Encapsulated bleb removal following Ahmed Glaucoma Valve Implantation

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Background
Uncontrolled glaucoma is a major challenge for the ophthalmic surgeon, especially in children. In cases of uncontrolled intraocular pressure (IOP) despite frequent surgical interventions, episcleral glaucoma drainage devices (GDD) are an option. Success rates are poor especially in cases that had several previous surgical interventions. In some patients treated with a GDD a water-impermeable fibrous capsule forms around the base plates of the devices with subsequent rise of IOP. This study was performed to identify potential risk factors for encapsulation and to assess whether removal of the capsule wall might salvage GDD function.

Materials and Methods

Design of case series
11 eyes of 10 patients with failed Ahmed Glaucoma Valve (AGV) implantation were included in this study. Failure was defined as IOP > 20mmHg on two consecutive visits despite additional medical treatment. If inspection of the bleb showed fibrotic capsule formation, the patients were prepared for removal of the capsule wall covering the GDD.

Surgical method
All dissections were performed under general anaesthesia by one experienced surgeon. After careful separation of the tenon and conjunctiva from the cyst an incision was made into the fibrous wall. From this incision aqueous humour gushed out of the cyst, indicating a watertight tissue able to keep the high pressure. The cyst was then removed dissecting right to the border of the base plate. Valve function was tested by pressurizing the anterior chamber via paracentesis. The remaining conjunctiva and tenon were then closed over the implant, reforming a conventional bleb for aqueous resorption.

Results
After removing the fibrous capsule, in all cases fluid transport could be observed at the exit port of the valve chamber without any fluid leakage at the side of the tube (Fig. 2). All surgeries could be performed without serious complications. Bleeding occurred in some cases but could be controlled by cauteries. In this study revision surgery was necessary in case after a mean of 19.0 months after initial AGV implantation (1.8 - 38.1 months). Time to failure appeared to be associated with younger age at AGV implantation. We found a statistically significant correlation ($R^2 = 0.366$, $p = 0.049$, Fig. 3) between the two parameters. A second revision was necessary in 6 eyes after a median interval of 15.6 months (2.5 - 47.4 months). At the end of follow-up (mean 27.6 month) 4 eyes were considered success with an IOP lower than 20 mmHg without medication. There was no correlation between time to first revision and time to second revision or final outcome or any other recorded parameter (e.g. age at implantation, number of previous surgeries, type or number of topical glaucoma medications, preoperative IOP). The mean IOP at the end of follow-up was $15 \pm 16$ mmHg.

Conclusions
Encapsulation is a frequent complication after AGV-implantation. This procedure is more frequent in younger patients. A possible surgical treatment is the removal of the cyst. After AGV-Revision further procedures are often necessary to lower IOP.