

A Simple and Easy Method Using Rigid Endoscope to Detect Iridocorneal and Keratolenticular Adhesions in Peters' Anomaly

Akira Hirata Tadashi Mine

Department of Ophthalmology, Saga University Faculty of Medicine, Saga, Japan

Key Words

Peters' anomaly · Iridocorneal adhesion · Topical endoscopic imaging

Abstract

Peters' anomaly is characterized by a central corneal opacity with corresponding defects in the posterior stroma, Descemet's membrane, and endothelium. We present 2 cases that showed corneal opacity when examined by topical endoscopic imaging (TEI). Case 1 was a 20-day-old neonatal female who had a central corneal opacity in the left eye. TEI showed that the iris stroma was adhered toward the back of the opacified cornea. Case 2 was a 4-month-old male who had a bilateral corneal opacity. TEI revealed that both a keratolenticular adhesion and a surrounding iridocorneal adhesion were observed behind the area of corneal opacity. The patient was diagnosed as having Peters' anomaly with persistent fetal vasculature. This study demonstrates that TEI is a novel method capable of looking into an eye from only a small area of the clear cornea.

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Introduction

Peters' anomaly is the most common cause of congenital corneal opacity [1]. This anomaly is characterized by a central corneal opacity with corresponding defects in the posterior stroma, Descemet's membrane, and endothelium [2–5]. Ultrasound biomicroscopy is a useful tool for detecting associated structural abnormalities such as keratolenticular or iridocorneal adhesions [6]. However, without the patients' cooperation, it can be difficult to obtain a desirable image when using this method. Topical endoscopic imaging (TEI) is a new tool that can be used to examine intraocular findings through a clear cornea [7]. Here, we present 2

Akira Hirata, MD
Department of Ophthalmology
Saga University Faculty of Medicine
5-1-1, Nabeshima, Saga 849-8501 (Japan)
E-Mail akhirata@gmail.com

cases that showed corneal opacity when examined by TEI. The study protocols were approved by the Clinical Research Ethics Committee of Saga University. After the parents of the patients had been given a written explanation of the study, they all provided written informed consent.

Case Presentations

Case 1

A 20-day-old neonatal female was referred to our department because of corneal opacity. The patient was born maturely following an unremarkable pregnancy. Although her right eye (OD) was normal, her left eye (OS) showed a central corneal opacity (fig. 1a). In both eyes, intraocular pressure was within normal ranges. The anterior chamber structures of the OS could be partially visualized through the clear area. Fundus examination showed a normal appearance of the OD and OS except for the superior periphery, which was difficult to observe because of the corneal opacity. Thus, to examine the anterior chamber in detail, we performed TEI with a previously reported method [7, 8]. Briefly, the authors used a rigid endoscope with an otoscope 6.0 cm in length and an outer diameter of 4 mm (1215AA; Karl Storz, Tuttlingen, Germany) with a crescent-shaped illuminating tip. A xenon lamp (Xenon Nova 175; Karl Storz) was used as the light source. The endoscope was connected to a digital camera utilizing a 400,000-pixel charge-coupled device image sensor unit, which was connected to a monitor in turn. The patient was placed on a bed in the supine position, and topical anesthetic was instilled into the OS. A spatula was placed between the eyelids, and hydroxyethyl cellulose solution was applied on the corneal surface to protect it and to create an interface that would improve the quality of the image. The endoscope was placed in proximate contact with the cornea and directed such that the angle could be observed. As shown in figure 1b, the iris stroma was adhered toward the back of the opacified area of the cornea, which confirmed the diagnosis.

Case 2

A 4-month-old male was referred to our department because of a bilateral corneal opacity. The patient was born maturely following an unremarkable pregnancy. Our examination demonstrated the presence of a bilateral central corneal opacity and extremely shallow anterior chambers, which made it impossible to observe the fundus in both eyes (fig. 2a). The intraocular pressure measured was 8 mm Hg in the OD and 9 mm Hg in the OS. Ultrasonographic investigations showed the presence of short axial lengths (OD: 16.0 mm; OS: 16.2 mm) and funnel-shaped retinal detachment. No systemic anomalies were detected during this pediatric examination. When TEI was performed via the clear peripheral cornea, both a keratolenticular adhesion and a surrounding iridocorneal adhesion were observed behind the area of corneal opacity (fig. 2b). The patient was diagnosed as having Peters' anomaly and persistent fetal vasculature.

