

New Promising Technique in Regulating Low IOP Using PRP

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Received: October 22, 2019; **Published:** November 14, 2019

Abstract

Purpose: To report a new surgical technique for the treatment of severe ocular hypotony by injecting autologous platelet-rich plasma in the anterior chamber.

Method: 4 cases were presented to our clinic with dramatic decrease in the intra-ocular pressure. First case was an Axenfield Rieger's with express Valve using mitomycin C. Second case presented with corneal Perforation after keratopigmentation. Third case diagnosed as juvenile chronic Uveitis. Fourth case underwent Cy-Pass Valve implantation. The four cases received an isolated injection of 0.3 ml of autologous platelet rich plasma in the anterior chamber.

Results: Intraocular pressure (IOP) measured by Goldman's applanation tonometry 6 hours after the procedure improved to reach normal IOP. IOP remained stable along the full follow-up period of 6 month. No filtration or hypotony or any intra or postoperative complications were observed.

Conclusion: Intracameral platelet rich plasma (E-PRP) injection was an effective, rapid, and safe procedure for treatment of severe chronic ocular hypotony in the absence of any postoperative complications.

Keywords: Hypotony; Platelet-Rich Plasma; Filtration; Cy Pass Valve; Glaucoma Surgery; Perforation

Abbreviations

IOP: Intraocular Pressure; MMC: Mitomycin c; EPRP: Eye Platelet Rich Plasma

Introduction

Normal IOP is usually between 12 and 22 mm Hg. Hypotony is defined as an intraocular pressure (IOP) of 5 mm Hg or less [1]. Ocular hypotony can adversely impact the eye in many ways, including corneal decompensation, accelerated cataract formation, macular edema, disc edema, hypotony maculopathy, and exudative retinal detachment. There are many surgical and non-surgical treatment options to treat it. The non-surgical procedures like using contact lenses which have little long lasting effect and negatively affecting the cornea, the surgical interventions include injection of viscoelastic into the anterior chamber, trans-conjunctival flap suturing, repeated intra-vitreous injections of highly reticulated hyaluronic acid, long term use of silicon oil fill [2-4]. While injections of viscoelastic and blood usually have little long-lasting effect, silicon oil causes pupillary block glaucoma, and techniques to reduce the transcleral flow by suturing or tissue patching can lead to massive elevation of the intraocular pressure (IOP), thus we need further pressure-reducing interventions.

Eye Platelet rich plasma (E-PRP) is a blood derived product that contains more concentrated platelets than whole blood and can be obtained via centrifugation from whole blood mixed with anticoagulant. Platelets contain variety of cytokines and growth factors. The α -granules within these platelets liberate platelet-derived growth factors, platelet-derived angiogenesis factor, platelet factor IV, and transforming growth factor (TGF)- β which has an important anti-inflammatory action [5,6]. It has many ocular surface applications such as in dry eye [7], dormant corneal ulcer [8] and it is also used surgically as sutured clot of autologous fibrin membrane in big neurotrophic corneal ulcers or imminent/already perforated eyes. In this case report E-PRP has been used in treating a chronic progressive hypotony resistant to all ways of management.

Materials and Methods

First case a 49 years old Caucasian male was attended in our center diagnosed with bilateral Axenfield Rieger Syndrome [9] suffering of progressive right eye visual loss. Clinical examination of the right eye revealed very low endothelial cell count (1028 CD/mm²), elevated IOP and cataract. Phaco-emulsification and IOL implantation was done without intraoperative complications. The patient was then prepared for an Ex-press valve filtering surgery with mitomycin C 0.02% for 2 minutes. Cornea returned transparent with a well formed diffuse bleb with negative filtration and normal IOP. Two years later, IOP started to decrease dramatically reaching zero mmHg because of an ischemic avascular bleb, associated to evidence of atrophic and thinner sclera at the quadrant affected by the MMC application.

Second Case was a 75 years old lady who was presented with traumatic corneal opacity which led to blind and cosmetically deformed eye. The patient underwent keratopigmentation. Hypotony here occurred due to micro-perforation during the surgery.

Third Case was a 6 yrs old girl diagnosed as juvenile rheumatoid arthritis, hypotony is one of the most important complication of chronic uveitis with onset at a younger age [10] where here IOP decreased dramatically reaching (1 mmHg) for 2 months, non-treatable by any of traditional ways.

Fourth case was an 88 years old lady following Cy-pass valve implantation. This lady came with elevated IOP due to non-functioning Express micro-valve. We replaced it with Cy-pass valve then after a year she developed hypotony for 1 month and macular edema resistant to all ways of management.

The 4 patients were scheduled for an intracameral injection of 0.3 ml of autologous platelet rich plasma (E-PRP).

Intracameral PRP injection should be done in a clean room, a room dedicated to intraocular injections and sterile interventions.

A good light is needed; the patient has to lie comfortably in a flat position.

Equipment:

- Prepared PRP as described in previous reports from our group [5-8].
- Syringe (1 ml) for injecting 0.3 ml of autologous platelet rich plasma.
- 5% (aqueous) povidone iodine solution for disinfecting the skin and conjunctiva.
- Eyelid speculum
- Topical anaesthetic drops
- Topical antibiotic drops
- Calliper.

