



Dry Pars Plana Vitrectomy for Aqueous Misdirection During Cataract Surgery

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Clinical Image

Aqueous misdirection following uneventful phacoemulsification is rare. Herein I report such a case during cataract surgery, which was treated successfully by 25-gauge pars plana vitrectomy.

A 79-year-old man had bilateral age-related immature-stage cataract with open angles and no history of glaucoma. The corneal curvature was 44.70/45.30. The axial length, measured by intraocular lens (IOL) Master, was 23.08 mm. *B-scan* ultrasound demonstrated liquefied vitreous. A clear corneal incision phacoemulsification was performed uneventfully with placement of a foldable IOL in the capsular bag. After the viscoelastic material was removed from the bag and anterior chamber, the anterior chamber became shallow. Balanced Salt Solution (BSS) was injected into the anterior chamber to deepen it, and the corneal incision was closed by stromal hydration. However, the anterior chamber was still flat, the iris prolapsed from the corneal incision, and the eye globe was very solid as tested by fingers.

It was thought that aqueous flow was diverted posteriorly into the vitreous cavity, resulting in aqueous misdirection. A core pars plana vitrectomy was performed without infusion using a 25-gauge sutureless vitrectomy system. The forward pressure was reduced, and the eye was softened, before the anterior chamber was re-formed by injecting BSS through the corneal incision (Figure 1). After a communication between the vitreous cavity and anterior chamber was created, the anterior chamber got re-formed spontaneously and remained deep. The corneal incision and sclerotomy site were closed with no sutures. Postoperatively, the visual acuity was 20/25, and the intraocular pressure was 19 mmHg without anti-glaucoma medications.

Aqueous misdirection, formerly referred to as malignant glaucoma, is characterized by elevated intraocular pressure and a shallow or flat anterior chamber without pupillary block or choroidal abnormalities [1]. It occurs not only in small eyes with anatomically narrow anterior chamber angles [2], usually after glaucoma surgery, laser iridotomy or miotic therapy, but also in eyes treated by capsulotomy or vitrectomy [3] and pseudophakic eyes [4]. To our knowledge, this is the first case occurring during cataract surgery.

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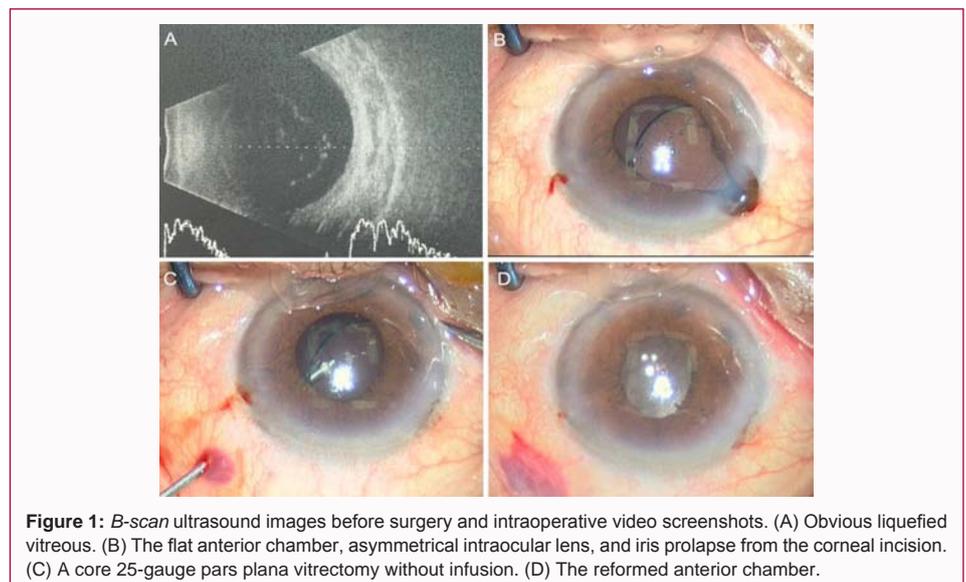


Figure 1: *B-scan* ultrasound images before surgery and intraoperative video screenshots. (A) Obvious liquefied vitreous. (B) The flat anterior chamber, asymmetrical intraocular lens, and iris prolapse from the corneal incision. (C) A core 25-gauge pars plana vitrectomy without infusion. (D) The reformed anterior chamber.

The exact pathophysiologic mechanism of aqueous misdirection has not been fully explained. It may be the misdirection of aqueous into or behind the vitreous body because of an abnormal anatomic relationship between the ciliary processes, crystalline or IOL, and anterior vitreous face [1,5]. However, since pseudophakic malignant glaucoma occasionally occurs in eyes with no narrow anterior chamber angles or angle-closure glaucoma, an alternative mechanism needs to be proposed for causation. In this case, aqueous misdirection occurred after IOL implantation and irrigation, and was aggravated after BSS injection. The notably liquefied vitreous may allow the irrigated fluid to flow posteriorly through the zonule during phacoemulsification and irrigation, lead to increased resistance through the anterior vitreous, displace the iris-lens diaphragm and ciliary body forward, and result in acute glaucoma. The liquefied vitreous was speculated to play a role in the initiation of the aqueous misdirection in this eye.

The goal of treatment for aqueous misdirection is to re-establish normal aqueous flow by creating a free communication between the posterior and anterior segments. It is initially treated with cycloplegics, aqueous suppressants, and hyperosmotics. For cases refractory to medication, combined pars plana vitrectomy, hyaloido-zonulectomy, and peripheral iridectomy is needed. How to deal with malignant glaucoma occurring during cataract surgery has not

been reported. In this case, a core vitrectomy was employed using the 25-gauge vitrectomy system without infusion, and the anterior vitreous gel which obstructed fluid flow during cataract surgery for sudden pseudophakic malignant glaucoma was removed. This approach seems simple and safe to be performed by cataract surgeons.

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