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Hexagonal Structures at Lens Capsule Zonular Attachments

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Abstract: Two years after uneventful phacoemulsification with posterior intraocular lens implant in an 84-year-old female patient, the capsular bag and enclosed intraocular lens luxated into the vitreous cavity. A vitrectomy was done to extract the lens and capsule for electron-microscopic examination. We found very few zonular attachments to the capsule, but did note hexagonal structures of unknown significance that our study indicates may be related to the lens epithelium. **Jpn J Ophthalmol 1997;41:81-83** © 1997 Japanese Ophthalmological Society

Key Words: Hexagonal structures, intraocular lens, luxation, scanning electron microscopy, zonule.

Introduction

Dislocation of the intraocular lens into the vitreous cavity is a serious complication of cataract surgery; however, there have been very few reports of dislocations of both the capsule and its enclosed lens.[1] We studied one luxated capsule and lens with scanning electron microscopy and discovered hexagonal structures of unknown significance at the zonular attachments of the capsule.

Case Report

An 84-year-old female visited Haibara General Hospital on May 20, 1992, complaining of bilateral blurred vision. Visual acuity was 0.1 (0.2X +4.5D) OD and 0.1 (0.2X +4D) OS; intraocular pressure (IOP) was 14 mm Hg OD, 16 mm Hg OS; there were bilateral cortical cataracts. No other abnormalities were found in the anterior segment, ocular media, or fundus. Axial length was 22.76 mm OD, 22.80 mm OS. Medical history included hypertension and lung cancer with metastasis to the right adrenal gland; nevertheless, she wished to have cataract surgery.

Uneventful phacoemulsifications and intraocular lens (Pharmacia U720^{TM}) implantations, after continuous circular capsulorrhexis, were done on the right eye on June 1, and on the left eye on July 2. The patient did well until July 12, 1994, when the right intraocular lens and capsule were found to be luxated into the vitreous cavity. Information obtained from the family (the patient now had senile dementia) revealed a fall 2 months earlier, with unspecified trauma to the eye. The patient was referred to our department on August 8. Right visual acuity was 0.6X +14D;cyl−2.5D, 70°. Mydriasis was good bilaterally; there was no pseudoexfoliation. Donesis of the left lens capsule and posterior chamber lens were also noted. On the following day, the luxated lens and capsule were removed with liquid perfluorodecaline, after vitrectomy. A new lens was implanted, using a transscleral suture. There were no postoperative complications.

Results

The extracted lens and capsule were fixed in 2% gluteraldehyde, dehydrated in a graded alcohol series, dried in a critical-point dryer, and gold-coated in preparation for study by electron microscope (Hi-

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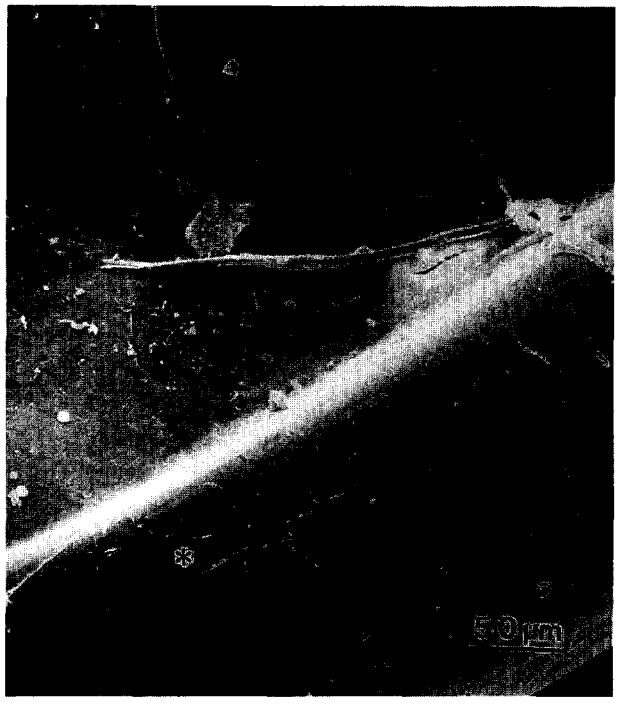

Figure 1. Scanning electron micrograph: anterior surface of luxated lens capsule; most zonular fibers and zonular lamellae have disappeared; hexagonal structures (arrows) in the pre-equator zone were found.
*Haptic of intraocular lens, covered by lens capsule.

Figure 2. Scanning electron micrograph: hexagonal structures with remaining zonules attached; centers are slightly convex.

tachi S-800). The lens was well sited in the capsule, although the capsule had sustained a small tear during the extraction. Only a few zonules remained and very few were attached to the posterior capsule; most zonular lammellae had disappeared. There were a few inflammatory and foreign-body giant cells on the surface of the posterior chamber lens. Hexagonal structures were found at the pre-equator zone (Figure 1), formed by clusters of fine fibrils, with some of the remaining zonules attached to them. One hexagonal side measured 5–7 μm; the center of the structure was slightly convex (Figure 2).

Discussion

In this patient, factors causing luxation of the intraocular lens and the capsule included age-related fragility and decrease in zonular fibers, as well as trauma, both accidental and surgical. Previous reports have noted the decrease in zonules with aging.[2,3] Luxations of posterior chamber lenses related to a capsular tear are frequently reported, but there are few accounts of capsule-enclosed lens dislocations.[1] These occurrences may increase, however, since cataract surgery is now being done in younger patients and postoperative lifespans are lengthening.

We believe this is the first description of an electron-microscopic study of a dislocated posterior chamber lens in the capsule and of the hexagonal structures seen at the zonular attachments. Previous study of normal lens capsules obtained at postmortem did not reveal any hexagonal structures because of the covering of dense zonular fibers and lamellae. The significance of these structures is unclear: their size and shape suggest they are related to the lens epithelium. The slightly convex shape suggests the "cobblestone-like" pattern presumed to be cells of the subcapsular epithelium.[4] Further investigation is required to identify the purpose of these hexagonal structures.

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