Since 1998, when Gerrit Melles published the first successful case of corneal transparency restoration by replacing the posterior layers of the cornea in a patient with bullous keratopathy (1), the frequency of treating corneal edema due to endothelial dysfunction with posterior lamellar keratoplasty (PLK) has increased. The main advantage of the technique described by Melles is that, through a posterior approach with a 9-mm scleral incision, it is possible to replace the endothelium, Descemet’s membrane (DM) and the posterior stroma with a donor disk with the same layers. This incision ensures that post-keratoplasty astigmatism is not an impediment during postoperative follow-up; this advantage, together with what we intuited could be a quicker functional recovery and reduced postoperative complications, led us surgeons from around the world to travel to Rotterdam to incorporate this procedure to our practice, which we considered, to say the least, promising. Melles himself devised a maneuver to reduce the size of the incision to 5 mm: folding the donor disk like a Mexican taco and inserting it thus in the recipient’s anterior chamber, then unfolding it once inside.

It was Mark Terry who began publishing truly important series of patients who had been treated with the technique he called Deep Lamellar Endothelial Keratoplasty (DLEK) (2), based on Melles’s PLK but conducted with specific equipment developed by Terry. For several years, Terry was practically the only author who worked to prove that PLK/DLEK was a superior technique than penetrating keratoplasty (PK) in terms of postoperative astigmatism and early functional recovery. Terry’s was a sort of solitary desert crossing and his efforts to ensure PLK/DLEK was not forgotten, should be recognized.

In 2004, Melles again described a surgical maneuver that simplified the procedure: extracting the DM from the recipient cornea so that the donor disk could be adhered to a far more homogeneous bed. This maneuver, called descemetorhexis (3), simplified the surgical process at the recipient phase and several groups in the United States (4) began employing a new technique they referred to as DSEK (Descemet’s Stripping Endothelial Keratoplasty). However, manual dissection of the donor disk continued being a technical issue. Obtaining the donor disk through keratotomy by microkeratome on an artificial anterior chamber made the technique far more reproducible, allowing both beds, donor and recipient, to join more homogeneously (5). This technique has been termed DSAEK (Descemet’s Stripping with Automated Endothelial Keratoplasty) and it is the one currently used by all of us cornea surgeons who believe in the benefits of a lamellar transplant versus a penetrating one.

Naturally, all this technical evolution has been accompanied by the publishing of results. There is no doubt that in terms of onset of astigmatism, time for functional recovery, refractive stability and postoperative complications, the techniques for replacing the posterior cornea layers are superior to PK (2). What critics of lamellar techniques refer to continuously to counter them before PK is that visual acuity of an eye with a double cornea layer can never be the same as a virgin cornea. This limitation is additional to, in the case of inserting a folded donor disk, the endothelial loss inherent to the surgery. The results published for DLEK and DSAEK show average corrected visual acuity (ACVA) of 20/40 (20/20 – 20/200) (2) and 20/34 ± 1.1 lines (6) respectively. However, we should ask whether the advantage of achieving a few cases of 20/20 ACVA a year with PK is excelled by having a majority of patients with uncorrected visual acuity 20/50 – 20/40 with a surgical technique with a far lower rate of complications. As for the second disadvantage of
PLK versus PK it should be noted that in a documented series published by Terry in eyes with Fuchs’s dystrophy, the loss of endothelial cells following DLEK/DSEK was similar to that reported in literature following PK after two years (43% in DLEK vs. 35% to 53% in PK) (7). Finally, an immediate postoperative complication inherent to DSAEK such as dislocation of the recipient disk, is no longer a significant limitation given the description of surgical maneuvers (4) diminishing the incidence of this event.

Many of us have wondered why this technique is being consolidated in the United States while in Europe it is not yet more frequently included in our surgical vade mecum. When several cases of DSAEK have been conducted, one can see the better functional outcomes achieved in patients whose corneal stroma has not yet been affected, in other words, only with corneal edema. Probably in our country we are more accustomed to providing cornea replacement surgery to patients with a painful eye and, normally, with corneal stroma fibrosis: in these eyes the technique may work to do away with the patient’s discomfort, but experience is beginning to show that visual outcome is poor. If aside from requiring early surgery we add the fact that the ever lower technical complexity of DSAEK allows conducting it in association to crystalline phacoemulsification and topical anesthesia, we should begin to question whether the gold standard treatment of corneal edema due to endothelial dysfunction should be PK or whether is should now be DSAEK. It is to be expected that, in the mid term, extensive series of patients treated with DSAEK will be published, which we will be able to compare with PK outcomes in terms of endothelial cell loss and graft survival.

Probably soon, and until we find a hypothetical definitive treatment to regenerate the corneal endothelium without having to resort to complex surgical techniques, the femtosecond laser will be the technology used to prepare the recipient bed and achieve a homogenous donor disk (PHS-DSEK); although, based on history, we must not neglect development of a new technique described by Gerrit Melles (8) consisting of replacing the DM with the corneal endothelium and without posterior stroma (DMEK: Descemet’s Membrane Endothelial Keratoplasty).

Gerrit Melles is an absolutely innovative author in corneal surgery and this has been recognized by the majority of publications on technical innovations and/or results with existing techniques in corneal lamellar surgery. Mark Terry’s efforts have managed to reinforce the interest in continuing development of these techniques. Both authors deserve our admiration and acknowledgement for devoting their talent and work to a quicker and safer recovery of our patients with damaged corneal endothelium.

REFERENCES