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The Occurrences of Gelatinous Drop-Like Corneal Dystrophy within an Acehnese Family

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ABSTRACT
Introduction: Gelatinous drop-like dystrophy (GDLD) presents as an infrequent form of corneal dystrophy characterized by an autosomal recessive inheritance pattern. While its incidence in Japan stands at roughly 1 in 33,000 individuals, it manifests less frequently in other populations. Surgical intervention, such as lamellar or penetrating keratoplasty is typically necessary to relieve symptoms
Objective: To describe 3 cases of Gelatinous drop-like dystrophy and their treatment approaches
Illustration: Three brothers were diagnosed with corneal dystrophy, marked by a white-yellow nodular lesion resembling a kumquat on the corneal surface. Each patient exhibited light perception with good projection in terms of visual acuity. All underwent full-thickness lamellar keratoplasty for treatment. A month post-surgery, their visual acuity had improved to 3/60, 2/60, and 2/60, respectively.
Conclusion: GDLD is a rare corneal condition associated with potential vision loss. Identification through familial history, corneal clinical features and involvement contributes to diagnosing GDLD. Full-thickness penetrating keratoplasty may be considered for managing significant visual impairment resulting from GDLD
Keywords: corneal dystrophy, full-thickness penetrating keratoplasty, gelatinous drop-like

INTRODUCTION

Gelatinous drop-like corneal dystrophy (GDLD) is a hereditary disease that occurs when gelatinous amyloid material is deposited in the corneal subepithelial and stromal regions. It typically develops gradually and is most commonly diagnosed in individuals under the age of 20. The disease has an autosomal recessive hereditary pattern.[1]

Nakaizumi first identified GDLD in 1914. It is primarily reported in Japan, where its estimated incidence rate is 1 in 33,000. The TACSTD2 gene, which is responsible for the maintenance of the corneal epithelial barrier function, is found to be associated with mutations in GDLD.[2]

The typical symptoms, such as photophobia and foreign body sensation, appear early in life, and treatment usually involves surgery such as keratoplasty.[2]

CASE ILLUSTRATION

In this case report, we describe three brothers who presented at our hospital with a shared symptom of visual disturbance in their right eye. They were born to parents with Acehnese ethnicity who were related by consanguinity (cousin marriage), and out of four children, only the first, second, and fourth were affected. While the parents had no ophthalmic abnormalities, the father's younger brother had a similar complaint. There was no history of eye trauma or surgery, and the patients' birth and neonatal development were unremarkable.

All patients were male, 28, 23 and 19 years old. They started complaining about visual disturbance when they were in elementary school. Their visual acuity was light perception with good projection. Intraocular pressure was normal. A slit lamp examination of the right eye shows

the cornea appears discoloured and similar to a kumquat with stromal opacification and neovascularisation (figure 1).

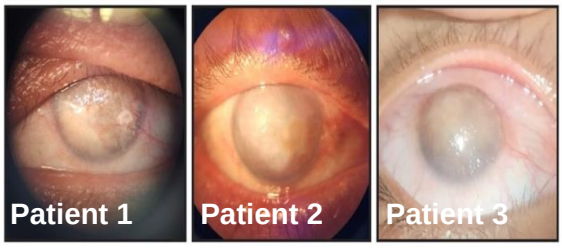

Figure 1. *Pre-operative Slit lamp examination show a kumquat with stromal opacification and neovascularization*

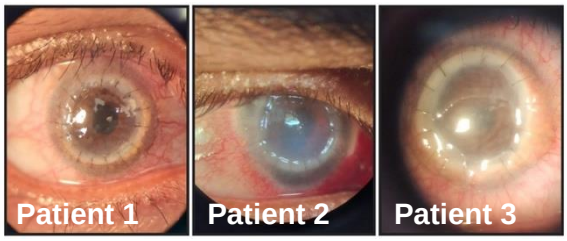

Figure 2. *Post-operative* Slit lamp examination one week after surgery revealed complete epithelial healing in Patient 2 and delayed epithelial healing in Patient 1 and 3

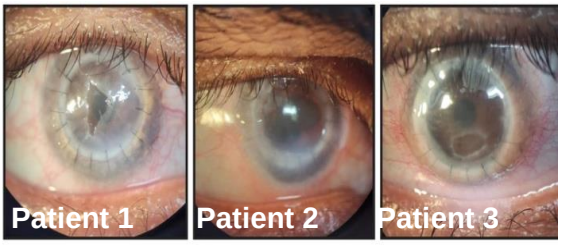

Figure 3. *Post-operative* Slit lamp examination one month after surgery show central corneal defect with hazy epithelial tissue in Patient 1. Patient 2 having complete epithelial healing. In Patient 3 it show relative good re-epithelialization of graft, but leaving paracentral corneal defect that disappeared next week.

