CASE REPORT

Bilateral cloudy cornea: is the usual suspect congenital hereditary endothelial dystrophy or stromal dystrophy?

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SUMMARY

We provide the diagnosis, treatment and follow-up period of a patient with cloudy cornea in both eyes from birth. A 4-year-old girl presented with blurring in both eyes. Penetrating keratoplasty (PK) was performed with the preliminary diagnosis of congenital hereditary endothelial dystrophy in June 2012. According to the pathology report for extracted host tissue, the Descemet's membrane (DM) and endothelium were healthy and diagnosis was reported to be congenital hereditary stromal dystrophy. Deep anterior lamellar keratoplasty was performed on the left eye. The DM was transparent at follow-up. Cornea transplantation is the only choice to provide visual rehabilitation in children with congenital cloudy cornea. However, it is known that the prognosis of traditional PK in the paediatric age group is not good. Therefore, when using alternative keratoplasty (deep anterior lamellar keratoplasty, Descemet's stripping automated endothelial keratoplasty) options, pathological examination of the host tissue should be made.

In this study, we report the diagnosis, treatment and follow-up period of a patient with cloudy cornea, which had been present from birth.

CASE REPORT

A 4-year-old girl was referred to our cornea clinic, with blurry vision and symptoms of bilateral cloudy cornea from birth. Visual acuity was counting fingers at 1 m in her right and left eyes. Slit-lamp examination revealed diffuse cloudiness in both cornea (figure 1A, B). Intraocular pressure (IOP) was 14 and 13 mm Hg in the right and left eyes, respectively. Central corneal thickness was 692 µm in the right eye and 684 µm in the left eye, as measured by an ultrasound-pachymeter. The diameter of the cornea was 11 mm in each eye. There was neither strabismus nor nystagmus. Since the cornea was cloudy, the endothelium of the patient could not be evaluated using specular microscopy or confocal microscopy. She had no other systemic pathology. The family history revealed that the mother, an 8-year-old sister and a newborn sister of the patient all had bilateral poor vision. Biomicroscopic examination revealed cloudy corneas in the patient's mother and in both the patient's sisters. Clinical findings were evaluated and a preliminary diagnosis of CHED was determined since there was a positive family history. Penetrating keratoplasty (PK) was performed in the patient's right eye in June 2012 and the extracted recipient tissue was sent for pathological examination. The pathology report revealed that the Descemet's membrane (DM) and endothelium were healthy and the diagnosis could be CHSD. All sutures were removed 14 months after surgery and

INTRODUCTION

Most common causes of congenital cloudy cornea are birth trauma, sclerocornea, Peter's anomaly, infection, inflammation, congenital glaucoma, mucopolysaccharidosis, corneal dystrophy (congenital hereditary endothelial dystrophy (CHED), congenital hereditary stromal dystrophy (CHSD) and posterior polymorphous dystrophy) and dermoids.¹⁻³ Genetic, developmental, metabolic and idiopathic factors have been suspects in the pathophysiology of congenital cloudy cornea.⁴

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Figure 1 (A) Preoperative biomicroscopy (A) right eye and (B) left eye.

Figure 2 Postoperative 14th month biomicroscopy—right eye.

Figure 3 Postoperative first day biomicroscopy—left eye.

the best-corrected visual acuity (BCVA) in the right eye had risen to 0.4 (figure 2).

After visual rehabilitation was provided in the right eye, deep anterior lamellar keratoplasty (DALK) was performed in the left

eye in February 2014, taking into account the pathology results of the previous operation. A big bubble created during surgery and the DM were seen to be transparent after the stroma was removed. The donor cornea with the stripped DM was sutured to the recipient bed and the operation terminated. Slit-lamp examination on the first postoperative day revealed a transparent graft (figure 3). The DM and graft were viewed in the anterior segment optical coherence tomography (figure 4). BCVA in the left eye was 0.4 with a correction of 3.00–5.50×135 third month after surgery. Postoperative endothelial cell density was 1541 cells/mm² in the right eye and 2358 cells/mm² in the left eye (figure 5).

DISCUSSION

Malformations of the anterior segment, congenital glaucoma, inflammation, systemic storage diseases and various corneal dystrophies are the most frequent causes of bilateral congenital opacification of the cornea at or shortly after birth.^{1–3} More rarely seen causes of cloudy cornea are cornea plana, oculo-auriculo-vertebral dysplasia (Goldenhar-Gorlin syndrome), congenital corneal ectasia, CHSD and posterior polymorphous dystrophy.^{5–7} When the clinical findings were evaluated in this case, since the corneal diameter and IOP were of normal dimensions, we kept away from the diagnosis of congenital glaucoma. Since no systemic findings were present in the case, the diseases with systemic symptoms such as mucopolysaccharidosis were ruled out of the differential diagnosis. The first possible diagnosis was CHED, given the positive family history and the corneal image in the biomicroscopic examination.

