Hypertensive –Phase After Ahmed Glaucoma Valve Implantation, Prevalence, Duration and Treatment, Our Experience In Royal Medical Services.

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ABSTRACT

Objectives: To determine the prevalence, duration, and treatment of hypertensive phase as an early complication after Ahmed Glaucoma Valve implantation.

Methods: This is a retrospective file review study including one hundred glaucoma patients who underwent Ahmed Glaucoma Valve (AGV) implantation in Royal Medical Services over the period of May 2017 and May 2018. The study group included 100 patients (47female,53male) who had been followed up for 12 weeks. Over these weeks, serial intra ocular pressure (IOP) measurements were documented from different visits. Post- operative follow up visits were scheduled after (one day, one week, 3weeks, 5weeks, 2months, and 3months). Hypertensive phase (HP) defined as IOP more than 21 mmHg. While resolution of hypertensive phase is an IOP less than or equal 21mmHg.

Results: The prevalence of HP was 43% (43 out of 100). The peak of occurrence was 3 weeks (range 1-12 weeks) with an average IOP 28 mmHg(range 22-34). Of those who had HP only 35% resolved and IOP returned to normal after 5weeks of treatment with ocular massage and anti-glaucoma eye drops. IOP readings that proceeded the HP were almost similar between the resolved and the non resolved HP.

Conclusion: The HP is a common complication after AGV surgery and portends a poor prognosis for IOP control. The majority of glaucoma patients who had HP continue to use anti-glaucoma medications after AGV surgery. IOP readings in the early post operative period could not predict the resolved from the non resolved HP.

Key words: Hypertensive phase , Ahmed glaucoma valve, Intra ocular pressure.

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Introduction

Reduction of intraocular pressure(IOP) was first tried in 1907 when Rollet implanted a horse's hair for draining aqueous out of the anterior chamber into the subconjunctival space at the limbus. [(1)] Several devices have been developed that aid angle filtration by shunting aqueous to a site away from the limbus, such as the equatorial subconjunctival space. Glaucoma drainage devices (GDD) implantation generally involves placing a tube in the anterior chamber, in the ciliary sulcus, or through the pars plana into the vitreous cavity. This tube is usually connected to an extraocular plate, attached to the sclera in the equatorial region of the globe between the extraocular muscles. GDD can be broadly categorized into two forms: non-valved devices without a flow restrictor or valved devices with a flow restrictor. [(2)]

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The Ahmed Glaucoma Valve (AGV) implant is one of the most commonly used flow-restricted implants in complex glaucomas. The Ahmed implant, with other implants, has a hypertensive phase (HP) characterized by IOP elevation and associated with the capsule formation . In this phase, the edema disappears, and fibrous tissue develops inside the deepest layer of the bleb. During the first 1to 4 weeks of this phase, the bleb wall becomes congested causing IOP elevation. Congestion and inflammation subsequently subside with IOP reduction and stabilization. [3] This HP has clinical significance because of elevated IOP. Although, it remains only for a short term of period, it may cause substantial glaucomatous damage to the optic nerve particularly, in patients with advanced glaucoma. [4] Hence, several methods such as medical therapies, and digital ocular compressions have been developed to lower IOP. [3]

The incidence of the HP has varied in different reports. [5] This study was conducted to evaluate the prevalence, duration, and treatment of HP after AGV(Model FP7) implantation in the Royal Medical Services.

Methods

A retrospective analysis of one hundred patients who underwent AGV implantation in Royal Medical Services (RMS) for over one year between May 2017 and May 2018 was carried out. All the patients were ranged between 18 to 84 years. Patients had been referred to glaucoma clinic in King Hussein Medical Center(KHMC) with various types of refractory glaucoma (neovascular glaucoma (NVG), uveitic, congenital, traumatic, aphakic, chronic primary open angle glaucoma (COAG), post penetrating keratoplasty (P.K), post pars plana vitrectomy (PPV) and sturge weber glaucoma). All patients were using full antiglaucoma eye drops with or without oral carbonic anhydrase inhibitors at the time of referral.

After obtaining the approval from the (RMS) ethical and research committee, data was obtained from the medical records of patients who underwent AGV implantation. The collected data was: age, gender, IOP measurements over several visits after AGV implantation (first day post op., 1week, 3weeks, 5weeks, 2months and 3months), routine post operative medication, and further antiglaucoma medications that have been used after surgery.

Simple calculations such as: mean, average, interval, percentage were used.

