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Case Report

AutoCAD - A Novel Method of Assessing Clear Cornea with Forceps-Induced Descemet Rupture

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Abstract

A 21-year-old male patient had a history of forceps delivery. On examination, we found a right eyebrow scar; an oblique Descemet tear extending from 2 o'clock near the limbus, passing nasal to the pupil margin

and ending at 6 o'clock near the limbus in the right cornea. The detachment area was measured by AutoCAD and accounted for 14.5% of total right cornea area. Mean cell density of the right eye was 1365 cells/mm^2, which was half of the left eye cell density. In the detachment area, there was a high coefficient of variation (73%) and low proportion of hexagonal cells (44%). Despite a detachment area of 14.5%, the right cornea remained clinically transparent. AutoCAD can be used as a tool to measure the cornea surface's defect.

Keywords: *AutoCAD; Clear Cornea; Forceps-Induced Descemet Rupture*

Introduction

AutoCAD as computer software is commonly employed in technical fields but can also be used in medicine. Using AutoCAD as a tool to assess the area of endothelial loss area has not been reported before. In this study, we present a case with Descemet tear induced by forcep delivery to illustrate the clinical implication of AutoCAD in measuring cornea lesions.

Case Report

A 21-year-old male patient presented for preoperative assessment for myopic refractive surgery. His medical history included forceps delivery at birth. The spectacle-corrected visual acuity was 20/20 in both eyes (right eye -3.25/-2.00 x 10, left eye -6.00/-1.00 x 164). Intraocular pressures of both eyes were 15 mmHg. On examination, the right cornea demonstrated an oblique Descemet tear extending from 2 o'clock near the limbus, passing nasal to the pupil margin and ending at 6 o'clock near the limbus. The detachment area was semicircular in shape and measured as 2.5 x 7.5 mm on slit-lamp examination (Figure 1B). Anterior Segment Optical Coherence Tomography (ASOCT) exhibited an elevated temporal flap of Descemet with rolled edge (Figure 1C).

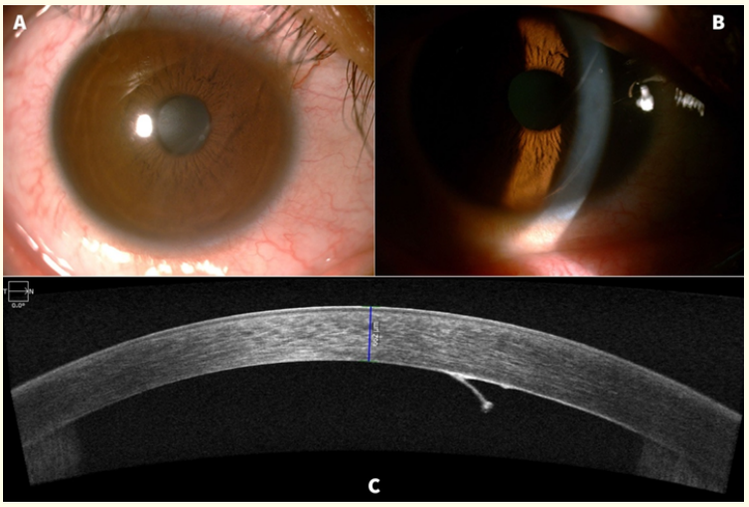

Figure 1: *(A, B) Slit lamp photograph of the right eye showing rupture of Descemet membrane. (C) ASOCT exhibited an elevated temporal flap of Descemet with rolled edge.*

AutoCAD 2020 (Autodesk, Inc, Mill Valley, USA), was used to calculate the detachment area accounted for 14.5% of the total cornea area (Figure 2A and 2B). Real horizontal and vertical diameters of the cornea were measured on slit-lamp examination and inserted into AutoCAD. Circumferential areas of cornea and Descemet detachment were marked by the software. Ratio of slit-lamp to AutoCAD cornea diameter was used to calculate the portion of real endothelial loss area. The central endothelial cell density of the right eye was 1536 cells/mm^2, compared with the left eye at 2675 cells/mm^2. On comparison of the right versus the left cornea, there was a high coefficient of variation (73% versus 24%), a lower proportion of hexagonal cells (44% versus 64%) and a thicker central corneal thickness (745 µm versus 552 µm) (Figure 3A and 3B). Clinically the right cornea remained relatively clear. The patient was also noted to have a right eyebrow scar, likely associated with the forceps injury. The refractive surgery did not proceed and regular clinical follow-up was recommended.

