

# Ex-PRESS Miniature Glaucoma Shunt in Treatment of Refractory Glaucoma

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## ABSTRACT

*Refractory glaucoma in a complicated type of glaucoma of different etiologies with one same characteristic – intraocular pressure of great resistance to therapy. There are different methods of treatment in such glaucomas, primary surgical options. Ex-PRESS miniature glaucoma shunt implantation was our treatment of choice. In our group of patients we achieved stable intraocular pressure values in 4 month period of time with no serious or unexpected complications.*

**Key words:** glaucoma, Ex-PRESS, drainage implants, glaucoma valve, tube surgery

## Introduction

Refractory glaucoma is an uncommon type of glaucoma that is difficult or nearly impossible to treat. It is a case of glaucoma with high intraocular pressure (IOP), medically uncontrolled. Previous failed guarded filtering surgery (trabeculectomy) is also characterized as refractory. The main characteristic of this type of glaucoma is its great resistance to IOP reduction with traditional medical or surgical treatment. All types of glaucoma can be refractory, primary or secondary, open angle or angle closure glaucoma. There are different types of surgical management of refractory glaucoma-tubes and valves implantation- Ahmed glaucoma valve implantation, Molteno valve, Baerveldt implant, Ex-PRESS miniature glaucoma shunt, destructive procedures-ND:Yag laser and diode laser cyclophotocoagulation. Shunt devices are introduced as an alternate means to improve poor long termed outcomes of trabeculectomy particularly in refractory glaucoma cases<sup>1</sup>. Ex- PRESS miniature glaucoma shunt device shunts aqueous from the anterior chamber to a subconjunctival space in a similar way as trabeculectomy<sup>2</sup>. It is a non valved 3 mm long device, external diameter approx. 400 microns<sup>3</sup>. It is implanted under a scleral flap<sup>4</sup>. The advantages of Ex-PRESS miniature glaucoma shunt are atraumatic implantation, less complications and inflammation, low diffuse blebs and high success rate.

## Methods

Ten eyes in 10 patients with refractory glaucoma, with high intraocular pressure on maximum antiglaucomatous medical therapy. Four patients had pseudoexfoliative glaucoma, 3 neovascular glaucoma, 1 secondary glaucoma and 3 patients with primary open angle glaucoma that already had trabeculectomy. We used parabolbar anesthesia with supplemental intracameral lidocaine injection. We performed shunt implantation in standard procedure without complications, implants were well positioned. In 3 patients we performed combined two-site surgery PHACO with implantation of acrylic IOL followed by filtering surgery – Ex-PRESS miniature glaucoma shunt implantation. All surgery was performed by the same surgeon, in Department of Ophthalmology, General Hospital Zadar. Postoperatively we recommended combined antibiotic and steroid drops every four hours in the first week followed by taper. Evaluated parameters were intraocular pressure, visual acuity and slit lamp examination on 1st, 7th postoperative day, 1 month and monthly 4 months after surgery.

## Results

Baseline intraocular pressure was 32–56 mmHg, baseline visual acuity was light perception in 4 patients, hand

**TABLE 1**  
PATIENTS – PRE AND POSTOPERATIVE FINDING

	CAT.	Preop.		1st post op day			7th post op day			1 month post op			4 months post op		
		IOP baseline	VA baseline	IOP	VA	Ant. segm.	IOP	VA	Ant. segm.	IOP	VA	Ant. segm.	IOP	VA	Ant. segm.
Neo 1	No	38	LP	12	LP		16	LP		14	LP		16	LP	
Neo 2	Yes	46	LP	14	LP		18	LP		18	LP		20	LP	
Neo 3	Yes	48	LP	10	LP	Shall. AC	20	LP		16	LP		14	LP	
Neo 4	No	56	LP	8	LP	Flat AC	18	LP	Shall. AC	14	LP		18	LP	
Pex1	Yes	40	0.01	14	0.08		16	0.1		12	0.4		16	0.5	
Pex2	Yes	36	0.02	12	0.03		14	0.03		16	0.1		16	0.3	
Pex3	No	38	HM	8	HM	Flat AC	18	HM	Shall. AC	18	HM		18	HM	
SEC glauc.	No	32	0.05	10	0.05	Shall. AC	14	0.07		14	0.07		16	0.08	
TTC	Yes	40	0.05	14	0.07		12	0.08		16	0.8		16	0.08	
TTC	Yes	32	0.08	10	0.08	Shall. AC	10	0.1		14	0.3		16	0.4	
M		40.6		11.2			15.6			15.2			16.6		
$\sigma$		7.47		2.35			3.10			1.93			1.65		

