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Case Report

A Case of Proliferative Retinopathy Complicated with Tuberous Sclerosis Treated by Vitreous Surgery

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Keywords

Tuberous sclerosis · Retinal hamartoma · Proliferative retinopathy · Vitreous surgery

Abstract

We report a case of proliferative retinopathy complicated with retinal hamartoma in a tuberous sclerosis patient. This study involved a 16-year-old female patient who was diagnosed as having tuberous sclerosis at birth. Ophthalmic examination revealed retinal hamartoma surrounding the optic disc in both eyes. Vitreous surgery involving a vitrectomy and resection of the proliferative membranes was performed for proliferative retinopathy in her right eye. Postoperative fundus findings showed improvement and decreased exudative changes. The proliferative and exudative changes appeared to be due to the retinal hamartoma, and vitreous surgery proved effective in this case.

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Introduction

Tuberous sclerosis (TS) is a disease with an autosomal dominant pattern of inheritance characterized by hamartoma throughout the body, with 3 dominant features consisting of mental deficiency, epileptic seizures, and facial hemangiomas [1]. As an ophthalmological symptom, hamartomas are found in the retina and optic nerves of approximately 50% of the

patients [2]. While the vast majority of hamartomas become calcified and do not require treatment, on rare occasions they increase, resulting in exudative changes. While treatment typically involves subjecting the hamartoma to laser photocoagulation, vitreous surgery may also be appropriate in cases complicated by exudative retinal detachment or vitreous hemorrhage [3–10]. However, and to the best of our knowledge, there have only been 6 reports of vitreous surgery being performed in cases of extensive proliferative retinopathy associated with TS [5–10]. Here, we report the case of a TS patient with advanced proliferative retinopathy accompanied by hamartoma that was successfully treated by vitreous surgery.

Case Report

A 16-year-old female presented who had previously been diagnosed with TS and subjected to medical treatment at approximately 1-month after birth. Communication was difficult due to the patient's mental retardation. Around February 2013, the patient began displaying behavioral patterns indicating a visual disturbance, thus prompting a consultation with the patient's previous doctor. She was diagnosed as having hypermature cataract in her right eye, and subsequently underwent lensectomy in that eye for treatment. A postoperative funduscopy examination indicated proliferative retinopathy, and she was referred to the Department of Ophthalmology at Osaka Medical College in January 2014.

Upon initial examination, nothing peculiar was found with regard to the patient's medical and family history; however, she had facial hemangiofibroma distinctive of TS spread across both sides of her face from the nose to the cheeks (Fig. 1). It was impossible to measure visual acuity and intraocular pressure due to the patient's mental retardation. Anterior segment findings of her eyes revealed that a surgery had been performed on a hypermature cataract in the right eye by the previous physician that resulted in surgical aphakia in that eye. A posterior subcapsular cataract was observed in her left eye. Fundus findings revealed upper and lower peripapillary retinal hamartomas in the right eye, with subretinal exudative changes in the surrounding area; an extensive proliferative fibrous membrane was also observed along the vascular arcade, which exhibited proliferative retinopathy (Fig. 2a). Although visibility of the left-eye fundus was poor due to cataract, hamartomas could be observed in the peripapillary region, with prominent hard exudates in the surrounding area (Fig. 2b).

The clinical course consisted of vitreous surgery being performed under general anesthesia in the patient's right eye on February 28, 2014. During surgery, remarkable retinal folds due to the proliferative fibrous membranes were observed in the macular region (Fig. 3). After the core vitrectomy, the fibrous membranes were resected using a 25-gauge vitreous cutter. When necessary, vitreous scissors were used on the areas of persistent vitreoretinal adhesion. Whitened ghost retinal blood vessels were observed around the optic disc, whereupon we performed panretinal endophotocoagulation over 4 quadrants of the fundus. It was determined that extraction of the hamartomas would be difficult; therefore, endophotocoagulation was also directly performed on the hamartomas until the lesions turned white in color. Postoperatively, the hamartomas were only somewhat reduced, yet the exudative changes around the hamartoma were significantly decreased (Fig. 4).