Results

One hundred patients (53 males,47 females) were assessed between May 2017 and May 2018. The age range was (18-84) years. All the patients presented had uncontrolled refractory glaucoma at the time of referral. 63% of those patients had a NVG, shown in Fig1.The prevalence of HP was 43%, shown in Fig 2.The peak IOP was observed on the third week with an average of 28.14 mmHg, shown in Fig3. Only 35% of those who had HP resolved, shown in Fig 4. The IOP started stabilizing after five weeks of treatment (topical beta blockers, ocular compression, topical and oral carbonic anhydrase inhibitors), shown in Fig 5. However, 65% of patients who had HP maintained a high IOP beyond the five weeks of treatment and categorized as non resolved HP, shown in Fig 6. A comparative look on the average IOP differences, between the resolved HP and the non resolved HP, shows that IOP readings in the early post operative period could not predict the resolved from the non resolved HP, shown in Table1, and Fig 7.

Table I: Average IOP differences.

	1st Day	1st week	3rd Week	5th week	2 Months	3 Months
All HP	11.86	17.47	28.14	24.37	21.16	19.67
Resolved HP	10.33	16.73	27.00	21.53	15.13	13.20
Non resolved HP	12.68	17.86	28.75	26.43	24.39	23.14
Difference between resolved HP and non-resolved HP	2.35	1.13	1.75	4.9	9.26	9.94

