

# Ahmed Glaucoma Valve Implantation Experience at King Hussein Medical Centre

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## ABSTRACT

**Objectives:** To evaluate Ahmed Glaucoma Valve Implantation at King Hussein Medical Center. Indications, outcomes, and complications were investigated.

**Methods:** The medical records of all patients who had Ahmed Glaucoma Valve Implant surgery at King Hussein Medical Center during the period between August 2006 and January 2009 were retrospectively reviewed. A total of 50 cases were enrolled in this study. A specially designed medical record abstract form was used to collect the following data: type of glaucoma, visual acuity, intraocular pressure, number of medications, and postoperative complications. Simple descriptive statistics (frequency, mean, percentage) were used to describe the study variables

**Results:** The mean age of patients was  $54.3 \pm 2.1$  years (range 1.3 to 79.9 years). Types of glaucoma included uveitic glaucoma, paediatric glaucoma, aphakic/ pseudophakic glaucoma, neo-vascular glaucoma, traumatic glaucoma and previous failed trabeculectomy. The mean follow-up duration was  $16.6 \pm 1.7$  months (range 9.8 months to 26.1 months). The mean intraocular pressure before surgery was 28.6 mm and 14.2 mmHg after surgery. The mean number of eye drops used by patient was  $3.8 \pm 0.4$  (range 1 to 4) and  $1.1 \pm 0.2$  (range 0 to 3) before and after surgery respectively. Transient postoperative hypotony with shallow anterior chamber occurred in 8 patients. Encapsulated bleb occurred in 5 patients. Revision of the procedure was performed in 3 cases. Endophthalmitis was not encountered in our series.

**Conclusion:** Results of Ahmed Glaucoma Valve Implantation surgery at King Hussein Medical Center showed that it is safe and effective procedure for treating refractory glaucomas.

**Key words:** Ahmed valve, Encapsulated bleb, Implant and refractory glaucoma.

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## Introduction

Glaucoma can lead to devastating visual loss if not adequately controlled. There are cases of refractory glaucoma that do not respond to medical treatment or trabeculectomy. Examples include paediatric, uveitic, neo-vascular, traumatic, aphakic/pseudophakic glaucoma and previous failed trabeculectomy. Glaucoma drainage implants are useful alternatives in treating refractory

glaucomas.<sup>(1-5)</sup> Among these implants is Ahmed Glaucoma Valve Implantation.

The Ahmed glaucoma valve was introduced in 1993. It provides resistance to the aqueous outflow compared to traditional trabeculectomy. A folded silicone membrane forms the valve that opens at certain intraocular pressure level, thus draining aqueous from the anterior or posterior chamber to an extra-scleral device that maintains a fibrous bleb

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through which filtration can occur.<sup>(6)</sup> An advantage of this mechanism is a decrease in the reported occurrence of postoperative hypotony compared to previous implants.<sup>(7-8)</sup> However, complications may occur such as tube obstruction by inflammatory debris, diplopia and tube erosion.<sup>(9-10)</sup> Other complications that may occur after any filtering surgery may also occur such as hyphaema, cataract, corneal decompensation, choroidal and retinal detachments and failure of the procedure.

The aim of the study was to evaluate Ahmed Glaucoma Valve Implantation experience at King Hussein Medical Center. Indications, outcomes and complications were investigated.

## Methods

The medical records of all patients who had Ahmed Glaucoma Valve Implant surgery at King Hussein Medical Center during the period between August 2006 and January 2009 were retrospectively reviewed. A total of 50 cases were enrolled in this study. A specially designed medical record abstract form was used to collect the following data: type of glaucoma, visual acuity, intraocular pressure, number of medications, and postoperative complications. Simple descriptive statistics (frequency, mean, percentage) were used to describe the study variables. A total of 50 cases were enrolled in this study. Data collected included: type of glaucoma, visual acuity, intraocular pressure, number of medications, and postoperative complications. Results from our data collection were compared to other studies from literature.

