (years)	Glaucoma diagnosis	GDI type	No. of medications presurgery	No. of medications postsurgery	Baseline IOP mmHg	Final IOP mmHg	% IOP reduction
1	72	PEXG	Baerveldt 250 mm^2	4	0	36	7	81
2	31	Sturge-Weber	Molteno3 175 mm^2	1	0	40	20	50
3	82	PEXG	Baerveldt 250 mm^2	3	0	35	14	60
4	66	NV	Molteno3 175 mm^2	4	2	60	11	82
5	77	PEXG	Molteno3 175 mm^2	3	1	30	14	53
6	80	Silicon oil	Molteno3 175 mm^2	5	3	44	21	52
7	54	PEXG	Molteno3 175 mm^2	3	3	34	12	65
8	74	PEXG	Molteno3 175 mm^2	4	3	36	5	67
9	72	PEXG	Molteno3 175 mm^2	4	2	21	12	43
10	57	NV	Molteno3 175 mm^2	5	1	49	14	71

Table 1 Demographics and ocular characteristics before and after GDI implantation surgery with Healaflow® as an adjuvant. Intraocular pressure and the number of required anti-glaucoma medications show a remarkable decrease during the 2-year follow-up period.[14]

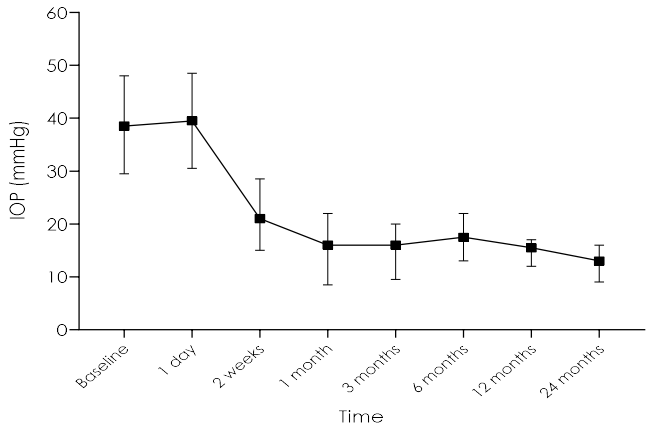

Figure 10 Mean and 95% confidence interval of IOP (mmHg) for 10 eyes of 10 patients with severe glaucoma at baseline and over time show the efficacy of GDI implantation and Healaflow®.[14]

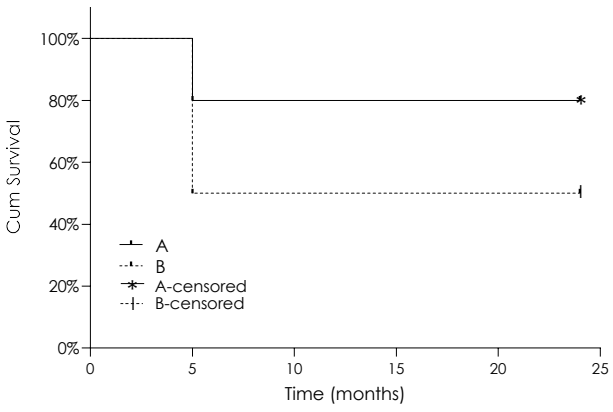

Figure 11 Kaplan-Meier survival curve after GDI implantation. Surgical success was defined as IOP <21 mmHg with ≥40% reduction in IOP by definition A (curve A) or ≥50% reduction in IOP by definition B (curve B) from baseline on 2 consecutive follow-up visits, IOP >5 mm Hg on 2 consecutive follow-up visits, and neither reoperation of glaucoma nor loss of light perception vision.[14]

Further applications of Healaflow

PERSISTENT OCULAR HYPOTONY

ADMINISTRATION SITE

Anterior chamber

INJECTED AMOUNT

Regular intracameral injection of 0.15-0.60 mL (0.1–0.2 mL for phakic or pseudophakic patients and 0.2–0.4 mL for aphakic patients). The average time between injections is about 4 to 9 months.[16]

TECHNIQUE

Caution is advised when injecting phakic or pseudophakic eyes due to the risk of sustained pressure spikes and difficulty removing the highly viscous Healaflow®. Lower injection volumes initially may help assess the eye's response and guide future adjustments. Close IOP monitoring within the first 24 hours is recommended, especially for patients with advanced glaucomatous optic disc damage.[16]

BENEFITS

- Healaflow® has effectively prevented long-term ocular hypotony complications. Post-treatment, visual performance improved, significantly enhancing quality of life while reducing the need for frequent interventions.[16]
- Healaflow® may break the cycle of hypotony, blood-aqueous barrier breakdown, inflammation, and edema, which leads to decreased aqueous production and persistent hypotony. Early intervention, before permanent structural changes occur, could enable novel treatments for hypotony.[16]

HEALAFLOW AS A RETINAL PATCH

ADMINISTRATION SITE

Cover the entire surface of all retinal tears.