Fig 1: Type of glaucoma and number of patients

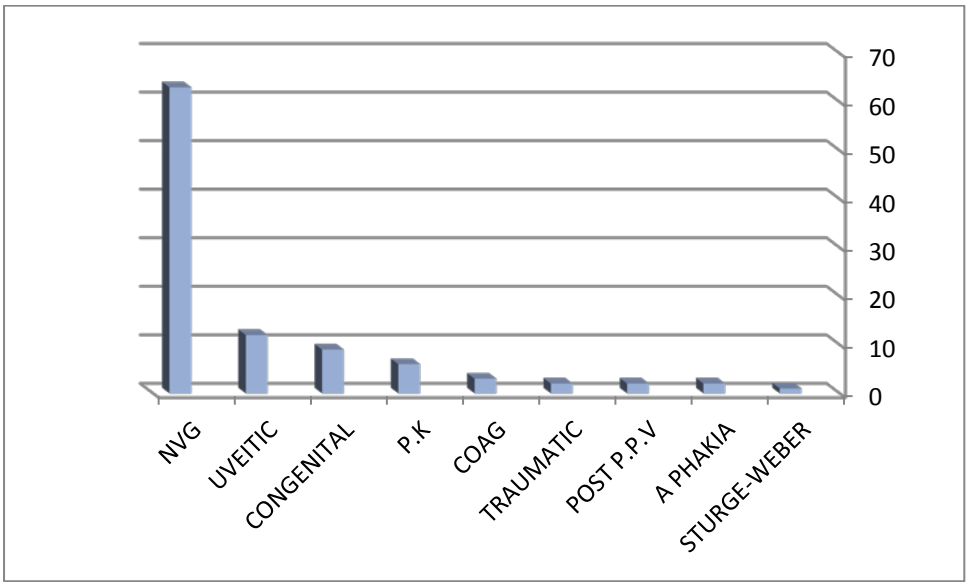


Fig 2: Prevalence of HP

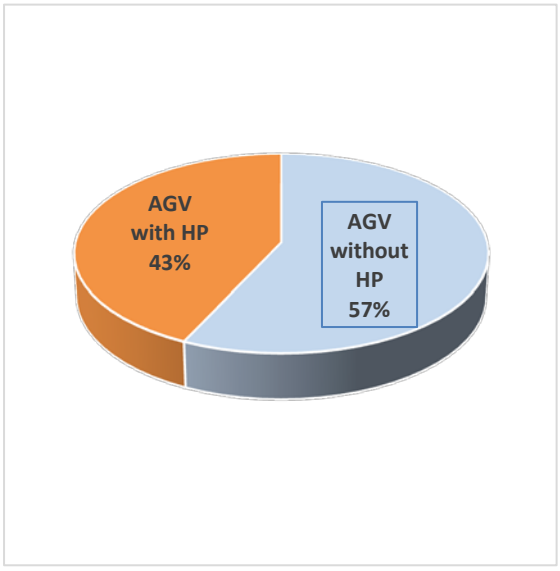


Fig 3: Average IOP for all HP

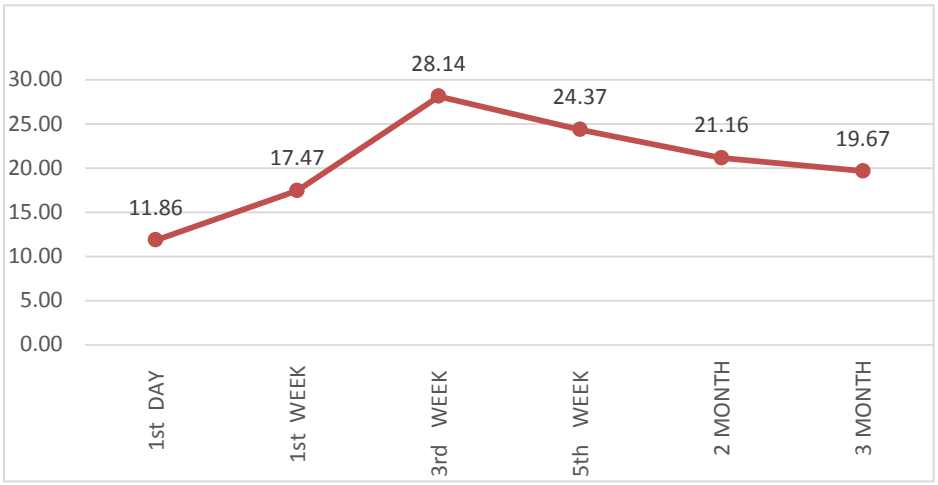


Fig 4: Resolution of HP

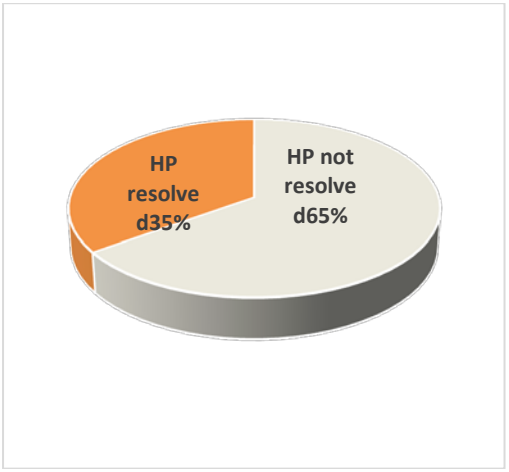


Fig 5: Average IOP in resolved HP.

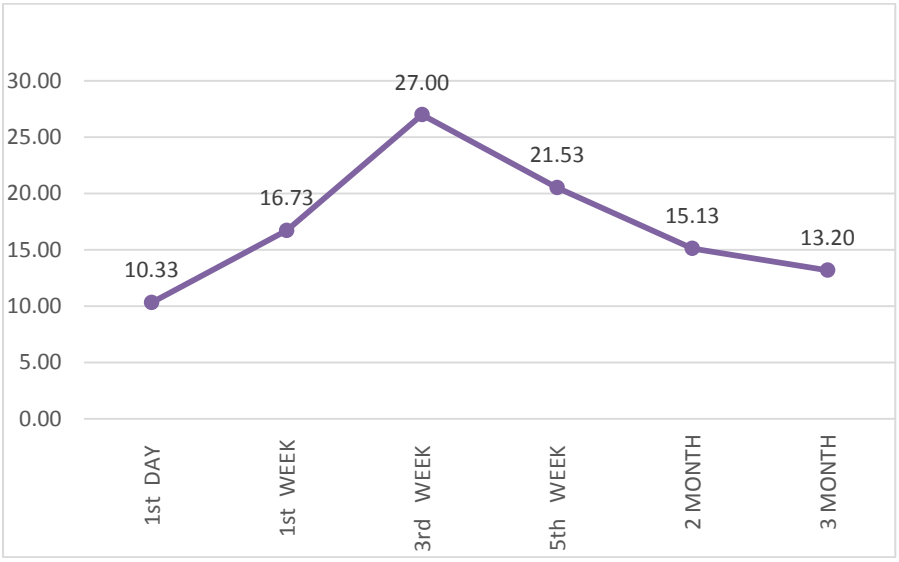


Fig 6: Average IOP in non-resolved HP.

