Standardized Deep Anterior Lamellar Keratoplasty (DALK): How to speed up the learning curve and master the procedure

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ASCRS Course ID: 2864, Tuesday 21th April 2015, 800-930AM

DALK - Introduction

• Aimed at the treatment of stromal pathologies that spare the Descemet’s membrane and the endothelium
• Became more popular since the introduction of the “Big bubble” method

DALK - Introduction

• Has a steep learning curve due to lack of standardization
• Risk of perforation and conversion to penetrating keratoplasty
DALK – Introduction

• In this course we will:
• Describe known techniques for DALK
• Identify methods leading for successful pneumatic dissection

DALK – Introduction

• In this course we will:
• Learn a simple standardized method of performing pneumatic dissection
• Describe our modified “small big bubble technique” and its results

Small Big Bubble DALK – Indications

• Any patient with pathology limited to the corneal stroma, with healthy DM and endothelium:
• Keratoconus or other forms of corneal ectasia (i.e. post-LASIK)
• Corneal scars (post-infectious, post-refractive surgery, non-perforating traumata, etc.)
• Corneal stromal dystrophies
Small Big Bubble DALK – Surgery Steps

• The surgery may be performed under peribulbar or general anesthesia.

1. Mark the center of the recipient cornea.
2. Choose a trephine. When ectasia is present, trephination must be performed peripherally enough (generally 8.75 – 9.0mm) to be able to cut through tissue with relatively normal thickness, thus including completely the thinner part of the cornea.

3. Perform partial thickness trephination, to depth of approximately 500-550 µm (90% of the peripheral host cornea thickness).
4. Make a paracentesis, and inject a small amount of air into the anterior chamber.
5. Reach the base of the trephination with the tip of a dedicated probe, then enter the central stroma at this deep level (500-550 µm) up to about 1.5-2 mm from the circular incision.

6. Remove the probe and insert a cannula, which is then further advanced centripetally for additional 2-3 mm.
7. Inject air gently, until peripheral displacement of the air in the anterior chamber is visualized.
8. Stop injecting as soon as the anterior chamber air is displaced. It is not important for the big bubble to enlarge up to the trephination mark.
Small Big Bubble DALK – Surgery Steps

9. De-bulk the emphysematous anterior stroma with a crescent blade or similar, leaving a relatively thin layer (±100 µm) of residual stroma.

10. Using a trephine or a skin biopsy punch, mark a central 6.0 mm diameter outline for dissection.

11. Place a small amount of viscoelastic device over the central cornea.

12. Using a 15 degree blade, cut into the stroma, until the big bubble deflates and the air in the anterior chamber is visualized to again shift centrally.

13. Using scissors with a blunt tip, with or without the aid of viscoelastic, dissect away the anterior stroma, up to the 6.0mm mark.

14. Prepare donor tissue using a linear microkeratome with a 400-450 µm cutting head, or take the anterior cap of a donor tissue previously utilized for endothelial keratoplasty in another case.

15. Punch this donor tissue to the same size as the recipient corneal trephination.

16. Fix donor tissue to host using your preferred suturing technique.
Small Big Bubble DALK – Surgery Steps

A) 9mm Trephination
B) Air injected into AC
C) Pneumatic Dissection achieved
D) Debunking of anterior stroma

E) 6.0 mm mark
F) Stroma removed out to 6.0mm mark
G) Donor prepared with microkeratome
H) Donor fixed with sutures.

Small Big Bubble DALK – Conversion to Mushroom Keratoplaspy

A) Following the perforation, corneal tissue is removed, full thickness out to the 6.0 mm mark
B) The posterior lamella of the donor graft is punched to a diameter of 6.0 mm and placed on the recipient bed
C) The anterior cap of the donor tissue is punched to the same size as the original host trephination, and fixed with sutures.
Small Big Bubble DALK – Postoperative Management

1. Commence topical steroid and antibiotic:
   a) 2 hourly for 2 weeks
   b) 3 hourly for 2 weeks
   c) 4 x a day for 2 weeks
   d) 3 x a day for 1 month
   e) 2 x a day for 1 month
   f) 1 x a day for 1 month, then stop

2. Review
   a) Day 1
   b) Week 1
   c) Month 1
   d) 3 Monthly