Ahmed Glaucoma Valve itself consists of a silicone tube with an outer diameter of 0.635 mm and an inner diameter of 0.305 mm connected to a polypropylene or silicone plate with surface area of 184 mm<sup>2</sup>.<sup>(11)</sup>

Although all surgical procedures were performed by the same surgeon, patients' examination and follow-up were performed by a team of ophthalmologists. A fornix-based conjunctival flap was performed in the supero-temporal or supero-nasal quadrant. The valved implant was irrigated by balanced salt solution through the tube using 27-gauge cannula and then was tucked posteriorly into the inter-muscular sub-Tenon's space and sutured to sclera via 9-0 Prolene sutures through the anterior positional holes of the plate, with the anterior border placed 8 mm posterior to the limbus. The tube was cut and bevelled up to permit its extension 2 to 3mm

into the anterior chamber. The anterior chamber was entered through the cauterized limbal area with a 23-gauge needle 1.5 mm posterior to the limbus and parallel to the iris plane. The tube was inserted into the anterior chamber via the needle track using special designed tube insertion forceps and secured to the sclera with a loose 10-0 Nylon suture. The tube was covered with a rectangle of preserved sclera of approximately 5x7 mm.<sup>(2)</sup> The conjunctiva was sutured back to its original position using 8-0 Vicryl sutures. Sub-conjunctival steroids and antibiotics were injected at the completion of the procedure in a quadrant away from the surgical site. Postoperative topical steroid-antibiotic and cycloplegic preparations (prednisolone acetate 1%, ofloxacin, cyclopentolate eye drops) were prescribed for the first several weeks.

## Results

Table I summarizes the results of our study. The mean age of patients was 54.3 ± 2.1 years (range 1.3 to 79.9 years). Types of glaucoma included failed trabeculectomy, uveitic, aphakic/pseudophakic, neo-vascular, paediatric and traumatic glaucoma as presented in (Fig. 1). The mean follow up duration was 16.6 ± 1.7 months (range 9.8 to 26.1 months). The mean intraocular pressure before surgery was 28.6 mm and 14.2 mmHg after surgery (Fig. 2). The mean number of eye drops used by patient was 3.8 ± 0.4 (range 1 to 4) and 1.1 ± 0.2 (range 0 to 3) before and after surgery respectively (Fig. 3). Transient postoperative hypotony with shallow anterior chamber occurred in 8 patients. Encapsulated bleb occurred in 4 patients. Revision of the procedure was performed in 3 cases. Of these 3 cases, Intra Ocular Pressure (IOP) was controlled in 2 patients after revision and the other case received another implant. Endophthalmitis was not encountered in our series. Table II shows the complications that occurred in our series. Success rate was 90% and was defined by IOP between 5-21 mmHg with or without medication, no further glaucoma surgery, no devastating complications, and no loss of light perception. These four criteria were also used by Huang MC *et al*<sup>(13)</sup> to define success rate.

In our series, the most common indication for Ahmed implant surgery was previous failed trabeculectomy (16 eyes representing 32%) followed by uveitic (24%), aphakic/ pseudophakic (18%), neo-vascular (12%), paediatric (8%) and traumatic glaucoma (6%) (Fig. 1).

**Table I.** Summary of the study results including demographic and clinical characteristics

Number of patients	50
Number of eyes	50
Follow up (mean and range)	16.6 months
Age range and mean	1.3-79.9 years, 54.3 years
Gender male: female	27:23
Intraocular pressure (preoperative and one year postoperative)	28.6 mmHg → 14.2 mmHg
Mean Visual acuity in Snellen's fraction (preoperative and one year postoperative)	0.24 → 0.29
Mean number of medications (preoperative and one year postoperative)	3.8 → 1.1

**Table II.** Complications of the procedure

	No.	%
Transient hypotony	8	16
Progression of cataract	6	12
Encapsulated bleb	4	8
Uveitis	3	6
Choroidal detachment	5	10
Retinal detachment and loss of vision	1	2
Revision of procedure	3	6
Diplopia	1	2
Correctopia	1	2
Tube touching iris	1	2
Dellen ulcer	1	2