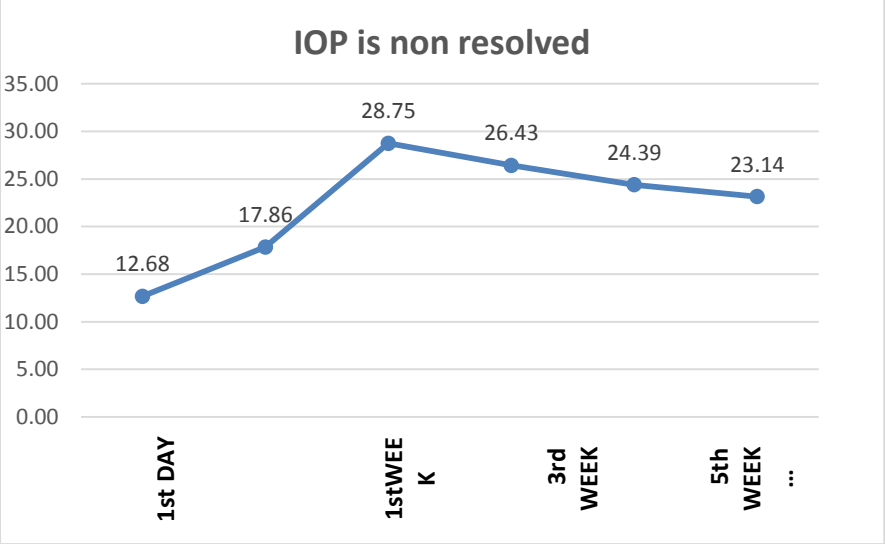
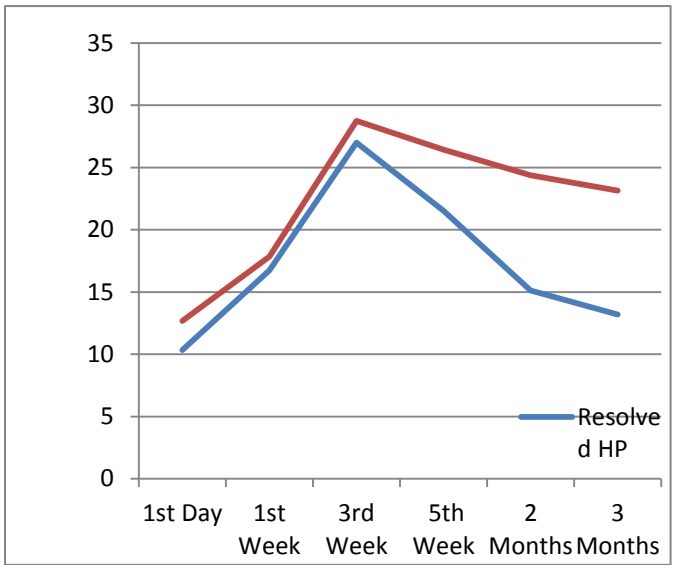


Fig 7: Average IOP differences.



Discussion

Glaucoma drainage device (GDD) surgery represents a significant advance in the treatment of refractory glaucoma. [6] Any type of GDD can go through a hypertensive phase but is common, or at least more easily noticed in valved devices. [7]

HP is a phenomenon of common occurrence, following AGV implantation and has been reported in 30% to 82% in various studies. [5,8-12] This is the first study to evaluate the HP in Jordan. Our study demonstrated the prevalence of HP to be 43% which is near the lowest values in the published studies. The elevated IOP was in the 22-34 mmHg range occurring between 1 and 3 weeks postoperatively and decreasing after the following five weeks in the resolved patients. The IOP range and the duration of HP have a wide variety in the literature. Chandler and Grant stated that elevated IOP is in the 30-50mmHg range occurring anywhere between 1and 6 weeks. [13] While in Freitaz 's book; the IOP increases to 25-30 mm Hg between 6 and 8 weeks, and is of variable duration decreasing in 2-3 months. [14] However, IOP reduction and stabilization over the next 3 to 6 months, [3,12] also documented in another books.

Patients with HP were treated with topical carbonic anhydrase inhibitors (CAI), oral CAI, beta blocker eye drop (E/D), and digital massage along with routine postoperative steroid and antibiotic E/D. Avoiding prostaglandin analogs, α-adrenergic or miotic drugs, which may increase the inflammatory response.[9,12-14] There is a generalized agreement for these medications. However, some surgical options have also been suggested such as bleb needling and surgical excision of the bleb wall. [13] In RMS we do not encourage these surgical options because HP is characterized by elevated IOP but not due to obstruction of the tube by fibrin, blood, iris, vitreous membranes, or silicone oil. Furthermore, the risk for severe complications, including endophthalmitis exists. [3,15] The resolution of HP occurred in only 35% of those who had HP, and the remaining patients continued to use antiglaucoma medications. The resolution ranged from 28% to 31.1% [9-10] in various studies. The HP portend a poor prognosis for IOP control. [3,9].

