

Ocular findings in syndromic gingival fibromatosis: a case study and electronic microscopic investigation of lens

Ye-Lei Tang¹, Xing-Chao Shentu², Su-Juan Zhao², Xia-Jing Tang², Long He³, Fei-Yun Ping³

¹Department of Neurology, Second Affiliated Hospital of the Medical College, Zhejiang University, Hangzhou 310009, Zhejiang Province, China

²Eye Center, Second Affiliated Hospital of the Medical College, Zhejiang University, Hangzhou 310009, Zhejiang Province, China

³Department of Stomatology, Second Affiliated Hospital of the Medical College, Zhejiang University, Hangzhou 310009, Zhejiang Province, China

Correspondence to: Xia-Jing Tang. Eye Center, Second Affiliated Hospital of Medical College, Zhejiang University, 88 Jiefang Road, Hangzhou 310009, Zhejiang Province, China. xiajingtang@zju.edu.cn

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Abstract

• We report a case of syndromic gingival fibromatosis with notable ocular lesions, bilateral congenital cataracts, esotropia, and high myopia of a 21-year-old male patient from China. The patient was diagnosed with gingival fibromatosis based on his massive gingival overgrowth and histological findings that were consistent with gingival fibromatosis through a gingival biopsy. Lens opacity features were presented and phacoemulsification with intraocular lens (IOL) implantation was performed to manage the cataracts in both eyes. Transmission electronic microscopy was used to investigate the ultrastructure of the removed lens tissue. We also review the literature on gingival fibromatosis and briefly summarize the ocular manifestations of this rare disease.

• **KEYWORDS:** congenital cataract; transmission electron microscopy gingival fibromatosis; syndrome

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INTRODUCTION

Gingival fibromatosis is a rare disease that is characterized by benign, slowly progressive, non-hemorrhagic, fibrous enlargement of maxillary and mandibular gingival^[1-3]. Such case has a prevalence of 1 per

175 000 population^[4,5]. Gingival fibromatosis can be hereditary or idiopathic. Idiopathic gingival fibromatosis shows no evidence of genetic transmission or family history of gingival overgrowth^[6].

We present a case of syndromic gingival fibromatosis with notable ocular lesions, bilateral congenital cataracts, esotropia, and high myopia. Lens opacity features were presented, and phacoemulsification with intraocular lens (IOL) implantation was performed to manage the cataracts in both eyes of this patient. Transmission electronic microscopy was used to investigate the ultra structure of removed lens, including the lens capsule and fiber tissue. In addition, we review the literature on gingival fibromatosis and briefly summarize the ocular manifestations of this rare disease.

CASE STUDY

The Chinese male patient, who was 21y old and has no family history of gingival fibromatosis, presented a massive gingival overgrowth in the past 15y (Figure 1). A gingival biopsy was performed on this patient, and the histological features were consistent with gingival fibromatosis.

The patient had poor vision in both eyes since his birth. His best-corrected visual acuity (BCVA) was 0.12 in the right eye and 0.1 in left eye upon decimal visual acuity unit examination. Slit-lamp examination disclosed cataracts with different opacity features in his bilateral lens. The lens showed nuclear with Y-sutural opacities in the right eye (Figure 2A), but in the left eye posterior subcapsular cataract was observed (Figure 2B). The fundus exam showed leopard spot fundus in both eyes. Optometry findings demonstrated the patient suffered from high myopia with -19.00 diopters in his right eye and -18.00 diopters in his left eye. A-mode ultrasound showed the axial lengths of his right and left eyes were 32.55 mm and 32.45 mm, respectively. We also found the patient had concomitant esotropia, about 15°, according to the Hirschberg corneal light reflex test.

