IMPROVED DALK TECHNIQUES

DALK can work well but there is a steep learning curve before surgeons feel fully at ease with procedures

by Dermot McGrath in Vienna

Improvements in deep anterior lamellar keratoplasty (DALK) techniques, as well as greater surgical familiarity with that particular approach, are resulting in a greatly reduced conversion rate to penetrating keratoplasty (PKP) procedures, according to Vincenzo Sarnicola MD.

“As our techniques have improved and we have become more familiar with this type of surgery, we no longer have to automatically convert to PKP when certain complications such as ruptures or perforations of Descemet’s membrane occur. It has been over eight years now since I have had to convert to PKP to rescue a failed DALK procedure,” Dr Sarnicola told delegates attending the 2nd EuCornea Congress.

Dr Sarnicola noted that DALK, which involves the removal of central corneal stroma while leaving host corneal endothelium and Descemet’s membrane (DM) intact, is currently the best procedure to restore corneal function in pathologies of shape and transparency of the corneal stroma in cases where the underlying endothelium remains healthy. He acknowledged, however, that there is quite a steep learning curve to be negotiated before surgeons feel fully at ease with DALK procedures.

Dr Sarnicola, Misericordia Hospital of Grosseto, Italy, said that DALK offers the best features of both lamellar and penetrating keratoplasty techniques by significantly reducing the risk of immune rejection and making any rejection more easily treatable. He noted that there are also fewer intraoperative and postoperative complications with DALK compared to penetrating keratoplasty.

Nevertheless, complications can and do occur in any surgery as intricate and complex as DALK, said Dr Sarnicola, who presented a review of his own complication rate in 456 DALK procedures carried out between 2000 and 2010. The data gathered by Dr Sarnicola included DALK procedures carried out using a variety of techniques such as dry dissection, hydrodissection, ‘big bubble’, air needle and, more recently, cannula DALK.

“This refined technique has worked very well for us and we are now achieving deep DALK by reaching Descemet’s membrane in 93 per cent of our cases,” he said.

The most common complications associated with DALK included perforation or rupture of Descemet’s membrane, microperforations and double anterior chamber, said Dr Sarnicola.

Using early DALK techniques such as dry air or hydrodissection, Dr Sarnicola recorded a complication rate for microperforations of 26 per cent in 19 cases and seven per cent in 41 cases respectively. This has been reduced to 2.5 per cent using the cannula DALK approach, which equates to three cases out of 118 procedures.

While only a few years ago a rupture of Descemet’s membrane invariably meant converting to penetrating keratoplasty, that no longer holds true if the surgeon follows some ground rules to rescue the situation, said Dr Sarnicola.

“First, it is important to complete the stromectomy and to avoid putting air into the anterior chamber without first suturing the donor. Once that has been done, the surgeon can then put air into the anterior chamber and can then move the eye in order to remove interface fluids between the stroma and Descemet’s membrane. If the surgeon follows these simple steps he should be able to retrieve the situation and avoid the need to convert to PKP,” he said.

Similarly, cases of excessive trephination leading to perforation of Descemet’s membrane can be rescued using DALK, said Dr Sarnicola.

“I am sure that most surgeons would convert in this type of scenario to PKP but you can actually deal with this complication and stick with a DALK approach. First we need to suture the zone of perforation and then carry out a layer-by-layer dry delamination to remove all the stroma. We can then suture the donor in place before delaminating the zone of perforation. All that remains then is to put some air in the anterior chamber and move the eye in order to remove the interface fluids,” he said.

Double anterior chamber is another complication that can arise during DALK procedures. In Dr Sarnicola’s series the incidence was 1.9 per cent for all 456 DALK procedures carried out between 2000 and 2010. Contrary to common belief, Dr Sarnicola noted that double anterior chamber is not always associated with a rupture of Descemet’s membrane.

“In fact you can also have double chamber without any rupture of Descemet’s, especially if the surgeon has used some viscoelastic to separate the Descemet’s from the stroma and some viscoelastic has been left between the membrane and the stroma. Fortunately, it is quite easy to deal with this problem by putting air into the anterior chamber,” he said.

In cases involving massive destruction of the stroma, the rule is to use DALK and only DALK, performing a large stromectomy and a layer-by-layer delamination, advised Dr Sarnicola.

Looking at the incidence of rejection, which was 26 out of 660 cases (four per cent), Dr Sarnicola noted that it was caused by epithelial rejection in two cases and subepithelial rejection in the other 24 patients.

To illustrate the utility of DALK in even the most severe cases, Dr Sarnicola presented a case study of a patient who presented to his clinic with severe infection and corneal melting 30 days after a big bubble DALK procedure.

The patient was given another larger graft the following day with an enlarged stromectomy, disinfection of the recipient bed and tissue culture for fungus and bacteria. Two days later, however, the infection returned and the tissue culture was negative for bacteria and fungal infection. The same pattern emerged after a third graft was attempted, with the infection returning after eight days. After a fourth DALK procedure, a polymer chain reaction (PCR) test for viral DNA revealed that the patient had ocular herpes. Subsequent treatment with acyclovir cleared the infection and three years later the patient has suffered no recurrence.

“The endothelial cell count is 1,200 cells/mm² after three years but remains stable. I think we can ask what would have happened in this case if we had not performed DALK but PKP. Everyone knows the survival rate of multiple PKP procedures is not good, so persisting with the DALK approach paid off in this particular instance,” he said.