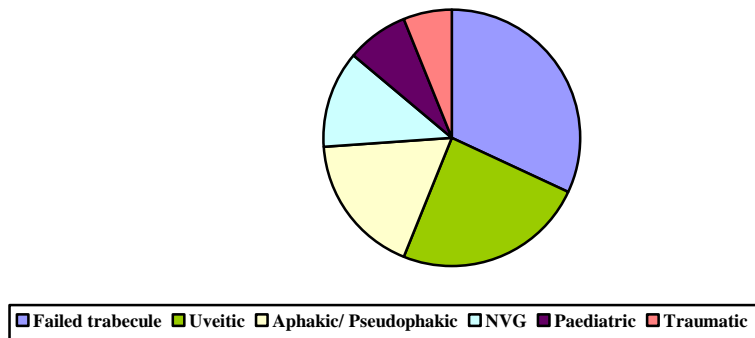
## Discussion

Glaucoma drainage implants had been used successfully for the treatment of refractory glaucomas such as previous failed trabeculectomy, uveitic, neo-vascular, traumatic, aphakic/pseudophakic, post penetrating keratoplasty, and paediatric glaucoma and irido-corneal endothelial syndrome. Our retrospective analysis showed high success rate for Ahmed Glaucoma Valve Implantation which was comparable to other studies in the literature.<sup>(6,12-13)</sup> The success rate of our series was 90%. Only 5 cases out of 50 showed failure. Four eyes had encapsulated bleb, 3 of them had procedure revision and the fourth eye received Diode Laser cyclophotocoagulation. The fifth case had loss of vision. This case was complicated by choroidal detachment and vitreous haemorrhage and eventually no light perception vision. All the three cases who their procedure revised showed good control in the first three months after surgery. Later on, intraocular pressure started to increase and became resistant to medications. Encapsulated bleb was seen in all patients. The types of glaucoma in those patients were pseudophakic, traumatic and neo-vascular. In order to decrease the frequency of procedure failure, local steroids were used postoperatively. Proper control of predisposing factor such as uveitis in uveitic glaucoma increased the incidence of success rate.

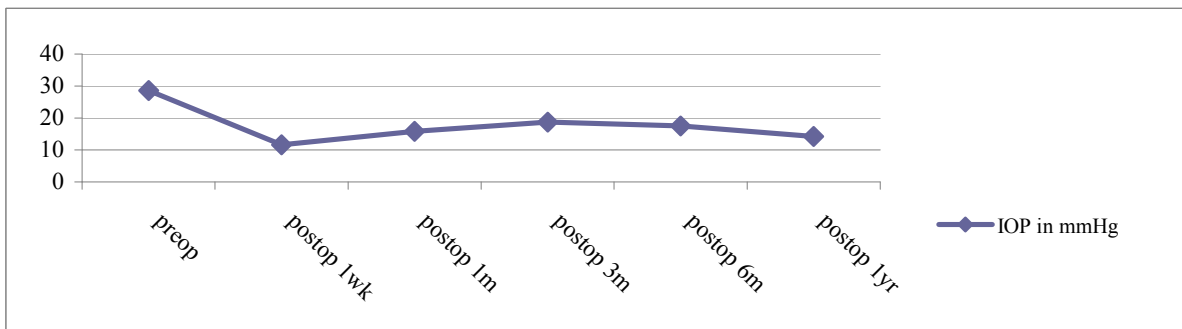
Figure 2 demonstrates the changes of intraocular pressure over a one year period. There was a dramatic drop of IOP in the first week postoperatively (28.6 mmHg to 11.6 mmHg) that was followed by a hypertensive phase till 3-6

months (11.6 mmHg to 18.7 mmHg), after that the IOP started to drop again (18.7 mmHg to 14.2 mmHg, Fig. 2). The number of eye drops used also showed changes similar to IOP change over a one year period (3.8 drops to 1.1 drops, Fig. 3). In addition, the drop of mean visual acuity in the first week postoperatively may be due to hypotensive phase (Fig. 4). Huang MC *et al*<sup>(13)</sup> conducted a study on 159 eyes and found a drop of IOP from 32.87 mmHg preoperatively to 15.9 mmHg postoperatively with a decrease of number of eye drops used from 2.7 to 1.1 drops and a success rate of 84%. Another study conducted by Lai and his colleagues<sup>(6)</sup> on 65 eyes showed reduction of IOP from 37 mmHg to 16.1 mmHg after Ahmed Glaucoma Valve surgery and a success rate of 73.8%. The period of transient elevation of intraocular pressure, termed the "hypertensive phase", has been described after glaucoma drainage implant surgery, appearing approximately 4 weeks after surgery and lasting at least 12 to 16 weeks.<sup>(14-15)</sup> The hypertensive phase may be transient in some patients. It is also claimed that its presence early in the postoperative period may be associated with an unfavourable outcome and most of these eyes may need continuing medical therapy. The hypertensive phase is thought to be more frequent with the Ahmed valve because of its reduced surface area.