INJECTED AMOUNT

The amount of Healaflow® injection was determined according to the size of the tears.[17]

TECHNIQUE

Apply Healaflow® combined with air tamponade after pars plana vitrectomy in patients with rhegmatogenous retinal detachment (RRD), using a 27-Gauge needle. Inject Healaflow around and all over the surface of the retinal tear.[17]

BENEFITS

- Healaflow® combined with air tamponade achieves a high reattachment rate in RRD treatment, with primary reattachment in 97.4% of cases and final attachment in all eyes.[17]
- Visual recovery was faster than with vitrectomy using only long-acting gas tamponade, and no post-surgery positioning was required, improving patient comfort.[17]
- Patching Healaflow® over the retinal tear provides extended support, aiding early visual recovery with fewer complications than long-acting tamponade.[17]

LACRIMAL DRAINAGE SYSTEM REPAIR

ADMINISTRATION SITE

Through the lower lacrimal point and then pushed forward through the lower lacrimal canal to the lateral wall of the nasal bone (lacrimal sac).[18]

INJECTED AMOUNT

Until it appears in the lower nasal passage.[18]

TECHNIQUE

In patients with rhinological pathology, reporting epiphora, Healaflow® was injected one day after the operation aimed at elimination of nasal cavity pathology. Ask the patient to sit, look up, and press their chin to their chest. Insert the cannula through the lower lacrimal point, advancing it through the lower lacrimal canal to the nasal bone's lateral wall. Inject the gel until it appears in the lower nasal passage. Slowly remove the cannula while continuing the injection. Monitor the lacrimal sac filling to control the gel injection process.[18]

BENEFITS

- In patients with lacrimal disorders and epiphora, Healaflow® enhances drainage and prevents scarring in the complex treatment of lacrimation system impairments.[18]
- The Healaflow® drainage implant is a safe, easy-to-apply, and well-tolerated solution that reduces excessive lacrimation and improves quality of life without side effects.[18]

ANIMAL MODELS: RETINAL PATCH

VARIOUS APPLICATIONS

Healaflow® is widely used in animal models (rats, rabbits) as a retinal patch following pars plana vitrectomy (PPV) and sclerectomy.[6,17,19-21]

INJECTED AMOUNT

0.5-1.0 mL Healaflow® is injected into the vitreous cavity of rabbit eyes.[6,21]

TECHNIQUE

Perform a central vitrectomy, leaving the peripheral vitreous intact to minimize the risk of traumatic cataracts, especially given the relatively large lens of the rabbit. After completing the fluid-air exchange, inject approximately 1 mL of Healaflow® using a 25 G needle. Suture the sclerotomies and conjunctiva if necessary.[21]

BENEFITS

- Healaflow offers strong, durable adhesion, ease of acquisition and preservation, and straightforward delivery to the retina, making it effective for covering retinal breaks.[17,19]
- It maintains its viscous structure in the vitreous cavity for at least a couple of weeks, potentially providing effective short-term tamponade.[21]
- Due to its structure and composition resembling natural vitreous, Healaflow exhibits excellent biocompatibility.[6]

Further applications of Healaflow

ANIMAL MODEL: INDUCING OCULAR HYPERTENSION

ADMINISTRATION SITE

Healaflow® is frequently used in animal models to induce ocular hypertension, allowing for the investigation of anatomical, functional, and molecular effects of hypertension over the short and long term.[22]

INJECTED AMOUNT

Three µL in the anterior chamber of rats is enough to induce ocular hypertension.[22]

TECHNIQUE

Insert a sterile 32-G needle into the anterior chamber parallel to the iris along the limbus, and create a self-sealing corneal tunnel. Carefully inject 3 µL of Healaflow® to avoid iris and lens damage. Once the iris turns white, slowly withdraw the needle, and use a cotton swab to compress the injection site for 30 seconds to minimize aqueous leakage.[22]

BENEFITS

- A single intracameral Healaflow® injection induced ocular hypertension, with an IOP peak within 1 day, then gradually decreased over the next 4 weeks.[22]
- A single injection causes a longer-lasting IOP elevation than hyaluronic acid or 0.3% carbomer.[22]
- Healaflow® is more cost-effective and easier to inject into the anterior chamber than microbeads or magnetic microbeads.[22]
- This surgical protocol is simple, safe, and reliable for inducing ocular hypertension without significant complications.[22]

ASHRAF ARMIA
Egypt

- During trabeculectomy, dissect the Tenon's capsule and conjunctiva as far posteriorly as possible.
- The procedure should address three areas: the cornea, trabeculae, and sclera.
- Ensure the peripheral iridectomy is full-thickness and placed at the base of the trabeculectomy, as far peripherally as possible.
- Properly close the scleral flap before applying Healaflow beneath it.
- Inject Healaflow® into all areas beneath the Tenon's capsule and conjunctiva, extending as posteriorly as possible.
- Take care to close the conjunctiva accurately.

ANDRÉ MERMOUD
Switzerland

- Within 1 to 2 days after injection, Healaflow® solidifies in the eye, contributing to its stability.
- Based on my observations, it remains in the eye for at least 3 months.
- As younger patients are likely to experience more excessive scarring in the subconjunctival and subchoroidal spaces, I recommend applying Healaflow in these areas as well.
- Subconjunctival Healaflow® typically disappears within 2 months, while it remains longer in the choroid.
- Additionally, Healaflow® can be injected under the scleral patch to provide resistance.
- In my clinical experience, Healaflow® does not induce inflammation, and eyes treated with it typically remain calm.

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