Preoperative assessment of opening and closing pressure of silicone Ahmed glaucoma valves

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Purpose: The Ahmed Glaucoma Valve (AGV) is increasingly used for the treatment of refractory glaucoma. Although the AGV is a restricted device with a valve like mechanism that should prevent early over filtration, early postoperative hypotony is reported in variable rates. The aim of this study was to assess a test procedure of the valve mechanism.

Methods: In 19 consecutive cases of implantation of an AGV, the device was tested for its opening and closing pressure before use. After priming the device as recommended with balance salt solution, the canula with the attached tube of the AGV was connected to an infusion bottle. The bottle height had been adjusted previously so that there was no flow in either direction. Afterwards, the pressure in the infusion bottle was increased gradually using the active infusion pump of an Oertli Phako Machine OS3 until flow through the valve of the AGV was noted (Opening pressure A). Then the pressure was reduced again until the flow stopped (Closing pressure B). Afterwards the pressure was increased again until flow was noted again (Opening pressure C). Intraocular pressure was then checked postoperatively on the same day. The differences between pressure A - B, between C - B, and A - C were calculated. Means and standard deviations were computed. Low IOP was defined as any value of 4 mmHg or lower. Each of the pressure parameters and the differences was assessed against low IOP (dependent variate) with univariate analyses.

Results: Mean (SD) opening, closing and re-opening pressures (mmHg) were 18.8 (5.9), 9.2 (5.2) and 12.1 (4.8), respectively. 6 patients (31.6%) had low IOP. The opening pressure (OR 0.50 (95% confidence interval CI 0.27-0.94; p = 0.032) and to a lesser extent the re-opening pressure [OR 0.60 (95%CI 0.38-0.95; p = 0.029)] were associated with low IOP, while the closing pressure and the difference parameters were not significantly associated. An opening pressure value of less than 18 mmHg had a sensitivity (6/6) of 100% (95%CI 54.1-100) and a specificity (10/13) of 76.9% (95%CI 46.2-95.0) to identify low IOP.

Conclusion: In the preoperative assessment of silicone AGC a substantial variability of opening, closing and re-opening pressure was observed. Pre implantation assessment of the valve function is recommended. An opening pressure below 18 mmHg, identified all patients developing postoperative low IOP. If confirmed in larger studies, this threshold should trigger a change of AGV.