

Large-diameter DALK technique minimizes postoperative astigmatism

The technique involves a steep learning curve and potential risks such as perforation of Descemet's membrane.



Richard A. Erdey

A novel deep anterior lamellar keratoplasty technique minimizes postoperative astigmatism, enhances long-term graft clarity and reduces the risk of graft failure.

The technique, called DALK selective anterior transplantation, involves a graft and trephination 8.5 mm to 10 mm in diameter; conventional DALK normally involves a graft and trephination 8 mm in diameter.

The technique has a steeper learning curve than conventional DALK but offers numerous advantages, ac-

ording to **Richard A. Erdey, MD**, the surgeon who pioneered the technique.

"I have found many advantages to large-diameter DALK that easily justify the additional time and effort required. Removal of a greater area of cornea pathology associated with keratoconus, pellucid marginal degeneration, and radial keratotomy scars and irregularity is an important consideration. Rapid visual rehabilitation and better astigmatism control are a major benefit," Erdey said.

There are a few downsides, such as the need to manage micro- or macro-perforations of Descemet's membrane so that conversion to full-thickness penetrating keratoplasty is kept to an absolute minimum, he said.

Big bubble and manual dissection

The two common methods of barring Descemet's membrane are the big bubble technique and manual dissection. A typical big bubble does not exceed 8 mm in diameter. Erdey said there is a risk of perforating Descemet's membrane when trying to expand a big bubble to perform a large trephination.

"A big bubble ... is only achieved between 30% and 80% of the time, depending on the diagnosis," Erdey said. "When it does, it rarely develops beyond 8 mm. Any attempts to 'force' more air into the bubble to cause it to expand further greatly increases the risk of Descemet's perforation. ... When a graft bigger than 8 mm is planned, I expect any big bubble achieved will likely fall short of the desired diameter."

Once a big bubble is formed, Erdey performs a manual pre-Descemet's dissection starting at the trephination zone, around 10 mm, and moving radially toward the bubble periphery, around 8 mm, for 360° before removing the stroma over the bubble.

Manual pre-Descemet's dissection over the entire corneal area within the trephination must be performed when a big bubble is not achieved, Erdey said. This also poses a risk of perforating Descemet's membrane.

"With either method, the greater the area of stroma targeted for removal, the higher the possibility of micro- or macro-perforation of Descemet's membrane, risking conversion to PK," he said. "It takes much more time and patience to expose Descemet's over a 10-mm diameter area than an 8-mm area and even more time yet to salvage Descemet's once a perforation occurs. This is perhaps the major reason why bigger-diameter DALK grafts are avoided."

Erdey said that of the last 60 DALK procedures performed at his surgery center, he and his partner, Daryl D. Kaswinkel, MD, had only one perforation severe enough to warrant conversion to PK.

Astigmatism management

"Astigmatism control is better," Erdey said. "The optics of the cornea are better because, in certain cases, it's almost a tectonic replacement of the cornea."

Corneal topography shows more regularity and fewer higher-order aberrations than smaller-diameter grafts, Erdey said.

Eyes with keratoconus that undergo

DALK with a normal-sized graft may develop long-term astigmatism, Erdey said. He described how astigmatism

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may be low when sutures are removed 6 months after surgery but may progress significantly after 4 or 5 years.

"If you only remove 8 mm of the cornea's 12 mm total diameter, then you leave a peripheral host bed of keratoconic tissue that in a young patient may eventually become ectatic, destabilizing the graft," he said. "Whereas if you remove the majority of the diseased keratoconic tissue and you replace it with a much bigger-diameter graft, astigmatism is not only better controlled initially but also better controlled in the long term." — *by Matt Hasson*

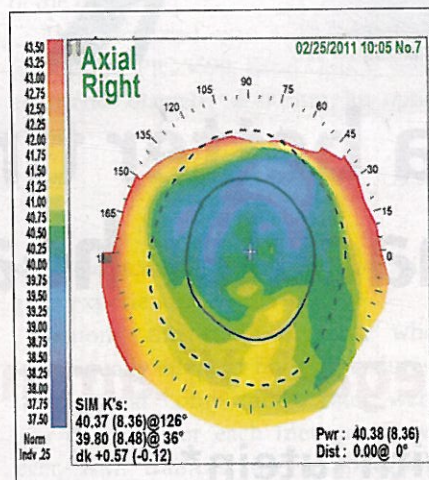
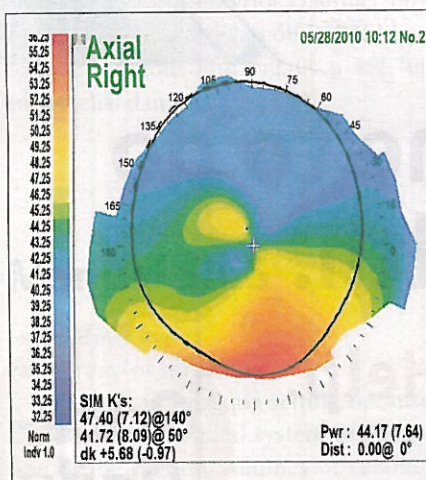
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Left, preoperative corneal topography of keratoconus: Rx: -7.0 + 7.0 x 20/50. Right, postoperative corneal topography after large-diameter DALK. Note: minimal astigmatism and refraction: +1.25 +1.5 x 175 20/20.



Cornea after DALK with sutures removed. The patient's own Descemet's membrane and endothelial cell layers are retained.

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