Discussion

TS reportedly occurs at a rate of approximately 1 in 10,000 births, and approximately 60% of those cases are regarded as sporadic [1]. Recently, an increasing number of mild TS cases has been observed due to advancements in the testing techniques. Ophthalmological findings have shown that retinal hamartoma occurs in conjunction with TS in approximately 50% of TS cases, and that it usually occurs around the optic disc. Histologically, these are regarded as astrocytic hamartoma [2]. While symptomatic changes to the fundus due to a retinal hamartoma occur in comparatively few cases, there have been some reports of other changes, including subretinal hard exudates, macular edema, vitreous hemorrhage, and exudative retinal detachment [3–10]. This invasive tumorous lesion tends to be limited to the retinal nerve fiber layer (NFL), and when examined by spectral domain-optical coherence tomography (SD-OCT), NFLs are reportedly observed as dome-like ridges of high intensity [11, 12]. In addition, it has also been reported that pathologically, myelin formation and gliosis are observed in this tumor [2]. In the present case, SD-OCT could not be performed due to the patient's mental retardation, yet hamartomas were observed in the vicinity of the optic disc.

As a treatment for ocular complications associated with TS in cases involving retinal exudative changes, direct laser photocoagulation has reportedly been effective [2, 13]. There are very few reports of vitreous surgery being performed to treat ocular complications occurring in TS patients, and only a few previous reports of patients complicated with vitreous hemorrhage from tumors [5–10]. The majority of reports discussing the outcome of vitreous surgery for epiretinal membranes or traction retinal detachment brought about by hamartoma in the vicinity of the optic disc have involved cases of retinal and retinal pigment epithelium hamartoma [14, 15]. To the best of our knowledge, there have been only 6 reports in which vitreous surgery was indicated for proliferative retinopathy with extensive fibrous membranes that arises secondarily to TS [5–10].

As a mechanism that gives rise to proliferative retinopathy, gliosis occurs due to the release of cytokines that promote intraocular inflammation, cell proliferation, and tissue remodeling. In the present case, despite the absence of any obvious retinal detachment, it is possible that some growth trigger or increased vascular permeability accompanying hamartoma led to the proliferative retinopathy. In addition, it can be theorized that as a result of performing vitreous surgery in this case, removal of the inflammatory cytokines in addition to the removal of the proliferative tissue led to the alleviation of the retinal pathological lesions. It is also possible that the endophotocoagulation performed directly on the hamartoma was effective.

In conclusion, since a hamartoma that occurs in conjunction with TS can cause proliferative retinopathy, as in the case reported here, we believe that close follow-up observation is necessary, including that of the patient's fellow eye.

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Statement of Ethics

This case study was approved by the Ethics Committee of Osaka Medical College.

Disclosure Statement

There are no conflicts of interest to report for all authors.

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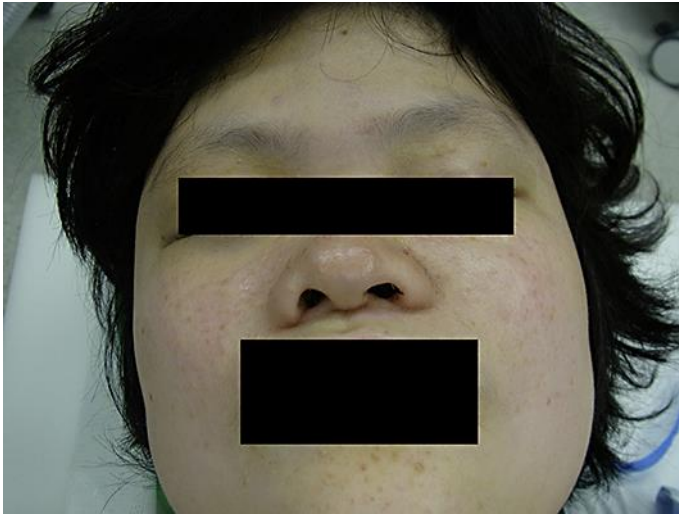


Fig. 1. Photograph of facial skin lesion in a female patient with proliferative retinopathy complicated with tuberous sclerosis (TS). Facial hemangiofibroma distinctive of TS can be seen spread across both sides of the face from the nose to the cheeks.