All of the patients received full-thickness penetrating keratoplasty. Their visual acuity was 3/60, 1/60, and 1/60, respectively, two weeks after the surgery. Patients 2 and 3 had improved visual acuity one month after the procedure, with 2/60 for each. However, patient 1's visual acuity remained the same. Figures 2 and 3 showed the corneal condition after each patient's surgery.

DISCUSSION

According to the classification of corneal dystrophies by the international committee (IC3D), GDLD belongs to the subepithelial dystrophies that are passed down in an autosomal recessive manner. The incidence of GDLD is higher in Japan than in other countries, which may be attributed to the greater prevalence of consanguineous marriages in Japan. Symptoms such as photophobia, tearing, foreign body sensation, and gradual vision loss appear during the first decade of life.[3,4]

GDLD usually affects both eyes and is characterised by the presence of greyish protruding subepithelial deposits in the central regions of the corneas.[5]

The deposits can cluster together to create bands, referred to as "band keratopathy type," or take on a characteristic appearance resembling mulberries in cases with multiple drop-like lesions, known as "mulberry type." If there is deep stromal vascularisation, the cornea may appear discoloured and similar to a kumquat, referred to as a "kumquat-like type."[6]

The gelatinous lesions form due to amyloid accumulation on the cornea's surface. These deposits expand within the corneal stroma and cause visual impairment.[7]

GDLD's phenotype can develop slowly over time. During the first decade, there may only be subepithelial lesions similar to band-shaped corneal degeneration or multiple small greyish epithelial nodules that cause severe photophobia, tearing, and foreign body sensation. The nodules increase and merge as time passes, giving a mulberry appearance. Finally, in the third decade, there is secondary

stromal opacification and neovascularisation, resulting in severe visual loss.[8]

Our patients started to feel their eyesight was impaired since they were in elementary school. Since then, there were no therapy or procedures have been conducted. Based on the slit lamp examination, we classify our patients as a kumquat-like type.

Usually, slit-lamp examination on GDLD patients reveals the presence of numerous sub-epithelial corneal deposits, which are gelatinous, milky-white, and often drop-shaped. They can sometimes appear protruding and opaque under direct illumination but transparent when viewed in retro illumination.[6] The most reliable method of diagnosing GDLD is genetic testing to analyse mutations in the TACSTD2 gene. Unfortunately, this type of testing is not widely available.[6]

We were limited in our diagnostic methods and had to rely on anamnesis to establish the diagnosis. The anamnesis revealed that three of our patients were siblings with a similar complaint to their father's younger brother. Their parents were related by a consanguineous marriage, and the slit lamp examination showed the same type of corneal dystrophy in all of them.

Mutations cause GDLD in the TACSTD2 gene, which is situated on chromosome 1's short arm, and only around 30 disease-causing mutations have been identified so far. The TACSTD2 gene is essential for maintaining the corneal epithelial barrier function. Harmful mutations in this gene result in the breakdown of tight cell junction proteins, including claudins and occludins, causing increased epithelium permeability. This increased permeability may lead to the deposition of subepithelial amyloid as a tear, and serum components penetrate the cornea in individuals with GDLD.[1,2,7]

The cornea of patients with GDLD is marked by the presence of extensive subepithelial amyloid depositions. It is believed that the disruption in communication between cells leads proteins, like lactoferrin to migrate beneath the epithelial layer from the tear film. These proteins then aggregate, forming a drop-like pattern, and subsequently cause damage to the epithelium and stroma. [7]

Due to the corneal deposit severity and visual impairment, we performed full-thickness penetrating keratoplasty on our patient with increased visual acuity from light perception with good projection to 2/60 and 3/60 in 1 month after the surgery. The goal of managing corneal dystrophies is to enhance vision and prevent the return of corneal erosions. Currently, no medication can stop the progression of these diseases. Treatment is limited to addressing the episodes of recurrent erosions. Patients without symptoms should not be treated but monitored regularly to check if the condition worsens.[4]

While medical treatment is not usually practical for this disorder, it can provide symptomatic relief to patients in the early stages of the disease using lubricating eye drops and bandage contact lenses. Suppose these treatments do not decrease the rate of corneal erosion recurrence. In that case, other options may be considered, such as corneal scraping, anterior stromal puncture, or phototherapeutic keratectomy with an excimer laser.

CONCLUSION

GDLD is a rare corneal condition associated with potential vision loss. Identification through familial history, corneal clinical features and involvement contributes to diagnosing GDLD. Full-thickness penetrating keratoplasty may be considered for managing significant visual impairment resulting from GDLD.

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