Anterior Subtenon Cyst Formation after Triamcinolone Injection during Ahmed Glaucoma Valve Implantation: A Case Report

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Abstract

Purpose: To report, for the first time, the development of anterior subtenon cysts following the injection of triamcinolone during AGV implantation.

Methods: This is a retrospective case report.

Results: We reviewed the clinical data of three patients who developed anterior subtenon cyst after AGV implantation with a triamcinolone injection. The duration between AGV implantation and subtenon cyst formation was 2 to 3 weeks after surgery. In all three patients, the cyst gradually decreased in size during 2 to 11 months after several needling sessions.

Conclusion: It is important to note that although intraoperative triamcinolone can be an effective method to improve AGV outcome but it can cause subtenon cyst formation. We can prevent the occurrence of significant cyst formation by being careful of any triamcinolone leakage into the anterior subtenon space during the operation.

Introduction

Glaucoma Drainage Devices (GDDs) are valuable tools for surgical management of glaucoma, especially in refractory cases. It is believed that GDDs can effectively reduce IOP when the risk of filtering procedure failure is high (1). The Ahmed Glaucoma Valve (AGV, FDA approved in 1993) is a safe, effective, and popular type of GDD used in patients with uncontrolled glaucoma (2). Being a less complex surgical procedure with fewer complications, AGV surgery has become increasingly popular among surgeons (3).

However, surgical success in AGV, like other filtering surgeries, decreases over time. One reason is the development of a hypertensive phase after surgery, which is associated with a higher rate of failure in long-term follow-up (5, 6). It appears that encapsulation and scar tissue formation around the AGV’s plate directly increases resistance to the aqueous humor outflow and secondarily increases the intraocular pressure (IOP)(7). In addition, there is evidence that the levels of proinflammatory cytokines increase in encapsulated blebs and that these levels are directly related to the level of IOP, indicating that the inflammatory mechanism is responsible for the hypertensive phase after AGV surgery (8). Therefore, wound modulation and anti-inflammatory agents should reduce this phase (9). Corticosteroids, which are anti-inflammatory agents, can be used to reduce fibrosis and modify encapsulation (10). Recent studies using an intraoperative triamcinolone injection at the site of the plate implantation have been shown to reduce the hypertensive phase in these patients, with no reported serious side effects (9, 10).

In this study, we present three cases of anterior subtenon cyst formation...
in patients who have undergone AGV implantation with intraoperative subtenon triamcinolone injection.

Methods

This retrospective interventional case report was approved by the institutional review board and Ethics Committee of the Iran University of Medical Sciences. We reviewed the clinical data of three patients who developed a long-standing anterior thin-walled subtenon cyst after AGV implantation with a subtenon triamcinolone injection. Data obtained from medical records included demographics, medical history, baseline data, and intraoperative and postoperative information.

Surgical Technique: All procedures were performed by a single glaucoma specialist (N.N.). Briefly, a fornix-based conjunctival peritomy was first created in the superotemporal quadrant. Then, 10 mg (0.25 cc) of triamcinolone acetonide was injected into the post-subtenon space behind the equator of the globe using a blunt hydrodissection cannula. Next, the AGV (model FP7, New World Medical Inc., Rancho Cucamonga, CA, USA) was primed, and the plate was secured to the sclera 10 mm posterior to the limbus using an 8/0 prolene suture. The tube was then trimmed and inserted into the anterior chamber through a posterior limbus track created by a 23-gauge needle. The tube was secured with a 10/0 nylon suture and covered with a 5×5mm corneoscleral patch graft. Finally, the conjunctiva and tenon were closed using an 8-0 vicryl suture. Postoperatively, all patients were placed on topical ciprofloxacin every 6 hours for 7-10 days and topical betamethasone every 3 hours for 2 weeks which was gradually tapered off during the following 3-4 months.

RESULTS

Case 1:

The patient was a 54-year-old male with a previous history of penetrating keratoplasty and lens extraction in the right eye due to extensive traumatic corneal laceration about 2 years ago. Because his IOP was uncontrollable with medications, an AGV implantation with triamcinolone injection was performed. A subsequent anterior thin-walled subtenon cyst formed about 3 weeks after the surgery (Fig. 1). IOP was 16 at the time of cyst formation. In addition to topical medications (including a fixed combination of Timolol/Dorzolamide), lubricant ointment was required, and the cyst wall was ruptured by needling with a 27 gauge needle behind a slit lamp several times due to bulging and temporal exposure of the conjunctiva and patient discomfort. After each needling, IOP decreased significantly to 10-12 mmHg. During the next 8 months, the size of the cyst gradually decreased, and the symptoms improved. Exposure of the conjunctiva and patient discomfort completely resolved one year after surgery, but a small cyst remained at the anterior border of the plate. No complications were detected post each needling session. IOP was 12 mmHg at the last follow-up.

