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Letter to the Editor

Critical Response to Ab Interno Versus Ab Externo Surgical Approach on Outflow Resistance of a Subconjunctival Drainage Device

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We read with interest the recent paper by Lee et al.[1] published in TVST entitled "The Implications of an Ab Interno Versus Ab Externo Surgical Approach on Outflow Resistance of a Subconjunctival Drainage Device for Intraocular Pressure Control."

We would like to present a few important considerations that may help readers better understand patient outcome predictors for ab interno and ab externo procedures. Wound healing in a clinical setting compared to microfluidics in a non-healing rabbit eye is clearly very different.

First, the title of the manuscript creates confusion because recent trends in surgery for subconjunctival drainage devices include ab interno (through a clear corneal incision that then tracks through sclera) or ab externo (from the sclera to the anterior chamber). This study does not look at the difference in how devices are placed but rather the difference in surgically dissecting conjunctiva versus no surgical dissection in an ex vivo model without blood supply or inflammatory mediators. The complete absence of wound healing and conjunctival closure and the fact that the proximal portion of the microstent does not rest in the anterior chamber as in the surgical eye severely limit this study from being clinically applicable. The resistance to outflow can be significantly manipulated or altered by these techniques, as well as by the use of perioperative antifibrotic agents. In addition, the authors state that the flow resistance of the standalone Xen45 gel stent is 10.3 mm Hg at a flow rate of 2 µL/min. The actual resistance for the Xen45 gel stent at 2 µL/min has been measured at 6.28 mm Hg and calculated via the Hagen–Poiseuille equation to be 6.05 mm Hg at 37°C.[2]

This article seems to inappropriately position the Xen gel stent and the InnFocus/PreserFlo microshunt against one another based purely on surgical technique, which is likely neither appropriate nor accurate, especially because the Xen gel stent can and is being placed ab externo with an open conjunctival technique. To our knowledge, there are no peer-reviewed studies directly comparing the Xen45 gel stent and the InnFocus microshunt.

The discussion section contains several statements that are concerning, likely emanating from the difference between a microfluidics ex vivo rabbit model and what is seen in a clinical research setting with variable wound healing:

1. The authors compared various peer-reviewed articles on the Xen45 gel stent and the InnFocus microshunt; however, these quoted studies are vastly different in terms of methods, patient population, and follow up, as well as dose of mitomycin C (MMC). The authors also did not cite the US Food and Drug Administration pivotal trial on the Xen gel stent nor did they cite the international comparative study of the Xen gel stent versus trabeculectomy.[3,4] The conclusion made by the authors is that one implant is perhaps superior at lowering intraocular pressure than another implant. Although this may eventually turn out to be true, there are no studies supporting this statement, and the current experiment was not designed to test that hypothesis.
2. The authors refer to the Moorfields Safer Surgery System to make statements about the Xen gel stent and InnFocus microshunt. Although this system remains a tremendous innovation for improving safety for trabeculectomy, there is no study confirming that the system is applicable to subconjunctival filtration with microshunt devices. Moreover, there

is no study indicating that this system is applicable when one injects MMC in the far posterior fornix during subconjunctival filtration procedures.

3. The authors also make a statement that performing a conjunctival dissection allows for greater predictability of directing aqueous flow posteriorly; however, their paper does not directly support this observation.
4. The authors postulate on a valve-like mechanism of the conjunctiva but make no comment regarding the position of the stent with reference to Tenon's capsule, which clearly has a major impact on all types of filtration surgery, including microshunt surgery. This theory is likely difficult to test or evaluate in their ex vivo model when tissues are not alive, vascularized, or even closed.
5. The authors make a statement that MMC injections are inherently more random and less predictable. Granted there is less long-term information regarding MMC injections and bleb morphology, but there is plenty of evidence to demonstrate improved bleb morphology and trabeculectomy success rates with MMC injection versus sponge use.[5]
6. The authors make a statement that there is "unpredictability of the bleb development with devices implanted via the ab interno approach with preimplantation subconjunctival injection of MMC." With the recent advances in subconjunctival minimally invasive glaucoma surgical (MIGS) surgery, including proper microstent placement and MMC application, we have seen significantly improved predictability, contrary to the authors' laboratory work.

Although this is a well-designed study to evaluate the outflow resistance of a specific subconjunctival drainage device in an ex vivo model, we are concerned that some of the authors' conclusions are not supported by this manuscript. Subconjunctival MIGS surgeons, especially nascent ones, must be vigilant in incorporating both laboratory and clinical findings in order to develop a meaningful perspective of subconjunctival filtration when approaching both ab interno and ab externo surgery.

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