Modified emulsion polymer isocyanate-gluing: A minor amendment in cyanoacrylate glue application

Dear Editor,

We have recently described a modified method of cyanoacrylate glue (CG) application named “Emulsion polymer isocyanate-gluing (EPI-gluing)” for noninfective nontraumatic corneal perforations ≤3 mm in size. Briefly, in this method, a small patch of fresh epithelium harvested from an adjacent healthy area of the cornea is transplanted to the site of melt before the application of CG. We conceptualized that the former might function as a mechanical barrier to aqueous leak and intracameral manipulations besides providing tectonic support to CG and promoting host-site epithelial healing. However, we also expressed our concerns regarding a remote possibility of infection and melt at the donor-site due to breach of epithelial integrity.

In order to overcome this fear, in our next five cases, we debrided 1mm concentric peri-melt epithelium (PME) and packed it inside the melt area, a process akin to inverted internal limiting membrane (ILM) flap technique for macular hole closure [Video 1]. However, unlike inverted ILM flap technique, in our modified method of EPI-gluing, we completely detached the PME from its adhesions and took necessary care to lay it epithelium side-up on the melt area (to avoid any risk of epithelial ingrowth). Usually, this PME is discarded due to the belief that it being necrotic and inflamed, could limit stromal adhesion of CG. No intraoperative or postoperative complications were encountered in our series of patients with the results being reasonably favorable. Modified EPI-gluing with PME, therefore, provided all benefits of EPI-gluing without disturbing the adjacent healthy corneal areas. Postoperative serial anterior segment optical coherence tomography could not reveal the status of transplanted PME due to shadowing effect of overlying CG [Fig. 1]. The final assessment after dislodgement of glue revealed a healed perforation with an intact epithelium.

Unlike adjacent healthy epithelium, the PME can be easily debrided due to its weak adhesions with the underlying stroma. This circumvents the need for any alcohol-based delamination and its subsequent intraocular entry. Nevertheless, extreme caution is required during the harvesting process to prevent unnecessary trauma to the already fragile melt area. We believe that utilizing PME not only evades the need for manipulating adjacent healthy areas, but also promotes adhesion of CG by baring the surrounding stroma. We presume that this minimalizes the risk of infection as the latter remains almost always covered by CG till its dislodgement. However, long-term studies comparing different methods of gluing are required for any conclusive evidence.

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Conflicts of interest
There are no conflicts of interest.

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Figure 1: Postoperative clinical photograph (a) and ASOCT (b) showing shadowing effect of cyanoacrylate glue on underlying corneal layers.
Dear Editor,

Descemet's membrane endothelial keratoplasty (DMEK) has revolutionized the surgical management of end-stage corneal edema. This technique allows for the transplantation of a thin layer of corneal tissue, thereby reducing the chances of donor variability and improving postoperative visual outcomes. The success rate of DMEK transplant is one of the crucial factors determining graft preparation and transplantation. Multiple studies report that donor factors, such as age, donor size, and endothelial cell count, as well as surgical factors, such as device used for pre-prepared DMEK grafts and surgical manipulation in the eye bank or recipient’s anterior chamber status, can influence the pre-transplant endothelial cell count (ECC) and the unfolding time of the graft.

Recipient factors such as small or shallow anterior chamber, aphakic state, and pre-existing posterior segment surgery can also affect the unfolding time. Some of the factors that influence the graft unfolding time have been categorized as donor factors, device factors, and recipient factors. It has been observed that when the pre-ECC is 2900 cells/mm², the graft unfolds tightly in less than 5 minutes, whereas with a pre-ECC of 2500–2800 cells/mm², graft unfolding takes approximately 4% endothelial cell loss (ECL) when a pre-loaded DMEK graft was stored for 20–96 hours.

In our previous report, we observed that donor variability, characteristics, and tissue manipulation in the eye bank may also account for the unfolding time. In fact, in recent studies, spontaneous unfolding of the graft has been reported to be tighter. In fact, in recent studies, spontaneous unfolding of the graft has been reported to be tighter. This suggests that ECC or the method of storage may influence the ECC and may also affect the unfolding time.

In our experience, we have observed that pre-ECC of 2500–2800 cells/mm² results in tighter scrolls but increases ECL. This indicates the importance of optimizing DMEK surgery. It would be important to collect and report information such as donor data such as age, to further optimize DMEK surgery.

In conclusion, a significant number of factors influence the graft unfolding time. Understanding these factors could help in optimizing DMEK surgery and improving postoperative visual outcomes.

Bafna RK, Agarwal R, Beniwal A, Bhandari A, Sharma N, Titiyal JS. Modified emulsion polymer isocyanate-gluing: Autologous epithelial transplant with cyanoacrylate glue application for small corneal perforations. Indian J Ophthalmol 2020;68:1636-9.

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