Besides, this patient had other clinical features, such as osteofibrosis of maxillary alveolar bone, multiple unerupted teeth, cerebral and cerebellar anomalies, mild mental retardation, mixed hearing loss, and facial dysmorphism. The patient was born after a full term uncomplicated pregnancy and his parents were not consanguineous. There was no prenatal exposure to teratogenic agents. Therefore, the young man was finally diagnosed with idiopathic syndromic gingival fibromatosis by the Department of Stomatology



Figure 1 Massive gingival overgrowth in the 21-year-old male patient with syndromic gingival fibromatosis. The gingiva was pink, firm, nodular, and non-hemorrhagic.

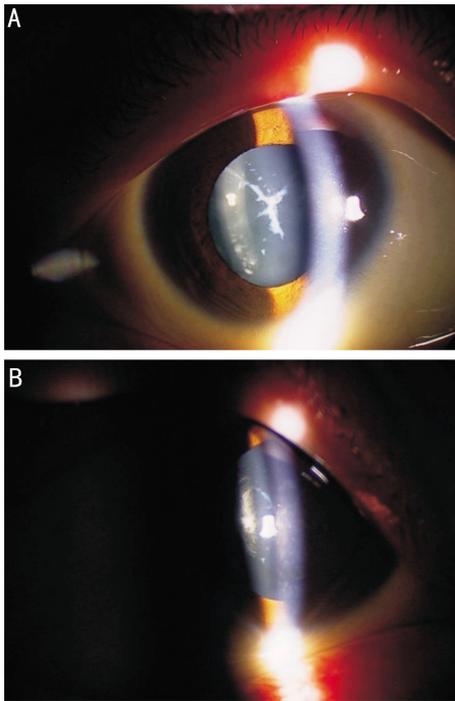


Figure 2 A: Nuclear with Y-sutural lens opacity in the right eye; B: Posterior subcapsular lens opacity in the left eye.

based on his clinical features and pathological results^[7].

An uncomplicated phacoemulsification with a continuous circular capsulorrhexis and foldable IOL implantation was performed in both eyes. The capsules were fragile during the capsulectomy and the cortex was aspirated. The patient's BCVA improved to 0.3 in both eyes at 3mo postoperatively.

ELECTRONIC MICROSCOPIC INVESTIGATION

Anterior lens capsules with attached lens epithelial cells were obtained by capsulotomy, and the lens material was aspirated during cataract surgery. The removed lens material was fixed in 2.5% glutaraldehyde for 30min and postfixed in 1% osmic acid for 1h at 4°C. After dehydration with a graded series of ethanol concentrations, specimens were embedded in epon resin. Ultrathin sections (60-90 nm thickness) were stained with lead citrate and uranyl acetate, and then observed by using the transmission electron microscopy (JEM-1200, Tokyo, Japan) at 60 Kv.

Electron microscopy of the anterior lens epithelium showed

some pathologic changes. The lens epithelial cells were highly irregular in shape and their lateral borders were indistinct (Figure 3A). In majority of the cells, the nuclear and cytoplasm contained numerous lacunae and there was a paucity of other organelles (Figure 3B). In addition, lens fiber cells displayed abnormal intercellular and intracellular alterations. The cell borders were highly irregular (Figure 3C), and there were foci of dense globular intracellular deposits (Figure 3D).

DISCUSSION

Congenital cataract, which is characterized as any opacity of the lens presented at birth or shortly thereafter, is one of the major causes of visual impairment and blindness in childhood. Cataracts can be isolated or associated with many different metabolic diseases or genetic syndromes^[8]. In this article, we studied a Chinese patient with a rare association of congenital cataract and idiopathic syndromic gingival fibromatosis.

In the previously literature, corneal opacity, microcornea, and retinitis pigmentosa have been reported to associate with gingival fibromatosis, but gingival fibromatosis associated with bilateral cataract is rare^[9-11]. Apart from case studies by Shah *et al*^[12] and Balasubramanian and Parker^[13], who described the Zimmermann-Laband syndrome with cataract, all the patients with gingival fibromatosis described in previous cases did not mention "with cataract." Since our patient does not have aplastic or phalanges with absent nails, his condition can be differentiated from Zimmermann-Laband syndrome.

