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Late Extrusion of Intrastromal Corneal Ring Segment into the Anterior Chamber: Case Report

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Abstract

Introduction: This report describes the extrusion of an intrastromal corneal ring segment into the anterior chamber, which is more frequent intraoperatively. The reported case consists in one segment extrusion into the anterior chamber 13 years after the placement of intrastromal corneal ring segment in a patient with keratoconus.

Case Report: A 49-year-old male patient, diagnosed with keratoconus in both eyes, underwent surgery for Ferrara intrastromal corneal ring segment in both eyes 13 years ago. He referred blurred vision of three-month of evolution. Intrastromal corneal ring segments were seen very close to the endothelium in both eyes and in the left eye partial extrusion of the temporal segment into the anterior chamber. The anterior chamber dislocation was managed electively in the operating room: with topical anesthesia and sedation it was decided to remove the segment from paracenteses that were performed near to the extruded segment and extraction of the segment with retinal forceps.

Conclusion: Follow-up of operated patients with intrastromal corneal ring segments is important to control the depth of implantation since extrusion of the segment to the anterior chamber may occur even many years later, as in this case.

Keywords: Intrastromal Corneal Ring Segment; Anterior Chamber; Ectasia; keratoconus; Ferrara

Abbreviations: OCT: Optical Coherence Tomography

Introduction

Reasons for removing the intrastromal corneal ring segments include keratitis, corneal lysis and corneal perforation through the endothelium, undercorrection, overcorrection, extrusion, mispositioning, progressive corneal steepening, and neovascularization. Anterior chamber extrusion is more frequent intraoperatively. The reported case consists of one segment extrusion into the anterior chamber 13 years after the surgery of these bilateral intrastromal corneal ring segments in a patient with keratoconus.

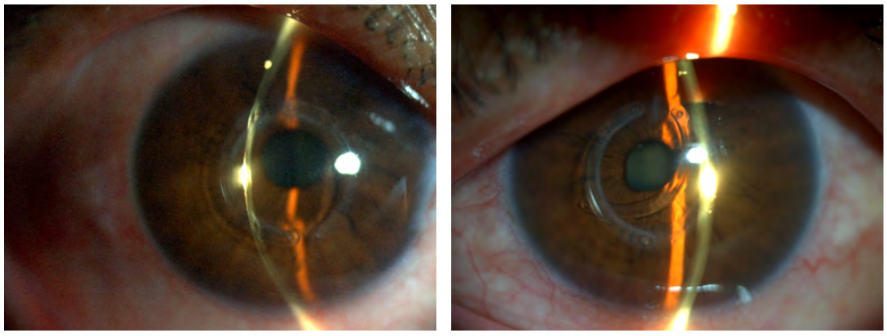

Figure 1: Intrastromal segments in both eyes.

Case report

A 49-year-old male patient, diagnosed with keratoconus in both eyes, underwent surgery for Ferrara intrastromal corneal ring segments in both eyes 13 years ago. He referred blurred vision of three-month of evolution, denying trauma and eye rubbing. Slit lamp examination showed, on one hand, intrastromal segments very close to the endothelium in both eyes and, on the other hand, in the left eye partial extrusion of the temporal segment into the anterior chamber. The patient had in the right eye a visual acuity of 1 (LogMAR) that improved in 0.5, and, furthermore, in the left eye he had a visual acuity of 0.5 that improved in 0.4. The intraocular pressure in the right eye was 16 mmHg and in the left eye 14 mmHg.

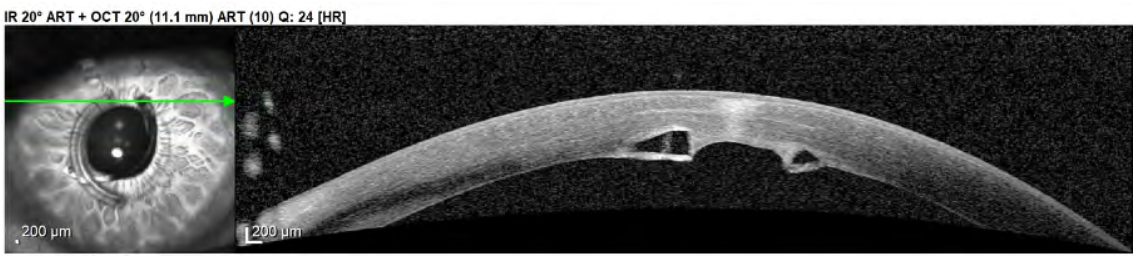

Figure 2: Optical Coherence Tomography of the left eye.