M – arithmetic mean;  $\sigma$  – standard deviation; Neo – neovascular; Pex – pseudoexpholiative; SEC – secondary; TTC – trabeculectomy; CAT – cataract; IOP – intraocular pressure; VA – visual acuity; LP – light perception; HM – hand motion

motion in one patient and 0.01–0.08 in 5 patients. Intraocular pressure in 1st postoperative day was 10–14 mmHg in 8 patients and 2 patients had hypotonia, visual acuity was light perception in 4 patients, hand motion in 1 patients and 0.03–0.08 in 5 patients, slit lamp examination showed flat anterior chamber in 2 patients, shallow in 3 patients and normal anterior chamber depth in 5 patients. Seventh postoperative day measured intraocular pressure was 10–20 mmHg, visual acuity was light perception in 4 and hand movements in 1 patient, 0.03–0.1 in 5 patients, slit lamp examination showed shallow anterior chamber in 2 patients and normal anterior chamber depth in 8 patients. Four months after surgery intraocular pressure was 12–18 mmHg, visual acuity light perception in 4 patients, hand movements in 1 patient, 0.07–0.8 in 5 patients, slit lamp examination showed normal anterior chamber depth in all patients. None of the patient used any medical therapy 4 months after surgery. Table 1 presents patients findings prior the procedure and in postoperative period during follow up. Table 2 presents only IOP findings in the same period of time.

**Discussion and Conclusion**

The major objective of treatment in glaucoma is the decrease of IOP while maintaining the patient’s vision and quality of life. Despite the possibilities some types of glaucoma remain refractory to treatment with remanance of high IOP and further progression of the disease<sup>5</sup>. Studies showed that shunt surgery and trabeculectomy with MMC are both viable surgical options for glaucoma patients who undergone prior failed filtering surgery<sup>6,7</sup>. Results of the Tube Versus Trabeculectomy Study (TVT Study) support

**TABLE 2**  
IOP VALUES

	Preop.	1st post op day	7th post op day	1 month post op	4 months post op
	IOP baseline	IOP	IOP	IOP	IOP
Neo 1	38	12	16	14	16
Neo 2	46	14	18	18	20
Neo 3	48	10	20	16	14
Neo 4	56	8	18	14	18
Pex1	40	14	16	12	16
Pex2	36	12	14	16	16
Pex3	38	8	18	18	18
SEC glauc.	32	10	14	14	16
TTC	40	14	12	16	16
TTC	32	10	10	14	16
M	40.6	11.2	15.6	15.2	16.6
$\sigma$	7.49	2.35	3.10	1.93	1.65

M – arithmetic mean;  $\sigma$  – standard deviation, Neo – neovascular, Pex – pseudoexpholiative, SEC – secondary, TTC – trabeculectomy, IOP – intraocular pressure

the expanding use of tube shunts. The two most common use devices are Ahmad and Berveldt valve. Studies report similar baseline characteristics and similar number of intraoperative complications for both devices<sup>8,9</sup>. There also studies evaluating additional glaucoma drain-

age implant (GDD) insertion in eyes with refractory glaucomas that have failed primary GDD. Those studies agree that the GDD insertion is the best option in treating refractory glaucoma even in cases of failed primary GDD<sup>10</sup>. Ex-PRESS miniature glaucoma shunt is an alternative in anti-glaucoma surgery<sup>11</sup>. Standard trabeculectomy and Ex-PRESS shunt are reported to have similar efficacy and safety profile while the cost of the shunt can make its use unjustified, especially as a primary procedure<sup>12</sup>. In some glaucoma cases not responding to maximum antiglaucoma therapy as in cases of prior and unsuccessful trabeculectomy the implantation of Ex-PRESS miniature glaucoma shunt is effective in lowering of intraocular pressure as

the main expected outcome of the procedure. There are also reports of comparison of using MMC or Ologen with Ex-PRESS – they suggest similar surgical success in both cases<sup>13</sup>. In our cases we used Ex-PRESS miniature glaucoma shunt with MMC in group of refractory glaucoma cases of different etiologies. In all cases we achieved the desired result – lowering the intraocular pressure and avoiding any topical antiglaucomatous therapy. Visual acuity after surgery was the same or better, especially in patients with combined cataract surgery and shunt implantation. We also had no unexpected adverse effects and complications confirming excellent safety profile.

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## EX-PRESS MINIATURE GLAUKOMA SHUNT U TERAPIJI REFRAKTERNOG GLAUKOMA

### SAŽETAK

Refrakterni glaukom je komplicirani glaukom, različite etiologije. Zajednička karakteristika svih tipova refrakternog glaukoma je povišen intraokularni tlak koji ne reagira na terapiju. Različite su metode liječenja takvog tipa glaukoma uglavnom operativne. Implantacija Ex-PRESS miniature glaukoma shunta bila je naša metoda izbora. U našoj grupi pacijenata nakon operacije i u periodu praćenja od 4 mjeseca postigli smo stabilne vrijednosti intraokularnog tlaka bez neočekivanih komplikacija.