The clinical features and the ultrastructure of the cataract in these patients have not been described in prior literature. To our knowledge, Shah's study is the only case that has suffered from cataract. Moreover, concomitant esotropia and high myopia have not been reported in syndromic gingival fibromatosis to date. Concomitant esotropia may be the result of abnormal function of frontal lobe or mechanical factors. The patient's lengthened ocular axis may be due to two reasons, which are congenital abnormalities in development, or congenital cataracts for lens opacification that would cause deprivation myopia.

Although the pathogenesis of gingival fibromatosis is not precisely understood, research at molecular level reveals abnormal expression of some molecules related to extra-cellular matrix (ECM) metabolism, such as TGF- β , and the abnormal expression at last leads to increased ECM deposition that contributes to pathogenesis^[14]. In the present study, by the transmission electron microscopy analysis of the removed lens tissue, lens fiber cells displayed abnormal intercellular and intracellular alterations. The cell borders were highly irregular and there were foci of dense globular intracellular deposits. These ultrastructural changes might lead to decreased lens transparency and contribute to cataract formation.

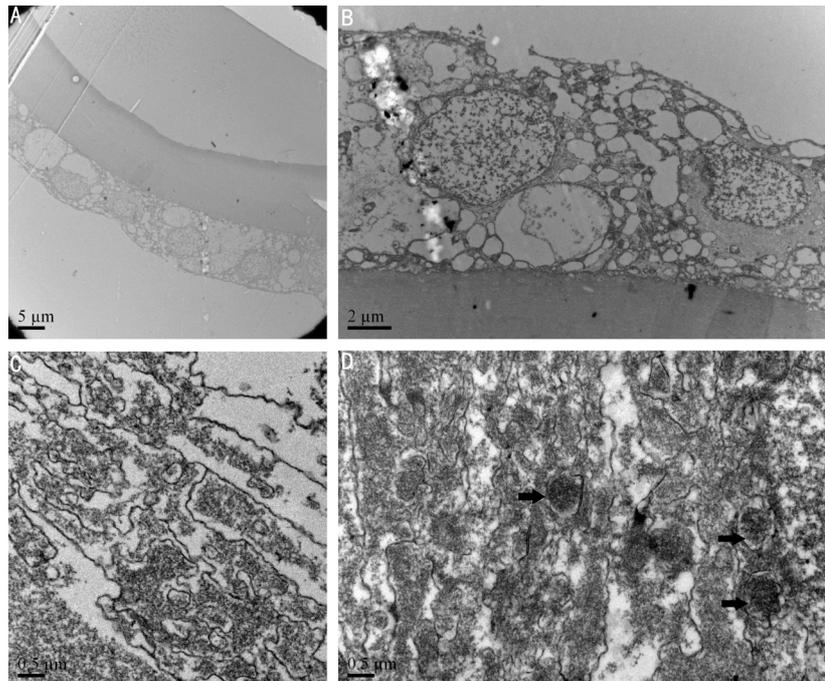


Figure 3 A: The lens epithelial cells were highly irregular in shape and their lateral borders were indistinct ($\times 2000$); B: The nuclear and cytoplasm contained numerous lacunae and there was a paucity of other organelles in the majority of lens epithelial cells ($\times 8000$); C: The lens fiber cell borders were highly irregular ($\times 20000$); D: There were foci of dense globular intracellular deposits (arrows) between the lens fiber cells ($\times 20000$).

In a summary, we reported a case of syndromic gingival fibromatosis with bilateral congenital cataracts, esotropia, and high myopia. Since gingival fibromatosis may be associated with ocular lesions, these patients should have regular eye screening to exclude ocular abnormalities and to obtain effective ocular interventions. Early surgery is necessary to maintain good vision if congenital cataract exists. We also demonstrated some ultrastructural changes of the removed lens tissue of this patient, which may provide clues to the mechanisms of cataract formation in syndromic gingival fibromatosis. The precise pathogenesis needs further research.

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