OCT scan of left cornea with intrastromal corneal ring segments showed 480 µm above the segment (outer corneal surface to the superficial edge of the segment).The anterior chamber dislocation was managed with topical anesthesia and sedation. Then it was decided to remove the segment from the original incision with the aim to reach the same depth and plane. Since the procedure had become difficult, it was decided to remove the segment through a new paracentesis. Two paracenteses were performed near to the extruded segment in M7 and M11 to place the viscoelastic and to remove the segment. For it, it was attempted to remove it with the reverse Sinskey hook encountering difficulties, therefore, the segment was removed using a retinal forceps.

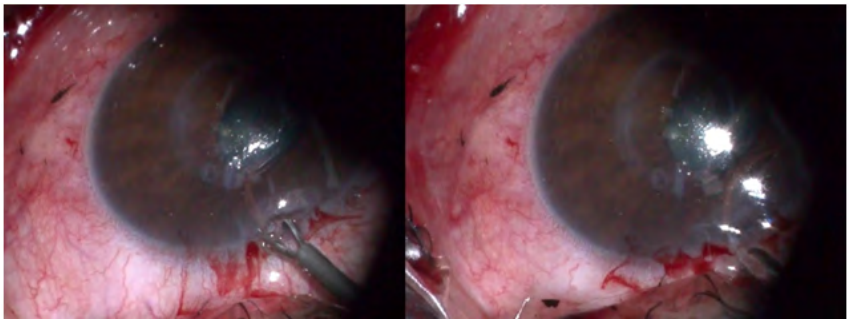

Figure 3: Extraction with retinal forceps.

An air bubble was left in the anterior chamber and the paracentesis wound was closed with a single 10-0 nylon suture. Even though the intrastromal corneal ring segment was removed, it was not replaced, and regarding the other segment in the same eye, it was not too removed.

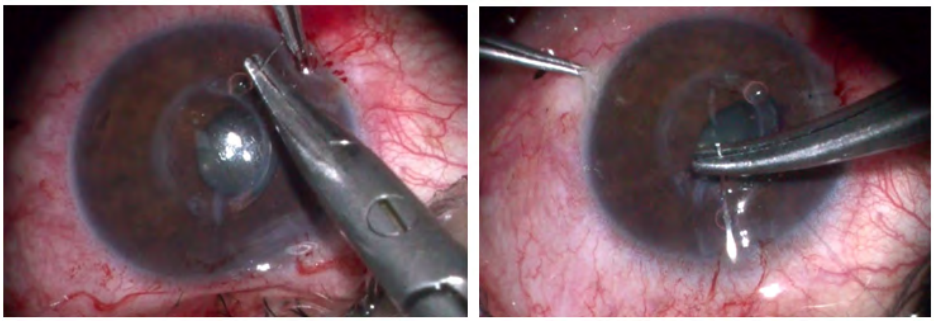

Figure 4: Suture with Nylon 10-0

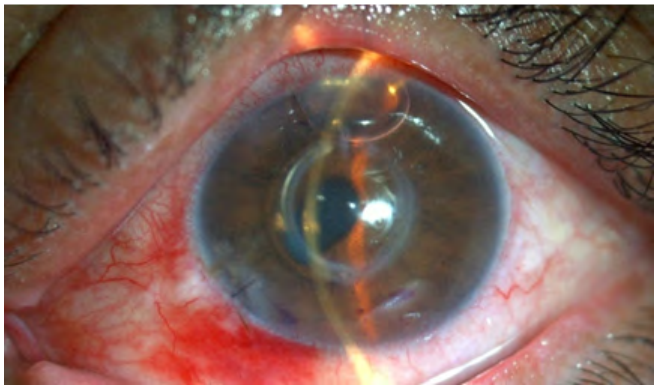

Figure 5: First postoperative day.

