Outcomes of Descemetopexy for Double Anterior Chamber after Deep Anterior Lamellar Keratoplasty

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Deep Anterior Lamellar Keratoplasty (DALK) over the last decade is rapidly becoming the preferred procedure of choice for pathologies of the cornea that do not involve the endothelium. DALK offers certain obvious advantages over Penetrating Keratoplasty (PK). As the donor endothelium is not replaced, the risk of endothelial rejection is negated and also obviates the need for long term steroid use. Being a predominantly extra ocular procedure, it eliminates the risk of devastating complications like expulsive hemorrhage and endophthalmitis and also provides a tectonically stronger globe with possible earlier removal of sutures and faster visual rehabilitation.

Despite these advantages, there are considerable challenges in many parts of the globe to convert to DALK. The reluctance to convert, partly stems from the technical challenges thrown up while performing DALK. Perforation with loss of anterior chamber necessitating conversion to PK is a common issue. Though the perforation rates have come down with advent of techniques such as the Anwar’s Big Bubble technique, microperforations still do occur which when not managed effectively can result in Double Anterior Chamber in the immediate post operative period. They can be managed by observation or by descemetopexy using air or perfluoropropane gases. In this study we describe a series of patient undergoing DALK who presented with double anterior chamber that have been characterised using anterior segment optical coherence tomography and their subsequent outcomes following descemetopexy.

MATERIALS AND METHODS

Retrospective consecutive interventional case series of patients undergoing DALK and presenting with double anterior chamber on post operative day 1 and subsequently underwent descemetopexy, conducted at the L.V. Prasad Eye Institute, Hyderabad, India during the period July 2008 to June 2014.

Surgical Technique

All cases were performed under local anaesthesia using a peribulbar block. A 7.5–8 mm vacuum trephine was used for the recipient. After performing a partial thickness trephination, the anterior cap was removed. Subsequent
to this a Big Bubble was attempted in all cases. In cases where Big bubble was not achieved, the DALK was completed by using a Manual groove and peel technique. In cases where the microperforation was noted on table, the DALK was continued by either using sutures or fibrin glue or by injecting air into the anterior chamber.

The donor cap was oversized by 0.25mm and after removal of the donor Descemet’ membrane (DM) was secured to the host by using 16 interrupted 10-0 monofilament nylon sutures. All cases underwent Anterior Segment Optical Coherence Tomography (Visante) the following day. The number of quadrants of DM detachment was noted and the maximum vertical and maximum horizontal extent of detachment was calculated. The total area of detachment of was calculated using Image J software.

All the cases included in the study underwent Descemetopexy in the immediate post operative period using Air or C₃F₈. With the ASOCT images as a guide care was taken not to cause any additional inadvertent perforations. A full chamber fill was maintained for 10 mins followed by partial fluid air exchange. A repeat descemetopexy was also done in certain cases with persisting detachment.

Success was defined as a complete anatomical attachment of the DM with restoration of corneal clarity. Failure was defined as persistence of DM detachment warranting a subsequent full thickness penetrating keratoplasty.

Statistical Analysis was performed using SPSS software. Mann Whitney test was used to analyse the non parametric data. The Student t test was used to analyse the parametric data. A p value of <0.05 was considered significant.

**RESULTS**

Twenty five eyes of 25 patients were included in the study. The indication for DALK was stromal dystrophy in 11 eyes, corneal scar in 10 eyes and Keratoconus in 4 eyes. DALK was performed by Big Bubble technique in 15 eyes and Manual dissection in 10 eyes. An intra-op perforation was noted in 8 eyes where a DALK was completed using air injection into the anterior chamber in 6 eyes and fibrin glue application in 2 eyes.

The mean maximum vertical height of the detachment measured using ASOCT was 0.88 mm and the mean maximum horizontal extent of the detachment was 6.05mm. Using ASOCT the number of quadrants involved were calculated. The detachment involved 2 quadrants in 5 eyes, 3 quadrants in another 5 eyes and 4 quadrants in the remaining 15 eyes. The detachment did not extend beyond the graft host junction in 15 eyes whereas in the remaining 10 eyes the detachment extended in atleast one quadrant beyond the graft host junction.
Success after descemetopexy was encountered in 19/25 eyes (76%). 14 of these eyes attached after a single descemetopexy and the remaining 5 eyes required a repeat descemetopexy. Failure was encountered in 6/25 eyes (24%) where the detachment persistent despite descemetopexy and all 6 eyes subsequently underwent a full thickness penetrating keratoplasty.

On further analysing the 2 groups the indication & technique (big bubble vs. manual) p=0.28 was not different. There was no statistically significant different in the mean maximum height of detachment (p=0.83), the mean horizontal extent of detachment (p=0.09) and the extent (no of quadrants) p =0.14, between the success and failure groups.

**DISCUSSION**

With improved microsurgical instrumentation, there has been increasing trend towards performing DALK rather than PK for pathogies involving the corneal stroma. This technically challenging procedure still throws up its share of intra operative and post operative complications. The most common intraoperative complication are perforation of the Descemet membrane which may be microperforations where the chamber can still be maintained with the aid of air in the anterior chamber or macroperforations where the anterior chamber can no longer be maintained necessitating abandonment of the DALK procedure and converting to PK. The incidence of perforations in various studies ranges from 0-39% in various studies with a pooled incidence of 11.7%.

Perforation of the Descemets membrane can occur at any step, during trephination, with the cannula during air injection, during dissection of the deeper stromal layers or even during suturing the donor graft. Microperforations can be managed by injecting air to maintain the anterior chamber and further manual dissection can be completed manually. Other adjuncts like fibrin glue or cyanoacrylate glue or even a patch of stromal tissue can be used for managing microperforations. In our series, intraoperative microperforation was seen in 8 eyes, in 6 of which DALK was completed by just air injection into the anterior chamber. Fibrin glue was used in the remaining 2 eyes.

Despite intraoperative management of microperforations with air or fibrin glue, there is a high incidence of double anterior chamber in these cases. The incidence of double anterior chamber varies from 0 -16% with a pooled incidence of 3.5%. The subsequent tight suturing of the donor cornea over the descemet’s membrane usually throws it into folds and could lead to opening up of these perforations leading to seepage of aqueous resulting in double anterior chamber the next post operative day. Management of the double anterior chamber could be observation or by descemetopexy.
using air or perfluoropropane gases. In our series we have looked at 25 such patients who presented with double anterior chamber on first operative day and underwent descemetopexy after appropriate ASOCT documentation. ASOCT was used to characterise the extent of the detachment, the number of quadrants of involvement. The ASOCT served as a guide to help in making a paracentesis and performing a descemetopexy without causing any inadvertent additional perforations.

An anatomical success rate of 76% (19 eyes) was achieved using descemetopexy. This was also accompanied with marked clearing of the graft. The success of the procedure did not appear to be affected by the indication of surgery, the type of technique used in performing the DALK (manual vs. big bubble) or by the extent and size of the detachment as measured by ASOCT. Among the 19 eyes, 5 eyes attached after a repeat descemetopexy. So it would be worthwhile considering a repeat intervention in selected cases. The cases which did not resolve with descemetopexy, never resolved spontaneously and all of them required a full thickness penetrating keratoplasty.

In conclusion we recommend performing a descemetopexy in all cases with Double anterior chamber following DALK procedure irrespective of the extent of attachment. This helps in rapid resolution of the detachment and early visual recovery.

REFERENCES