Case 2:

The patient was a 43-year-old male diagnosed with Fuchs Heterochromic Iridocyclitis and glaucoma who underwent AGV implantation with triamcinolone injection. An anteriorly located thin-walled subtenon cyst formation with picture and symptoms similar to case 1 was detected 3 weeks after the surgery (Fig. 2). IOP was 16 at the time of cyst formation. The approach was similar to case 1, with...
multiple needling sessions, and a complete improvement of the cyst after 11 months. Also, IOP decreased significantly after each needling; the IOP was 14 mmHg at the last follow-up with a fixed combination eye drop of Timolol/Dorzolamide. No complications were detected after each needling.

Case 3:

A 7-year-old child diagnosed with Aphakic glaucoma underwent AGV implantation with the same method of subtenon triamcinolone injection during surgery. Two weeks after surgery, an anterior thin-walled cyst with temporal conjunctival bulging and exposure was detected, involving patient discomfort and parental concern. IOP was 20 at the time of cyst formation. The cyst gradually decreased after 2 needling sessions performed over 8 weeks with no complications. After 6 months, there were no obvious cystic changes at the plate site, with no conjunctival exposure or patient discomfort. After each needling, IOP decreased significantly, and 1 year after surgery, the IOP was 14 mmHg with Timolol drops once a day.

Discussion

One of the leading causes of failure in AGV surgery is the formation of scar tissue and fibrosis around the plate, which increases the resistance to aqueous outflow from the eye. Intraoperative Triamcinolone acetonide (TA) is one of the anti-fibrotic agents used to decrease postoperative inflammation and scar formation in AGV implantation (9, 10). The safety and efficacy of Subtenon triamcinolone injection have been proven in many studies for intraocular inflammations, uveitis, and macular edema (11).

Turalba et al. evaluated the effect of intraoperative subtenon triamcinolone in AGV surgery (9). In this retrospective comparative study, 19 patients received 0.5 ml of triamcinolone (40 mg/ml) injected near the plate after AGV surgery, and 23 patients received no injection. At the 6-month F/U, the Hypertensive Phase was observed to be significantly lower (26% vs. 52%) in the injected group. There were no significant differences in the evaluation of complications between the two groups, and no case of subtenon cyst formation was reported.

Yazdani et al. also studied the effect of triamcinolone intraoperatively in a triple-blind RCT study (10). In this study, a dose of 10 mg (0.25 ml) TA was injected in the sub-tenon space around the AGV plate using a blunt hydrodissection cannula in 46 patients and then compared with 44 non-injected patients. At the one-year F/U, the mean IOP was lower in the triamcinolone subtenon group but only significantly lower in the first month. Complications reported in this study included: loss of more than 2 lines BCVA, choroidal effusion, corneal decompensation, and wound dehiscence. These complications were not significantly different between the two groups. No case of subtenon cyst was reported in this study.

However, rare cases of subtenon cyst formation have been reported after subtenon triamcinolone injection in a few studies. Byun et al. evaluated the complications and safety of subtenon triamcinolone injections in macular edema (11). Their study included patients with diabetic macular edema, macular edema in branched or central retinal venous occlusion (BRVO or CRVO), and postsurgical cystoid macular edema. They reported only one case of subtenon cyst at the injection site in 159 eyes with a history of Posterior subtenon injection (PSTI) of TA.

Carmen et al. reported the development of an encapsulated triamcinolone cyst after subtenon injection in a case-report study (12). In this study, a 29-year-old man with Behçet’s disease who underwent triamcinolone injection in the supranasal region due to uveitis developed a subtenon cyst. One of the reasons mentioned in this study was the leakage of triamcinolone into the anterior subtenon space. There have also been limited reports of immediate exacerbation or inflammation following intra-articular injection of triamcinolone hexacetonide (13). One of the causes is triamcinolone crystals, which are large and tend to accumulate, causing crystal-induced Inflammation (14).

In our study, subtenon cysts formed in the anterior region following the use of triamcinolone during surgery. Possibly leakage of triamcinolone into the anterior subtenon space with crystal-induced inflammation was among the causes of cyst formation in these patients. After observing these findings in our practice, we became more cautious using the triamcinolone injection technique. We made sure that the excess triamcinolone was completely removed from the anterior parts of the tenon and conjunctiva using a weck-cel sponge and balanced salt solution. Following this change in procedure, we did not encounter any further cases with significant cyst formation.

To the best of our knowledge, this study reports, for the first time, the development of anterior subtenon cysts following the injection of triamcinolone during AGV implantation. It is important to note that although intraoperative triamcinolone can be an effective method to improve AGV outcome by reducing postoperative fibrosis and hypertensive phase, we must be careful of any TA leakage into the anterior subtenon space during the operation to reduce the possibility of developing subtenon cysts. Although managing subtenon cysts is easy by needling, IOP lowering medications, and conservative treatment, it bothers the patient and takes months to resolve completely. In summary, we can prevent the occurrence of significant
cyst formation by considering the precautions mentioned above.

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Precise: To report the development of anterior subtenon cysts following the injection of triamcinolone during AGV implantation with a recommendation to reduce its formation.

References