Commentary

Simple limbal epithelial transplantation: Impactful innovation

The first major scientific advancement in the field of ocular surface diseases was made by Kenyon and Tseng in 1989,[1] whose seminal work provided clinical evidence for the existence of corneal epithelial stem cells at the limbus. They elegantly demonstrated that by transplanting healthy limbal tissue from a donor eye, one could successfully reverse the blinding conjunctival overgrowth seen in burn-injured corneas. Following that breakthrough, both clinicians and stem cell biologists had focused their time and energy on developing techniques aimed at minimizing the amount of limbal tissue required for successful corneal regeneration and thereby limiting the risk to the donor eye. While *ex vivo* expansion of cells from a tiny limbal biopsy in a laboratory emerged as an alternative,[2] this technology was not only inaccessible to most corneal surgeons but also remained beyond the reach of most patients because of the astronomical costs involved in the process. This ideal balance between minimal donor tissue and minimal risks and costs seemed practically unattainable until the development of simple limbal epithelial transplantation (SLET) by Sangwan *et al.* in 2010.[3] The innovative new technique turned existing paradigms on their heads by introducing the concept of *in vivo* stem cell cultivation, completely eliminating the need for expensive laboratories, using the ocular surface as a biological incubator and making stem cell technology accessible to every ophthalmic surgeon and patient. To use a more relatable metaphor, SLET as an innovation breathed new life into limbal stem cell transplantation just as the development of phacoemulsification, capsulorhexis, viscosurgical devices, and foldable intraocular lenses together had changed the future course of cataract surgery many decades ago.

Clinical practice patterns, however, cannot be and indeed should not be influenced solely on the basis of novelty. Modern medicine is evidence-based and therefore the concepts of efficacy/safety, reliability, and replicability are very important to consider in the context of a new therapeutic modality. While it is likely that a medical or surgical innovation will work well in the hands of those who developed it, the real test lies in how easily others are able to replicate the original experience. The encouraging initial results of SLET[3] were validated in a much larger series of 125 cases which clearly established its long-term efficacy and safety in transplanted eyes and safety in donor eyes.[4] Using appropriate methodological rigor, the paper also showed that the outcomes were reliable irrespective of the patient's age or the surgeon's experience. Subsequently, a multicentric study, notably not including the original group from Hyderabad, replicated the results in a diverse population including three independent centers in North America.[5] The paper in this issue of the journal not only reaffirms the efficacy of SLET in an impressive series of thirty cases but also provides the readers with an inclusive review of literature on the outcomes reported by individual groups.[6] It is indeed heartening to note that SLET has been put through intense scientific scrutiny and has managed to emerge as an effective, safe, reliable, and replicable surgical technique of treating ocular surface diseases due to limbal stem cell deficiency.

The most impressive aspect of SLET, however, has been the ease with which it has crossed the boundaries of specialty practice and has been adopted and adapted in the management of ocular surface tumors[7,8] and degenerations.[9] This is largely because SLET is analogous to an open-source software platform which allows the users to customize it based on their individual preferences. More importantly, SLET does not require any additional surgical paraphernalia, logistical support, or extensive training. The only caveats worth mentioning here are that beginners and enthusiasts should use the recommended fresh frozen variety of human amniotic membrane and fibrin sealant and follow the well laid out surgical steps before venturing out into improvisations of their own. The easiest way to stay ahead of the learning curve, as with any surgical technique, is probably to spend a day or two in the operating room with an experienced SLET surgeon and to attend the educative instruction courses held at various regional and national meetings. At the end of the day, the gratification of doing something new is far superseded by the feeling of gratitude one sees in the eyes of the person whose appearance, self-esteem, and vision have been successfully restored with SLET.

Sayan Basu, Chirag Bahuguna, Vivek Singh

Tej Kohli Cornea Institute, L V Prasad Eye Institute, Hyderabad, Telangana, India.

Correspondence to: Dr. Sayan Basu, Room 606A, 6th Floor, L V Prasad Eye Institute, Hyderabad - 500 034, Telangana, India.
E-mail: sayanbasu@lvpei.org

References

1. Kenyon KR, Tseng SC. Limbal autograft transplantation for ocular surface disorders. Ophthalmology 1989;96:709-22.
2. Baylis O, Figueiredo F, Henein C, Lako M, Ahmad S 13 years of cultured limbal epithelial cell therapy: A review of the outcomes. J Cell Biochem 2011;112:993-1002.
3. Sangwan VS, Basu S, MacNeil S, Balasubramanian D. Simple limbal epithelial transplantation (SLET): A novel surgical technique for the treatment of unilateral limbal stem cell deficiency. Br J Ophthalmol 2012;96:931-4.
4. Basu S, Sureka SP, Shanbhag SS, Kethiri AR, Singh V, Sangwan VS, *et al.* Simple limbal epithelial transplantation: Long-term clinical outcomes in 125 cases of unilateral chronic ocular surface burns. Ophthalmology 2016;123:1000-10.
5. Vazirani J, Ali MH, Sharma N, Gupta N, Mittal V, Atallah M, *et al.* Autologous simple limbal epithelial transplantation for unilateral limbal stem cell deficiency: Multicentre results. Br J Ophthalmol 2016;100:1416-20.
6. Gupta N, Joshi J, Farooqui JH, Mathur U. Results of Simple Limbal Epithelial Transplantation in unilateral ocular surface burn. Indian J Ophthalmol 2018;66:45-52.
7. Mittal V, Narang P, Menon V, Mittal R, Honavar S. Primary simple limbal epithelial transplantation along with excisional biopsy in

the management of extensive ocular surface squamous neoplasia. Cornea 2016;35:1650-2.

8. Kaliki S, Mohammad FA, Tahiliani P, Sangwan VS. Concomitant simple limbal epithelial transplantation after surgical excision of ocular surface squamous neoplasia. Am J Ophthalmol 2017;174:68-75.
9. Hernández-Bogantes E, Amescua G, Navas A, Garfias Y, Ramirez-Miranda A, Lichtinger A, *et al.* Minor ipsilateral simple limbal epithelial transplantation (mini-SLET) for pterygium treatment. Br J Ophthalmol 2015;99:1598-600.

Access this article online

Quick Response Code:

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_947_17

Cite this article as: Basu S, Bahuguna C, Singh V. Simple limbal epithelial transplantation: Impactful innovation. Indian J Ophthalmol 2018;66:53-4.