On the first postoperative day, the visual acuity in the left eye was 1 (LogMAR) and visual capacity was 0.5. During the slit lamp examination, were observed localized edema in the area of segment extracted and more visible scarring at the edges of the tunnel. Intraocular pressure was 15 mmHg. One month after surgery, visual acuity turned out to be 0.5 (logMAR) and visual capacity 0.2 with a refraction -1.25-3.5x140. A specular microscopy was performed one month after the procedure for the purpose of evaluating the health of the endothelial cells. The cell count was 568 cells / mm2, also were seen pleomorphism, polymegatism; the pachymetry was 439 µm.

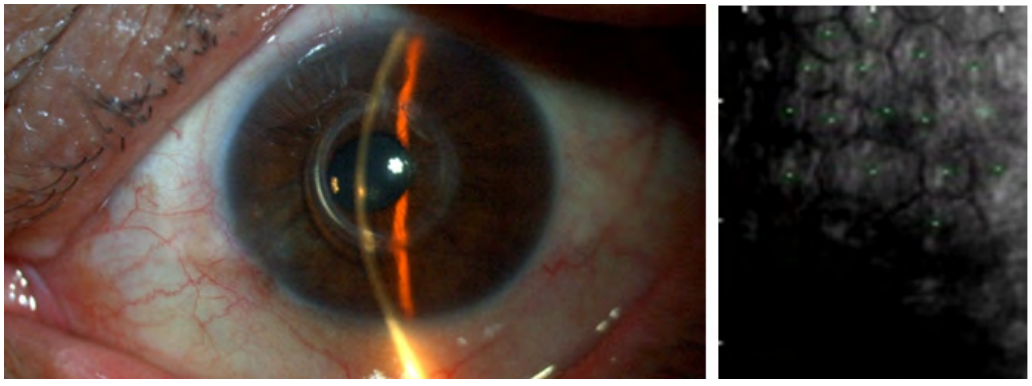

Figure 6: One month after surgery. Slit lamp examination and specular microscopy.

Discussion

During an intrastromal corneal ring segments implantation, the area of damaged epithelium and the basement membrane are smaller than in other surgeries, which leads to a lower release of cytokines at that level and a lower response of the healing cascade [1]. Activation of wound healing processes are seen in the peripheral cornea near to the segments. In the compressed lamellae there are many active keratocytes and an increase in mitosis at the epithelial level [2]. Although the damage caused by the surgery to the basement membrane in the incision for the implantation of the intrastromal corneal ring segments is smaller than other procedures, the keratocytes are transformed into myofibroblasts, that are secondary to the release of TGF-b and predominantly located around the segment in the outer and inner inferior angles, especially in the corner next to the cornea center [3]. Removal of the intrastromal corneal ring segment when implanted superficially or 80% depth is relatively easier to remove from the surface and from the main incision. When this segment is extruded into the anterior chamber, it can be removed from the main incision or from a new paracentesis, in which case viscoelastic is used to protect the structures of the anterior chamber.

This intrastromal corneal ring segment might have been migrating because of an implantation with a depth more than 80% or secondarily by factors that are external to an appropriate depth. Although deep implantation helps prevent extrusion of the segment, posterior migration of the intrastromal segment could result in Descemet's disruption, endothelial damage, anterior chamber perforation and extrusion like this case. It has been proposed that the intrastromal corneal ring segment can be dislocated internally to the anterior chamber, possibly through a weak point at the level of the main incision or at the site of separation of the lamellae by the segment that was performed in a very deep plane [4]. Most of the patients have some corneal ectasia, a situation that predisposes the thinning of the cornea and that associated with ocular rubbing and microtrauma can produce over time migration of the corneal segment. These factors perform greater compression towards the posterior stroma of the collagen lamellae, mechanical displacement, and later corneal segment perforation into the anterior chamber. The changes in specular microscopy also may occur because of the loss of endothelial cells due to the trauma of the segments, where cells fill the empty places in since they acquire contractile properties as a response to endothelial scarring.

Conclusion

Follow-up of operated patients with intrastromal corneal ring segments is important to control the depth of implantation since extrusion of the intrastromal corneal ring segment to the anterior chamber may occur even years later, as in this case. If we have an extrusion of these intrastromal corneal ring segments to the anterior chamber, it is also important to evaluate the endothelial damage secondary to this trauma. We recommend long-term follow-up of these patients with the purpose of evaluating the progression of ectasia and the risk factors in case of complications.

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