A new method to assess the effect of conjunctiva tissue on Intra-Ocular Pressure immediately after drainage surgery.

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Purpose: There is limited data available on the effect of conjunctiva tissue on intra-ocular pressure immediately after glaucoma filtration surgery. Currently, minimally invasive glaucoma devices assume minimal conjunctival resistance immediately after surgery. If this is not the case, this has significant implication for drainage devices. The research is intended to assess a new experimental method to measure the change of flow pressure due to conjunctiva tissue.

Methods: Glaucoma filtration surgery was simulated on an ex-vivo rabbit eye. A superior limbal conjunctival incision was created and a PEEK tube (internal diameter 125µm) was inserted through the cornea, bypassing the anterior chamber and into the sub-conjunctival space. Conjunctival closure was performed using 8-0 Prolene (Ethicon, NJ, USA). A reservoir of water was connected to the tube and a microfluidic pressure pump/flow sensor setup (Fluigent, Villejuif, France) was recording the pressure at a rate of 1Hz. The flow rate was fixed at 2 µl/min to simulate aqueous humour production. The fluid drained into the subconjunctival space with the conjunctiva tissue forming a bleb.

Results: The pressure difference due to the tube outside the eye was theoretically fixed using Poiseuille law at 10 mmHg for a flow rate of 2 µl/min and was verified experimentally as the control experiment with an error below 1%. The change of pressure observed with the tube in situ is assumed to be entirely due to the effect of conjunctiva tissue forming a bleb and was found to be 2.60 +/- 0.19 mmHg at a flow rate of 2 µl/min.

Conclusions: The experimental method to assess changes in Intra-Ocular Pressure due to the bleb conjunctiva tissue was characterised successfully and found to be 2.60 +/- 0.19 mmHg at 2 µl/min. Work in progress aims to generalize this method to correlate the change in Intra-Ocular Pressure with the size of the bleb formed by the conjunctiva tissue.

Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.: Visualisation of the tube going to the sub-conjunctival space with the conjunctiva tissue forming a bleb for an accumulative volume of 105 µl of water.
Change of pressure ($d\rho_{\text{con}}$) due to the effect of conjunctiva tissue forming a bleb for increasing volume of fluid draining through the set-up.