

Micro Perforating Deep Sclerectomy: A New Modification of Non Penetrating surgeries to Improve results and Flatten learning Curve

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Introduction

The High intra ocular pressure (IOP) is the only risk factor that we can control in glaucoma treatment, and it has been shown that reducing this pressure will stop or reduce glaucoma progression. Usually, when the patients diagnosed, we will start treatment with drops that reduce aqueous humor production or increase its out flow in the trabecular mesh work in order to reduce the pressure inside the eye. But sometimes, this reduction is not enough and we can't reach to our planned Target Intraocular pressure and it's necessary to plan a surgical procedure that could reduce this pressure even more to finally achieve our intended IOP.

Glaucoma surgery has multiple variations but the gold standard procedure is still the trabeculectomy, creating a pathway from the anterior chamber, to the subconjunctival space by a scleral ostium and peripheral iridotomy. This surgical technique is usually not very difficult to perform, but the chances of having surgery or post operation complications are very high, specially, those related to ocular hypotension due to unexaggerated and not controlled out flow. Another usual problem is when we try to control or reduce the out flow, and we perform really small ostiums or very tight sutures in the scleral flap and we get a poor result in the reduction of the intraocular pressure.

So there are many options to develop a surgery that can provide good intraocular pressure reduction with fewer complications than the penetrating procedures like trabeculectomy or valve implants. The development of Non penetrating Deep Sclerectomy became one of the most promising of this new surgical techniques. It is described as a good option for open angle glaucoma, especially if the target IOP, is not very low, or when the risk of hypotonic is high (phakic, nanophthalmos,

Hypermetropia). This technique consist carving a first superficial scleral flap of about 4 or 5 mm wide and 1/3 of scleral thickness, then its carved a second Deep scleral flap is about 3 to 4 mm and almost 2/3 of scleral thickness arriving just choroid darkness. This Deep flap goes forward until we see the change of the scleral fibers when the scleral spur is located, then we find the external Wall of Schlemm's canal, Schwalbe's line and continue forward at least one or two millimeters into clear corneal stroma. At this moment an anterior chamber paracentesis can be done to avoid prolapse of schlemm's canal tissue or the perforation of this very thin tissue that remains between anterior chamber and the outside, that we call trabeculo-Desemet membrane. These cond deepest flap is cutted and then next step is to remove that schlemm's canal outer Wall and at that moment we will see a continue controlled filtration or aqueous humor, without collapsing or abrupt compression of the anterior chamber.

This technique has shown good results in intraocular pressure reduction, compared to trabeculectomy, with an important difference in the incidence of complications related with hypotonic (atlamy, cataracts, endothelial damage, hypotonic aculophaty, retinal detachment, choroidal effusion or detachment) or to the communication of the outside environment with the inside of the eye (Endophthalmitis).

This is a safe, effective technique but with a very high learning curve, especially at the moment of the second Deep flap carving when the trabeculo-descemet membrane is created, the perforation of this very thin tissue is a common complication and usually learning specialists try to avoid it by not going very Deep, over the choroidal plane and that is a reason, why the surgeons can't get the correct plane, that will guarantee and adequate aqueous filtration trough the trabeculode scemic membrane into the scleral lake as a decompression chamber,

sub conjunctival space. The use of laser goniopunctures were needed to get the IOP lowering effects expected.

This was our main problem when we tried to learn and teach this technique in Bolivia, we had to convert to trabeculectomy due to perforation or not enough IOP lowering effect.

The solution was to perform the surgery with the same steps as the original but when we found the remaining tissue was too thick to achieve a good filtering function, the risk of perforation trying to go deeper, we used a 30 gauge needle to perform about 5-10 micro perforations in the trabeculode scemetec like membrane we created, turning this membrane into a net like tissue that kept the resistance of the aqueous out flow, avoiding fast decompression problems. And hypotony problems in the post operation period without requiring an extra procedure like yag laser goniopunctures or surgery revision.

Results

66 cases have been conducted from which (9.09%) should have been turned into trabeculectomy by perforation of the trabecular descemetec membrane. On a 3-year average follow-up, a 17±3 IOP was obtained during the first year in 54 patients (81,8%) in 50 (75,7%) after 2 years, and in 48 patients (72,7%) after 3 years of control, and them education had to be restarted in the rest. Out of the operated patients, only 7 required a new surgical procedure (Ahmed valve implant) on the 3rd year of the follow-up. No cases of hypotonia, at halaria, choroid detachment or end ophthalmitis were reported 3 years after the control.

Conclusions

On our first years of experience with the non penetrating Deep sclerectomy, we found our selves continuously with the situation of membrane perforation, or a thicker, non functioning membrane created. We need to turn many surgeries into big trabeculectomies, that increased the incidence of hypotony related complications in the post operatory time or if we were conservative, filtering surgeries that worked bad or didn't work at all, needing new medications, new surgeries, or yag laser retreatment.

Turning Non Penetrating Deep sclerectomy surgeries into Micro Perforation Deep Sclerectomy give us a safe, effective option, that we used a lot in the beginning, with practice and gaining experience. We need to use less over time, once having dominated the surgery planes we needed to reach, when the learning curve was passed.

Its is a good option for learning residents or experienced surgeons who want to start with the Non penetrating surgeries to reduce the chances of complications and increse effectiveness of the filtering technique, until they achieve the needed practice to perform a perfect flaps carving and reaching a trabeculo-decemet level needed to really reduce IOP.

Learning non penetrating surgeries, allows Glaucoma surgeons to identify and reach schlemm's channel, and that opens options for other Glaucoma surgeries, like visco canalostomy, canaloplasty, or trabeculectomy.