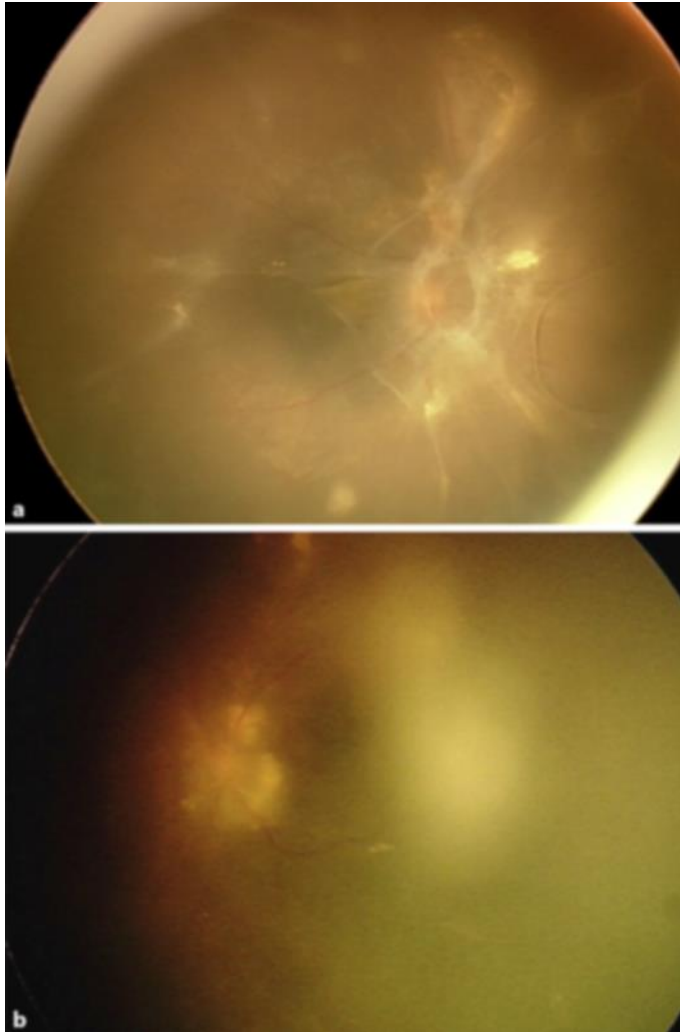


Fig. 2. Preoperative fundus photographs. **a** Right eye. **b** Left eye. A peripapillary retinal hamartoma accompanied by subretinal exudate can be seen in both eyes. Extensive proliferative fibrous membrane can also be observed along the vascular arcade in the patient's right eye.



Fig. 3. Image showing the intraoperative findings of the patient's right eye. Remarkable retinal folds due to the proliferative fibrous membranes can be seen in the macular region.

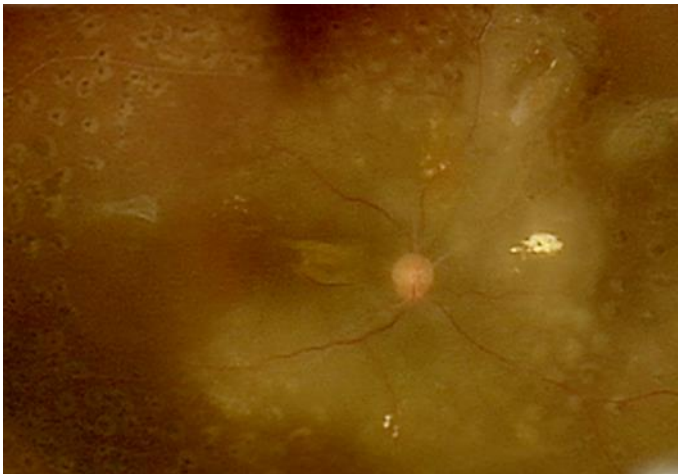


Fig. 4. Postoperative fundus photograph of the patient's right eye. After surgery, the hamartoma was only somewhat reduced, while the exudative changes around the hamartoma were significantly decreased.