

Commentary: A simple surgical technique for splitting a single donor eye for both deep anterior lamellar keratoplasty and Descemet membrane endothelial keratoplasty without a microkeratome

We read with great interest the article written by Siddharthan *et al.* on "A simple surgical technique for splitting a single donor eye for both deep anterior lamellar keratoplasty (DALK) and Descemet membrane endothelial keratoplasty (DMEK) without a microkeratome."^[1] The authors concluded that this technique will allow corneal surgeons in all developing countries to

cost-effectively perform more lamellar surgeries thereby reducing the magnitude of corneal blindness without the need for expensive microkeratomes. We agree with the authors that microkeratome expense can be reduced and lamellar keratoplasty can become more effective with this technique.

In developing countries such as India, there is a marked shortage of good-quality corneal tissue due to which the use of non-optical grade tissues for therapeutic and anterior lamellar keratoplasties like DALK are quite common. The need for donor corneas per year in India is at least 20 times the current procurement. The global need for corneal donor tissue also significantly outweighs the available supply, and an estimated 12.7 million patients are waiting for corneal transplants.^[2]

Vajpayee *et al.*^[2] first described the technique of a single tissue for three patients from our center in 2007. The anterior

lamellar disk was used for automated lamellar therapeutic keratoplasty in a patient with macular dystrophy. The posterior lamellar disk was used for Descemet stripping automated endothelial keratoplasty (DSAEK) and the peripheral corneoscleral rim was used for limbal stem cell transplantation in a child with limbal stem cell deficiency.^[3] Before the advent of DMEK, we were also using the technique for optimal utilization of donor cornea.^[3,4] However, in our experience, there were some issues related to combining DALK with DSAEK. First, microkeratome cut might not be always predictable. There could be an over or under-cut by 50–100 microns. This will lead to a donor tissue which is either over or under thickness for the bed following DALK dissection. In either scenario, there will be a mismatch at graft–host junction which could lead to epithelial healing problems. Besides, DALK is most commonly performed for cases of advanced keratoconus with corneal thinning and weakened tensile strength. Transplanting a donor tissue with a thickness of <450 microns may not provide adequate tectonic support. In fact, there are several occasions where the anterior part had to be discarded due to the suboptimal thickness of the donor tissue. The second major issue was the diameter of the anterior stromal lenticule. Depending upon the microkeratome and parameters like pressure inside the artificial chamber, the diameter of the donor tissue obtained used to range between 8 and 9 mm. In cases of keratoconus with a wide cone, the size of the graft required is between 8.5 and 9 mm and an 8 mm donor graft may not always be suitable. Third, with microkeratome, the edges of the anterior cut are not perpendicular rather sloping. In contrast, the edges of the host tissue are perpendicular. This could lead to poor apposition between the donor and host edges. Lastly, if there is a perforation or uneven or eccentric cut, the anterior lenticule becomes unsuitable for transplantation.

Combining DMEK with DALK is an excellent technique to avoid all the above discussed problems. The anterior donor lenticule has a predictable thickness, and can be trephined to a diameter of choice. Besides, even if the peeling of the DMEK roll fails, the anterior part still can be used for DALK. Lastly, a less discussed advantage of combining DMEK with DALK is the use of good-quality donor tissue for DALK. At our center, we prefer non-optical grade tissues (endothelial count <2000; stromal edema, loose epithelium, Descemet fold) for performing lamellar procedures while DMEK is always performed with very good-quality donor tissues (endothelial count >2500, compact stroma). By combining DMEK with DALK, the DALK patient receives a donor tissue with a compact stroma and good endothelial count. The clinical impact of this is difficult to ascertain, but theoretically, there must be some advantage we believe.

The only problem with combining DMEK and DALK is it might not be logistically feasible all the time.^[5] Often, it becomes difficult to accommodate two patients with anterior corneal pathology and endothelial decompensation simultaneously within a short time window even in a tertiary care center like ours. The case selection criteria for DMEK are more stringent than DSAEK. Often, we get cases more suitable for DSAEK than DMEK.

To conclude, we would like to encourage and recommend this technique to all corneal surgeons especially in developing countries in order to meet the large gap between the demand and supply of corneal tissues and to perform cost-effective transplants. The technique of DMEK or DALK can vary depending on the surgeon's experience but wherever feasible these should be combined.

Prafulla K Maharana, Deepali Singhal¹

Department of Ophthalmology, Dr. Rajendra Prasad Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi, ¹ASG Eye Hospital, Bhubaneswar, Odisha, India

Correspondence to: Dr. Prafulla Kumar Maharana, Room No S5, Dr. Rajendra Prasad Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi, India. E-mail: drprafu13@gmail.com

References

1. Siddharthan KS, Agrawal A, Reddy JK. A simple surgical technique for splitting a single donor cornea for performing deep anterior lamellar keratoplasty and Descemet membrane endothelial keratoplasty without using a microkeratome. *Indian J Ophthalmol* 2021;69:2441-5.
2. Gadhvi KA, Coco G, Pagano L, Kaye SB, Ferrari S, Levis HJ, *et al.* Eye banking: One cornea for multiple recipients. *Cornea* 2020;39:1599-603.
3. Vajpayee RB, Sharma N, Jhanji V, Titiyal JS, Tandon R. One donor cornea for 3 recipients: A new concept for corneal transplantation surgery. *Arch Ophthalmol* 2007;125:552-4.
4. Sharma N, Agarwal P, Titiyal JS, Kumar C, Sinha R, Vajpayee RB. Optimal use of donor corneal tissue: One cornea for two recipients. *Cornea* 2011;30:1140-4.
5. Maharana PK, Sahay P, Singhal D, Garg I, Titiyal JS, Sharma N. Component corneal surgery: An update. *Indian J Ophthalmol* 2017;65:658-72.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Quick Response Code:	Website: www.ijo.in
	DOI: 10.4103/ijo.IJO_1109_21

Cite this article as: Maharana PK, Singhal D. Commentary: A simple surgical technique for splitting a single donor eye for both deep anterior lamellar keratoplasty and Descemet membrane endothelial keratoplasty without a microkeratome. *Indian J Ophthalmol* 2021;69:2445-6.