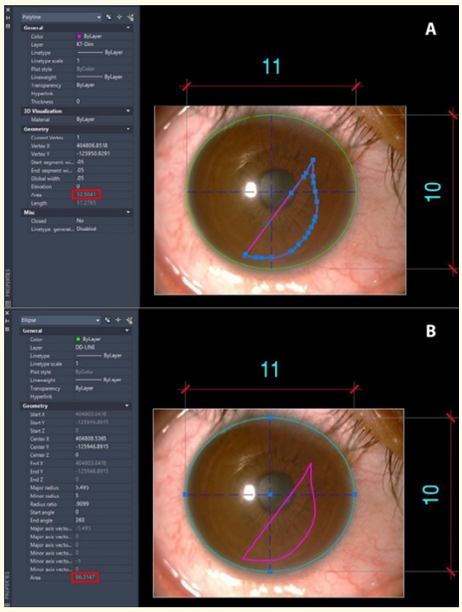

Figure 2: *AutoCAD was used to calculate the Descemet membrane detachment area (A) and the corneal surface (B).*

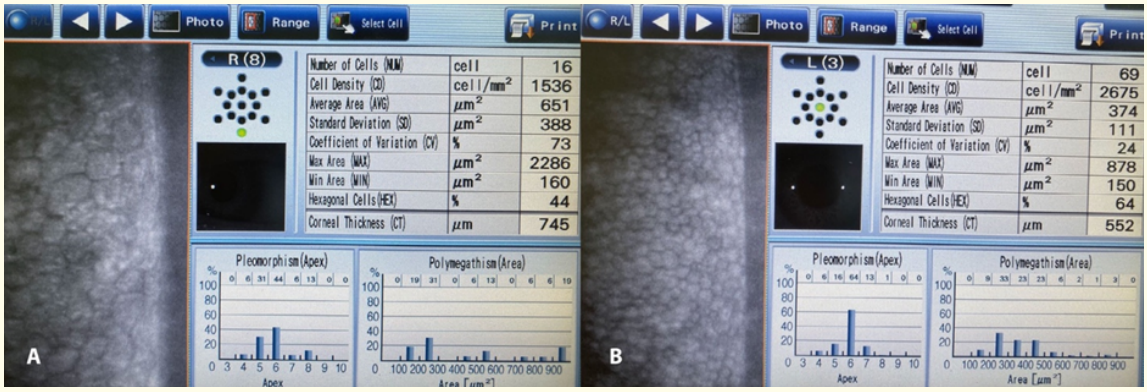

Figure 3: *Specular microscopy image of the right eye (A) and the left eye (B).*

Discussion

AutoCAD (computer-aided design) is a technical software primarily used by architects, engineers, structural designers, but can be adapted for medical purposes. It has been used to assess the time of post abrasion corneal re-epithelialization [1] and qualitative analysis of corneal sub-basal epithelial nerves with dry eye [2]. The use of AutoCAD to evaluate the area of endothelial loss area however, has not been previously reported.

The onset of corneal edema depends on the degree of Descemet detachment. Corneal edema may recover over weeks to months due to endothelial cell migration if the detachment is small. If the area of detachment is more extensive, the corneal edema becomes irreversible and requires surgical intervention [3]. Even when corneal decompensation is later onset following forceps trauma, endothelial keratoplasty can be considered [4]. Software programs such as AutoCAD can be used to document the extent of Descemet detachment and corneal edema.

Similar cases of forceps-induced endothelial trauma have been reported [5,6]. Descemet rupture was incidentally found in one eye of both cases during assessment prior to cataract surgery [5,6]. It is also noteworthy that the patient described by Alobaidy had dense amblyopia in the traumatized eye, so cataract surgery was not recommended [6]. Our patient was detected at an earlier age and fortunately developed no amblyopia in spite of the significant astigmatism in his right eye.

Conclusion

Thank to using AutoCAD in this case, we were able to measure the area of Descemet detachment (14.5% of the total corneal surface), together with the endothelial cell density of 1536 cells/mm^2 resulting in corneal edema indicated by the central corneal thickness of 745 µm. At his relatively young age, it is likely with normal age-related endothelial loss; the cornea will decompensate and will need a keratoplasty to maintain corneal clarity.

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