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EDITORIAL (BY INVITATION)

Free ILM patch transplantation for recalcitrant macular holes; should we save some internal limiting membrane for later?

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We would like to highlight in this issue, the case series from Dai et al. on internal limiting membrane (ILM) transplants for unclosed macular holes [1]. Those of us who have tried a free internal limiting membrane (ILM) patch graft will appreciate the challenges that face surgeons performing this type of surgery. Impressive as the results might be, the impact of this publication goes beyond the introduction of a new technique.

Let us 'dissect' some of the surgical challenges. Firstly, in eyes with a previous extensive ILM peel, harvesting a new suitable sized patch can be problematic. Although there is a limited evidence base to guide us, many surgeons feel that when it comes to ILM peeling, the larger the better [2]. Therefore, when it comes to re-operation, the remaining ILM may only be available near or even beyond the arcade and surgical experience tells us this is usually thin and difficult to peel.

Secondly, there is a problem of "placing" the ILM patch near the macular hole. Without any attachment, as is the case with an inverted ILM flap, the gossamer-like ILM patch is unlikely to stay put where it is "placed". The authors describe using the edge of the hole to secure the graft. Previously, Tom Wolfensberger [3] and more recently others [4] have advocated the use of hyaluronate-based viscoelastics to act as an adhesive. It is interesting that Dai et al. also use viscoelastics to cover the macular hole prior to ICG use. It is possible that the viscoelastic was acting as a 'glue' to keep the subsequently placed graft in place. Lai et al. have used autologous blood as a glue [5]. The use of perfluorocarbon liquids for a prolonged period during surgery by Park et al. may also have a similar effect [6].

Thirdly, intraocular forceps are designed to be very effective at grasping ILM. They are, however, not as good at letting it go! The act of releasing the free ILM and placing it in the hole as described can therefore be challenging. The authors emphasise that the patch should be tucked in under the edge of the neurosensory rim of the hole to "hold" the ILM in place. They acknowledge that occasionally it was necessary to use the light pipe to disengage the ILM from the forceps. If however, the membrane is not secured by the edge of the macular hole or if not adherent to the viscoelastic, it is likely to float away on intraocular currents during or after surgery. Surgical attempts to re-capture a free floating ILM can also be 'challenging' if not impossible.

Finally, the fluid to air exchange is not simple. The ILM is liable to be aspirated up the extrusion cannula along with the last drop of vitreous cavity fluid, despite all precautions including aspirating well away from the hole, tilting the eye to dry the fovea first and limiting aspirational flow rates with low pressure gradients and the use of narrow bore cannulas.

Assuming all these steps go well, there are still many unanswered questions. How big does the ILM graft need to be? Park et al. suggested a patch twice the size of the hole for a free patch [6]. Such a large membrane may be difficult to harvest, depending again on the extent of the first peel. Is it necessary to use the membrane to completely cover the hole (as a 'lid')? Certainly this seems to be reasonable if mechanistically the

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ILM is to act as a barrier to prevent fluid transgress into the hole. Is it necessary to literally invert the ILM inside the hole [7]? Aside from the surgical challenges of ensuring such an orientation, some think not. More pertinently, is it necessary to spread the ILM so that it can act as a bridge to span the gap between one edge of the macular hole to the other? If the concept is that the ILM were to provide a bridge for cellular migration, this might be important. Anecdotally, some surgeons have performed an autograft and placed the ILM inside the hole as a folded clump and the holes did not close. Is it necessary, therefore, to spread the ILM as an unfolded lamina preferably to fill the whole defect? If so, do we have the surgical techniques to do this? Should we be using one hand, two hands, viscoelastics, and perfluorocarbon liquids?

We will be seeing more publications on specific ILM manipulations in attempts to close large holes, unclosed holes, myopic macular holes, and even optic disc pits. Dai et al.'s paper is noted for the innovation of using the edge of the macular hole to hold the ILM in place. From our limited experience, it might not be such an easy technique to master and execute consistently. Nevertheless, vitreoretinal surgeons like rising to challenges. Many readers might be enthusiastic to give this a try. The real impact of Dai et al.'s paper is that it exposes our lack of fundamental understanding of the mechanism of surgery and the biological process: In whom should we peel the ILM and how much ILM should we optimally remove? Why does the retention of ILM in the form of flaps help the closure of large holes? Where does the ILM go? Although occasionally one sees ILM flaps on postoperative optical coherence tomography, the striking feature is that when large holes close following a free patch or inverted flap, the retina regains its laminar structure showing the hole is mostly "filled" with neurosensory retina rather than just basement membrane.

It seems that if an operation works, we tend to lose interest. As surgeons we embrace elegant techniques like ILM peeling and apply them to all cases; to small holes, to all epiretinal membranes peel cases, to all cases of retinal detachments with or without proliferative vitreoretinopathy. As with George Mallory and Mount Everest, our boundless enthusiasm drives us to peel all ILM, because 'it is there'. Perhaps, we should at least 'spare' one thought. If a macular hole fails to close following primary surgery, we might be pleased if the initial peel was not too extensive, and there is some accessible ILM to harvest for patch graft surgery.

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