Technique:

- First of all you have to reassure the patient and explain every step of the procedure to him/her.
- Patient will lie down comfortably; scrub your hands then wearing the surgical sterile gloves
- Disinfect the skin and conjunctiva with 5% aqueous iodine, then dry the skin around to remove excess iodine with a sterile drape then put the eyelid speculum
- Instil one drop or two drops of anaesthetic drops and antibiotic drops. Drops will work after two minutes.
- Use the calliper for measuring a safe distance behind the limbus in the inferotemporal quadrant. In pseudophakic patients it will be 3.5 mm and in phakic patients with their own lens it will be 4 mm.
- Inform the patient you are about to inject so as not to move, insert 1/3 of the needle, inject the autologous PRP and then remove the needle.
- Check the patient’s vision then add another 2 drops of antibiotic
- Prescribe antibiotic drops twice for 5 days.

IOP was measured by Goldman’s applanation tonometry 6 hours after intracameral injection it was 19 mmHg. Slit lamp biomicroscopic examination showed mild edematous cornea with well-formed anterior chamber and the PRP clot can be seen filling the AC, with rounded regular reactive pupil. The anterior segment OCT scan in the 1st day PRP clot filling the anterior chamber, 2 weeks later it showed remnants of E-PRP stuck in the corneal periphery.

Intraocular pressure (IOP) measured by Goldman’s applanation tonometry 1 hour after the intracameral injection of E-PRP, was 30 mmHg; 6 hours later it was 18 mmhg. Anterior segment OCT scan showed remnants of E-PRP stuck in the corneal periphery.

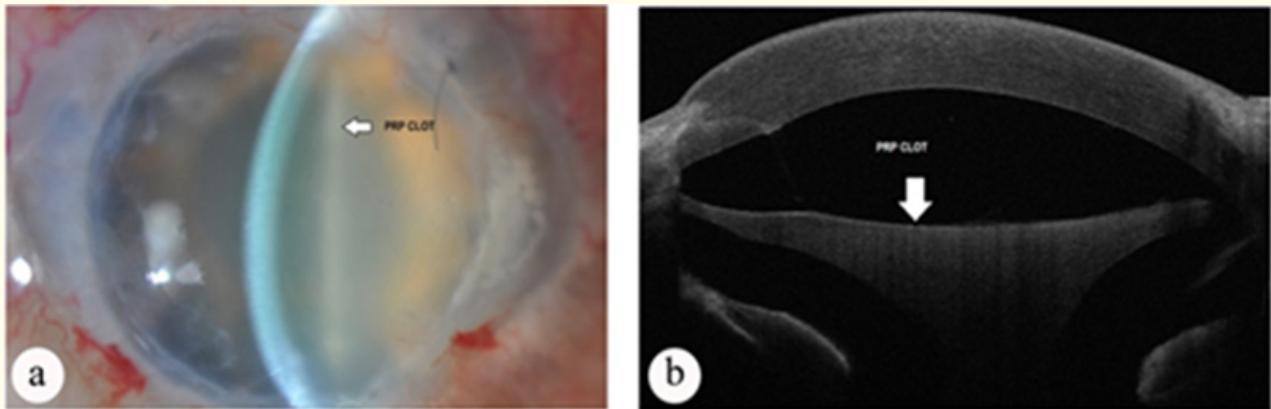


Figure 1: PRP Clot: (a) Slit lamp shows PRP clot filling AC; (b) Anterior segment OCT showed remnants of E-PRP stuck in the corneal periphery.

YAG laser (3 - 4 mJ/Pulse, for 2 msec) was used to dissolve the E-PRP remnants 2 weeks later. While the cornea retained its thickness and transparency without folds, IOP was controlled and became within the normal range (12 - 21 mmHg), and E-PRP was almost vanished at both bio microscopy and OCT scan.

Results and Discussion

Ocular hypotony has two types: statistical and clinical hypotony. "Statistical" hypotony is defined as an intraocular pressure (IOP) of less than 6.5 mmHg. "Clinically significant" hypotony is when a patient's IOP is so low that there is resultant visual loss. Hypotony has also been described as "low pressure in an individual eye, leading to functional changes and structural changes". Hypotony encountered in the ophthalmologist's practice, with many cases being caused by glaucoma surgeries, as here in this case report. Hypotony can occur early (within the first two weeks after surgery), or late (over two weeks). Here the causes of hypotony was scleral atrophy and an over filtering and leaky conjunctival bleb, both related to MMC toxicity, so the aqueous outflow was increased and uncontrolled. This risk is increased in antifibrotic agents like mitomycin C are used [11].

Actually, platelet rich plasma (E-PRP) offers new surgical perspectives in many fields of medicine helping in wound healing, it represents a greater similarity to the natural healing process as a composite of multiple growth factors, is safe due to its autologous nature and has both mitogenic and chemotactic properties. E-PRP functions as a drug delivery system and a tissue sealant.

Conclusion

All cases confirm the effectiveness and safety of the intraocular use of E-PRP to successfully recover desperate cases of chronic hypotony non responsive to alternative medical and surgical treatment options.

Conflict of Interest

The authors, their families, their employers and their business associates have no financial or proprietary interest in any product or company associated with any device, instrument or drug mentioned in this article. The authors have not received any payment as consultants, reviewers or evaluators of any of the devices, instruments or drugs mentioned in this article.

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Volume 10 Issue 12 December 2019

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