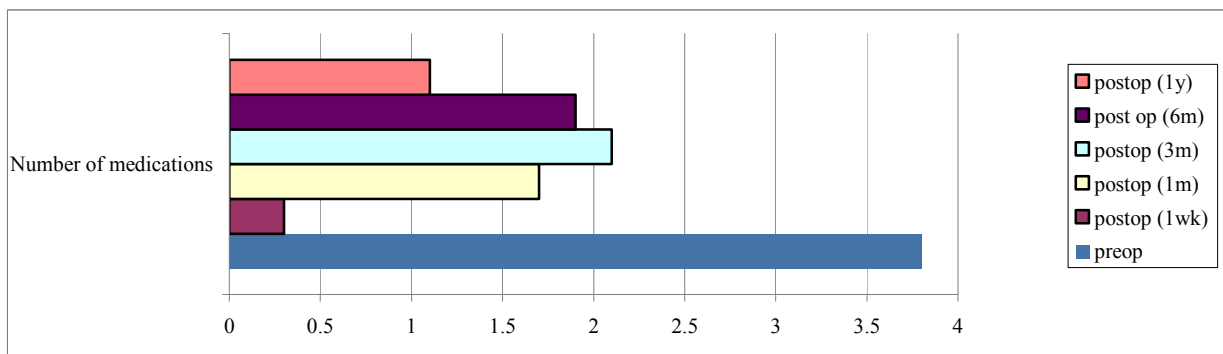
Table II illustrates the complications we encountered in our patients. Transient hypotony being the most common (16%), progression of cataract occurred in 6 eyes (12%), encapsulated bleb in 8%. Uveitis occurred in 3 patients; all of



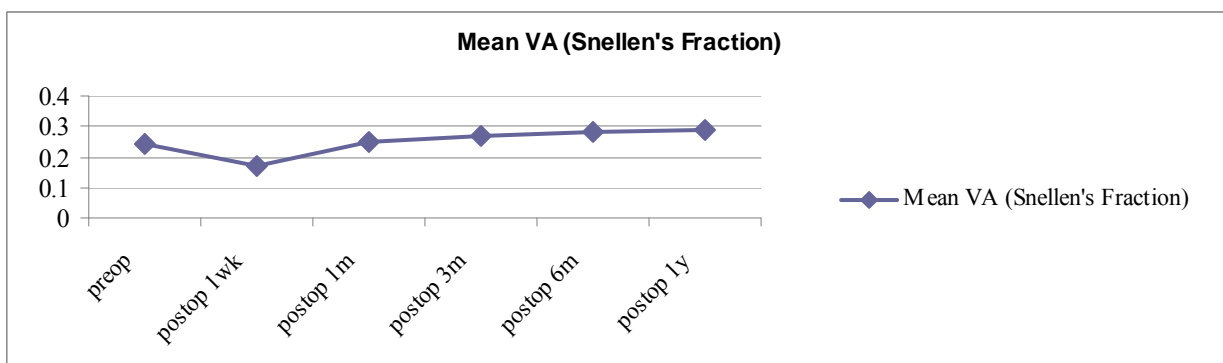
**Fig. 1:** Types of glaucoma



**Fig. 2:** Mean intraocular pressure changes over 1 year period



**Fig. 3:** Mean number of medications used over 1 year period



**Fig. 4:** Change of mean visual acuity (VA) (Snellen's Fraction) over 1 year

them had uveitic glaucoma. The procedure was revised in 3 patients. One patient had diplopia that was corrected by spectacles, and one patient had tube eroding the iris that did not require intervention. There was no case of tube eroding the cornea or endophthalmitis. Endophthalmitis was reported to occur in 0.8% to 6.3% of patients.<sup>(16-17)</sup>

## Conclusion

Results for Ahmed Glaucoma Valve Implantation surgery at King Hussein Medical Center showed that it is safe and effective procedure for treating refractory glaucomas.

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