CASE REPORT

Dynamic tube movement after reimplantation of Ahmed glaucoma valve in a child with glaucoma in aphakia

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SUMMARY

A 10-year-old girl underwent an Ahmed glaucoma valve (AGV) implantation as a primary procedure for glaucoma in aphakia due to congenital cataract surgery. Following an unintended accidental excision of AGV tube during bleb revision for hypertensive phase, AGV was explanted and a second AGV was implanted in the same quadrant after 2 weeks. This resulted in a rare complication of dynamic tube movement in the anterior chamber with tube corneal touch and localised corneal oedema. Excision of the offending unstable tube and placement of a paediatric AGV in a different quadrant led to resolution of this complication, stable vision and well-controlled intraocular pressure. This case highlights the possible causes of dynamic tube, related complications and its management. This case also highlights the importance of understanding the various physiological phases after glaucoma drainage device implantation and their appropriate management.

BACKGROUND

Glaucoma drainage devices (GDDs) function by creating an alternative drainage pathway for aqueous outflow from the anterior chamber through a long tube to an equatorial plate.¹ GDDs are used more frequently in the treatment of paediatric and adult refractory glaucoma. In certain secondary glaucoma cases with high risk for failure of trabeculectomy, GDD implantation is preferred as a primary procedure.

The technique of placing a GDD requires meticulous surgical technique and although a rewarding surgery, it may be associated with complications ranging from minor to sight threatening. GDDs are associated with implant-related long-term complications such as plate exposure and tube erosion in 2–12% of the cases.²

The complication of dynamic tube movement following a GDD implant is very rare and has been reported only once earlier by Law *et al.*³ However, the dynamic tube in the previous report was not associated with any intraocular complication.

CASE PRESENTATION

A 10-year-old girl was referred to our clinic by the treating ophthalmologist with an unusual tube movement in the anterior chamber following reimplantation of Ahmed glaucoma valve (AGV). The child had undergone bilateral lensectomy and anterior vitrectomy for congenital cataract at 10 months of age. After 10 years, she underwent

an AGV in her right eye for medically uncontrolled glaucoma. Four weeks post AGV implantation, during the high-pressure phase (hypertensive phase (HP)), bleb excision was attempted to decompress the encysted bleb during which the tube was accidentally cut and the AGV was explanted. After 2 weeks, second AGV was implanted in the same quadrant. Two months after reimplantation surgery, excessive movement of implant tube was noted in the anterior chamber, with tube corneal contact and localised corneal oedema, hence the child was referred to our centre.

On examination, vision was 20/100 in the right eye and finger counting at 2 m in the left eye and nystagmus in both eyes. Both eyes were aphakic; a GDD was noted in the superotemporal quadrant with a long subconjunctival tube (not covered by any patch graft). The tube in the anterior chamber was found to be lengthening and shortening with various position of gaze, measuring up to 5 mm in the anterior chamber in upgaze and was retracting beyond limbus into the subconjunctival space in down gaze (figure 1). We noted tube cornea touch, peaked pupil and vitreous condensation closer to the tube. Intraocular pressure (IOP) was 19 and 10 mm Hg in the right and left eyes, respectively (on two topical antiglaucoma medications). Fundus examination revealed large pale discs with vertical cup to disc ratio of 0.9 with bipolar notch in both eyes.

INVESTIGATIONS

Humphrey visual fields showed advanced field loss in both eyes.

DIFFERENTIAL DIAGNOSIS

On the basis of above clinical findings, a diagnosis of both eyes aphakia with glaucoma, post AGV implant with dynamic tube and localised corneal oedema in the right eye was made.

TREATMENT

We hypothesised that the tube was excessively mobile due to improper anchoring of the tube or lack of fixation sutures. In view of tube corneal touch and excessive tube movement with subconjunctival retraction, we planned tube repositioning or anchoring and scleral patch graft under general anaesthesia.

The intraoperative findings noted were absence of anchoring suture to the tube, absence of patch graft and a long straight tube (>16 mm) with

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Figure 1 Intraoperative pictures with variable length of the tube at different gaze. (A) Subconjunctivally retracted tube in down gaze (arrow). (B) Intrastromal tube with corneal touch (arrow) in primary position. (C and D) The tube length increasing (arrow) in up gaze.

posteriorly positioned implant plate. The device was located almost 14 mm from the limbus instead of the usual 8–10 mm. The implant plate had strong adhesions to the tenons capsule and the extraocular muscles were not anchored to the underlying sclera. This made the implant dissection very difficult and unsafe; hence tube excision with closure of the fistulous tube entry site and the conjunctiva was performed. Postoperatively, the right eye IOP continued to be high despite maximum anti-glaucoma medication. After 6 weeks, she underwent a paediatric AGV implant in the inferotemporal quadrant 8 mm from the limbus. The implant plate and tube were secured to the underlying sclera with non-absorbable 10-0 prolene and nylon suture, respectively. The entire length of the subconjunctival tube was covered with 5×5 mm preserved donor scleral patch graft, and the conjunctiva was meticulously closed with 8-0 vicryl suture.

OUTCOME AND FOLLOW-UP

On the first postoperative day, the IOP in her right eye was 12 mm Hg. The tube was well placed and stable with no tube corneal touch or movement. She was placed on routine post-operative medications in the right eye and a combination of bimatoprost and timolol was continued in the left eye. One month after inferior AGV implantation in the right eye (figure 2), the IOP was 32 mm Hg (HP), which was treated with aqueous suppressants and HP phase resolved in 4 weeks. At the last follow-up visit, 6 months after surgery, the IOP was 16 mm Hg with one topical antiglaucoma medication, and vision was stable at 20/125 and the patient was doing well.

Figure 2 The right eye showing an inferotemporal implant and a well-placed tube, corneal scarring in the area of previous tube corneal touch superotemporally.

DISCUSSION

Law *et al*³ reported this rare complication of dynamic tube movement in three cases. They studied 1500 AGV implantations and found dynamic tube in three eyes; however, none in their series had any sight-threatening complications due to this dynamic tube movement. They hypothesised three reasons for the dynamic tube. They were either due to loosening of the non-absorbable suture, extrusion of the suture securing the device to the sclera or a stronger adhesion of the fibrous capsule around the device to the fornix, or a combination of these mechanisms.³

The possible reason for this complication in our case could be absence of fixation suture of the implant and tube to the sclera and absence of patch graft. Improper fixation could have predisposed the implant to excessive mobility and tube corneal touch at certain gaze positions leading to localised corneal oedema. This complication could have been prevented by avoiding reimplantation of AGV in the same quadrant, proper anchoring of the plate and the tube to the underlying sclera and appropriate management of HP with aqueous suppressants avoiding bleb excision. As we did not notice the dynamic tube movement after inferior AGV implantation, it is possible that an improperly fixed tube could have resulted in excessive tube movement in our patient rather than nystagmus.

Learning points

- ▶ Glaucoma drainage devices (GDDs) are useful in treating refractory glaucomas; however, their placement requires meticulous surgical technique to prevent postoperative complications.
- ▶ Understanding the phases of GDD (low pressure, high pressure phase and stable phase) is vital to assess the efficacy of drainage implant and to provide appropriate postoperative care.
- ▶ Ideally, once a GDD is explanted, placement of a new device in the same quadrant should be avoided and choosing a different quadrant would provide better stability to the implant.
- ▶ The dynamic tube, a rare complication following GDD implantation, could be observed if it is not associated with any intraocular complication. However, surgical intervention either to stabilise the dynamic tube or GDD explantation may be required in the presence of sight-threatening complications.

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