Recommendations

Due to these data, many studies have been emerged to investigate the causes and risk factors for HP, in order to provide primary prevention. The significance of this study is to determine the prevalence of HP in order to begin a new research to explore the risk factors in our country. So, we can anticipate the high risk patients and treat them earlier.

Limitations

This was a retrospective study held in KHMH. The aim of the study was to investigate the past records of the patients to know the prevalence, duration, and treatment. Other information such as: causes, risk factors, compliance...etc., and could not be investigated in such study design.

Conclusion

Hypertensive phase after AGV is an early post- operative complication having high prevalence rate. HP portend a poor prognosis for IOP control and large number of patients who had HP continued to use antiglaucoma medications after AGV implantation. IOP readings in the early post operative period could not predict the resolved from the non resolved HP.

Abbreviations

AGV: Ahmed Glaucoma Valve.
CAI: Carbonic Anhydrase Inhibitor.
COAG: Chronic Open Angel Glaucoma.
E/D: Eye Drop.
GDD: Glaucoma Drainage Device.
HP: Hypertensive Phase.
IOP: Intra Ocular Pressure.
KHMH: King Hussein Medical Hospital.
NVG: Neo Vascular Glaucoma.
P.K: Penetrating keratoplasty.
PPV: Pars Plana Vitrectomy.
RMS: Royal Medical Services.

References

1. Roy FH, Benjamin L. Surgical techniques in ophthalmology Glaucoma surgery. Philadelphia: Elsevier Saunders;2008. p.55.

2.Cioffi GA. Glaucoma. In: Cantor LB, Rapuano CJ, editors.Basic and clinical sciences course 2015-2016.San Francisco: American academy of ophthalmology; 2015.p.228-235.
3. Allingham RR, Damji KF, Freedman S, Moroi SK, Rhee DJ.6th ed. Philadelphia:lippincot williams & wilkins;2011. p527-532.
4.Sharaawy TM, Sherwood MB, Hitchings RA, Crowston JG. Glaucoma.2nd ed. London: Elsevier Saunders;2015.p.1078.
5.Park CK, Jung KI. Risk factors for the hypertensive phase after implantation of glaucoma drainage devices. Acta ophthalmologica [Internet].2016[cited 2015 Nov 25];94(5):260-267. Available from: https://doi.org/10.1111/aos.12916.
6. Bettin, Khaw P.T. Glaucoma surgery. Switzerland:Karger;2012.p37.
7. Kahook MY, Berdahl JP, Eisengart JA, Khaimi MA, Radcliffe NM, Stein JD. Essentials of glaucoma surgery. USA: Slack incorporated;2012.p125.
8. Dubey, Suneeta s, Dushyant K, Bhoot, Madhu P, Julie, et al. Hypertensive phase following silicon plate ahmed glaucoma valve implantation. Journal of glaucoma[internet]. 2017 Mar; 26(3):p 124 . Available from : https//journals.lww.com DOI:10.1097/IJG.0000000000000544.
9. Ayyala RS, Zurakowski D, Smith JA, et al. A clinical study of the ahmed glaucoma valve implant in advanced glaucoma. Ophthalmology. 1998;105;1968-1976.
10. Nouri-Mahdavi K, Caprioli J, Evaluation of the hypertensive phase after insertion of the Ahmed glaucoma valve. Am J Ophthalmol. 2003; 136;1001-1008.
11. Won HJ, Sung KR. Hypertensive phase following silicone plate ahmed glaucoma valve implantation. J Glaucoma. 2016 Apr; 25(4):313-7. DOI:10.1097/IJG.0000000000000249.
12. Ramakrishan R, Krishnadas SR, Khurana M, Robin AL. Diagnosis and management of glaucoma. India: Jaypee-Highlights;2013.p612.
13. Khook MY, Schuman JS. Chandler and Grants Glaucoma. 5th ed. USA: SLACK incorporated;2013.p583.
14. Freitaz ML, Lisboa JE, Marinho Q, Grieshaber MC. Adult Glaucoma Surgery. India: Jaypee Brothers; 2013. p20.
15. Chen PP, Palmberg PF. Needling revisionof glaucoma drainage device filtring bleb. Ophthalmology. 1997;104(6):1004-1010.