Discussion

Townsend et al. [9] have subdivided Peters' anomaly into the following three types: (I) central corneal leukoma only; (II) central corneal leukoma and keratolenticular adhesion, and (III) central corneal leukoma associated with Axenfeld-Rieger mesodermal dysgenesis. Case 1 showed an iridocorneal adhesion, which corresponds to type I, while case 2 displayed

bilateral corneal opacity with iridocorneal and keratolenticular adhesions, which matches type II. Case 2 also showed bilateral funnel-shaped total retinal detachment and a short axial length, assuming Peters' anomaly complicated with persistent fetal vasculature, as described previously [10]. In the present cases, we employed the widely used otoscope to perform TEI. Utilization of this method makes it possible to easily visualize the anterior segment structure via a small clear area of the cornea [7, 8]. When TEI was used to examine case 1, a small iridocorneal adhesion positioned toward the back of the corneal lesion was observed. In contrast, a prior ultrasound biomicroscopy examination of the same case could not detect this adhesion. Moreover, utilization of this method in case 2 revealed a partially formed and extremely narrow anterior chamber with iridocorneal and keratolenticular adhesions. Therefore, this study demonstrates that TEI is a novel method that is capable of looking into an eye from only a small area of the clear cornea, although the image obtained with this system is a monocular image and its resolution is restricted by the performance of the charge-coupled device. In addition, this technique may also be helpful when investigating congenital abnormalities in the anterior chamber, angle, iris, and lens, especially in patients unable to remain in a sitting position [7].

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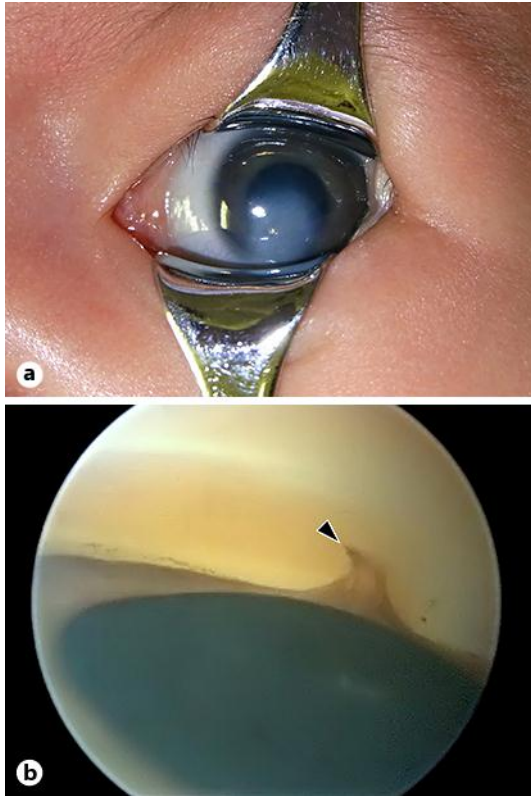


Fig. 1. **a** Photograph of the anterior segment of case 1. A central corneal opacity is observed. **b** TEI endoscopic imaging showing the anterior chamber of case 1. Iridocorneal adhesion is noted (arrowhead).

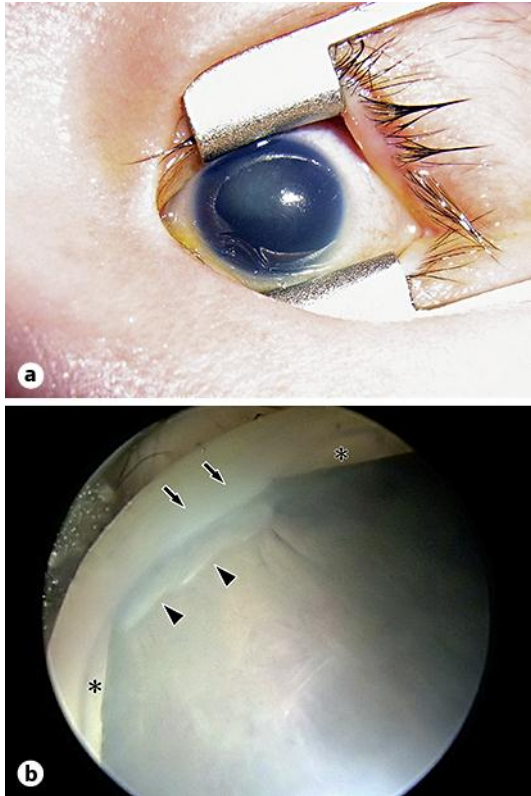


Fig. 2. **a** Photograph of the anterior segment in the OS of case 2. A central corneal opacity and a shallow anterior chamber are observed. **b** TEI endoscopic imaging showing the anterior chamber of case 2. Keratolenticular adhesion (arrows) and iridocorneal adhesion (arrowheads) with a shallow anterior chamber (asterisks) are noted.