CHED is a rarely seen corneal dystrophy with an autosomal recessive (AR) or autosomal dominant (AD) trait characterised by mild or severe corneal cloudiness seen bilaterally at or shortly after birth. The type with an AR trait is seen at birth or right after birth, it is not progressive and nystagmus is frequent. In the type with the AD trait, on the contrary, the cornea is transparent at birth and cloudiness progresses gradually over several years.^{8–9} Usually, families bring their children in with symptoms of epiphora, photophobia and cloudy cornea. There is no nystagmus in this type. Although the AD type would have been thought to be present due to symptoms of poor vision in the mother and both sisters of the patient, the presence of the

Figure 4 Postoperative anterior segment optical coherence tomography—left eye.

Figure 5 Postoperative specular microscopy of right and left eyes.

cloudiness starting from birth suggested that it was the AR type of the disease. The family did not consent to a genetic study, therefore a PK was performed in the right eye of the patient with the preliminary diagnosis of AR CHED. To confirm the diagnosis, corneal tissue that was excised in full thickness from the recipient bed was sent for pathological examination. The pathology report revealed that the corneal epithelium was non-specific, the Bowman's layer was slightly thickened, there were stromal fenestrations and there was an increased number of keratocytes. The DM and endothelium were healthy and stromal fibrosis was observed with periodic acid-Schiff and Masson-trichrome staining, thus a picture of CHSD instead of CHED was assumed. When the family history, biomicroscopic examination and pathology report were considered together, it was determined that the diagnosis of the patient was the more rarely seen CHSD.

CHSD with an AD trait is characterised by bilateral, symmetric and diffuse corneal cloudiness developing at birth or shortly after. The diameter of the cornea and IOP are in the normal ranges. Corneal thickness is generally increased. This finding may help the CHSD to be differentiated from other corneal pathologies with normal corneal thickness. Corneal surface is either normal or slightly irregular. Small opacities characteristically seen through all the corneal stroma give the cloudy appearance of the cornea.¹⁰ There are only five families with the diagnosis of CHSD in the literature.^{10–13} Interfamilial variations were seen in the affected families. No genetic study was performed in this case because the family did not consent.

Keratoplasty in the early years of life is typically recommended to prevent the development of amblyopia in CHSD. No recurrences have been reported in the donor graft. Although final visual acuity is rarely above 20/200,¹⁴ good visual acuity, such as 20/30, has been reported.¹⁰ PK was performed in the right eye and the recipient tissue sent for pathological examination in the current case. Since the DM and endothelium were detected to be healthy on pathological examination, DALK was performed in the other eye because the endothelium was preserved with lower risks of complication during and after the operation, with a more rapid rehabilitation with this type of surgery.

In recent years, DALK has become the preferred procedure instead of PK in patients with healthy endothelium. It is an

extraocular procedure, where the corneal stroma is replaced with a lamellar donor button, preserving the recipient's DM and endothelium.¹⁵ This provides the advantage of the absence of potential corneal endothelial rejection and preservation of the endothelial cells during the surgery.¹⁶ This technique diminishes the risk of endophthalmitis, cataract formation, retinal detachment, expulsive choroidal haemorrhage and post-operative glaucoma. Sutures can be removed earlier than in PK. As a result of these advantages, earlier visual rehabilitation can be provided.^{16 17}

In conclusion, corneal transplantation appears to be the single treatment option to provide visual rehabilitation in children with congenital cloudy cornea. However, the prognosis of conventional PK has been known to be poor in the paediatric age group. Therefore, in order to use the alternative keratoplasty options (Descemet's stripping automated endothelial keratoplasty and DALK) in these patients, we recommend that pathological examination of the recipient tissue be performed.

Learning points

- Differential diagnosis of patient presenting with cloudy cornea is important.
- Pathological examination of the recipient tissue should be performed.
- Prognosis of conventional penetrating keratoplasty has been known to be poor in the pediatric age group, we can prefer the alternative keratoplasty options (DALK and/or DSAEK) in favour of the patient.

Competing interests None declared.

Patient consent Obtained.

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