Original Article

Surgically induced scleral staphyloma

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Background: To report the clinical features of surgically induced scleral staphyloma and investigate the management.

Methods: Retrospective uncontrolled study.

Results: A full ophthalmological evaluation of surgically induced scleral staphyloma in four patients was performed. The first patient was a 3-year-old young girl underwent corneal dermoid resection. The second patient was a 60-year-old man underwent nasal pterygium excision and conjunctival autograft without Mitomycin C (MMC). The other two were respectively a 74-year-old woman and a 69-year-old man underwent cataract surgery. All patients performed allogeneic sclera patch graft. In the at least half a year follow-up, the best corrected visual acuity (BCVA) of all the four patients were no worse than that of preoperative. Ocular symptoms disappeared, including eye pain, foreign body sensation, and so on. Unfortunately, the fourth patient showed sclera rejection and partial dissolution at postoperative 1 month.

Conclusions: Surgically induced scleral staphyloma must be considered in the differential diagnosis of patients with staphyloma following corneal dermoid, pterygium, and cataract surgery. Allogeneic sclera patch graft is one of the methods for treating scleral staphyloma. However sclera rejection and dissolution should be considered postoperatively.

Keywords: Scleral staphyloma; corneal dermoid; cataract; pterygium; scleral patch graft

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Introduction

Common reasons for staphyloma formation include surgery, trauma, inflammation, glaucoma, high myopia, malnutrition, and developmental abnormalities. Surgically induced scleral staphyloma had been reported in cataract surgery, pterygium surgery, and so on (1,2). We report several cases of sclera staphyloma induced by surgery, involving corneal dermoid resection, cataract surgery, and pterygium surgery, with descriptions and treatment that may help surgeons to further manage those special situations.

Materials and results

All patients were referred to Joint international eye center of Shantou University and The Chinese University of Hong Kong. Surgical methods were scleral patch graft, combined autologous conjunctival pedicle transposition at the same time if necessary. Allogeneic scleras, which were glycerol cryopreservation, were provided by the eye bank of Joint international eye center of Shantou University and The Chinese University of Hong Kong. The minimum age of the patient was 3 years old, and the maximum was 74 years old. The average age was 50 years old. Three

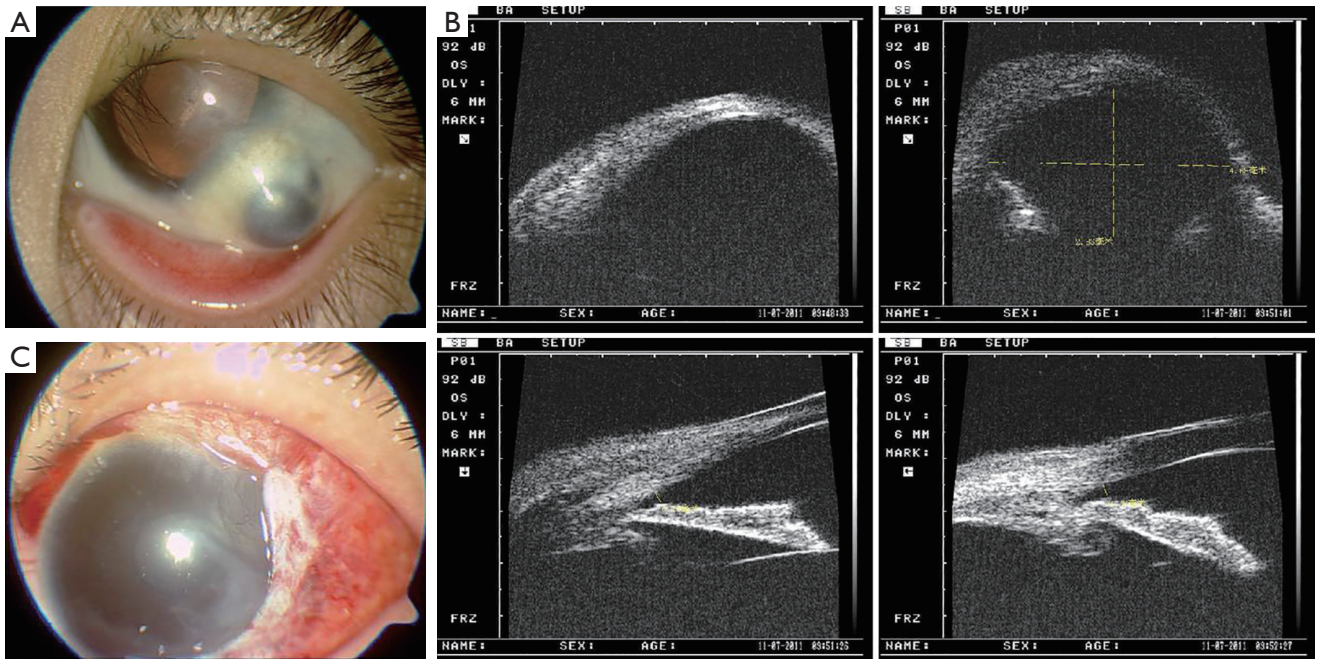

Figure 1 Scleral staphyloma after corneal dermoid resection. (A) Pre-op; (B) UBM pre-op; (C) post-op. UBM, ultrasound biomicroscopy.

patients were female and one was male. They had a surgery history of corneal dermoid, cataract, pterygium, respectively. All patients provided informed consent, and this study adhered to the tenets of the Declaration of Helsinki [Ethic Approval ID: EC 20160616(4)-A12]. The following was medical records:

Case 1 (*Figure 1*): a 3-year-old young girl was referred to our hospital with a history of congenital corneal dermoid resection without graft one year ago. She complained of foreign body sensation and "black lump" on the operated eye postoperatively. No other history was reported. Best-corrected visual acuity (BCVA) was 4/20 in the left eye and intraocular pressure (IOP) was 15 mmHg. Slit-lamp examination revealed a 6 mm × 7 mm brown protruding bulge on the infratemporal. The anterior chamber and fundus examination showed no abnormal. BCVA was 12/20 and slit-lamp examination showed no obvious abnormalities in the right eye. Laboratory examinations results were normal, including blood-R, urine-R, blood biochemistry, hemostatic, HIV, HCV, HBSAg, RPR, chest X-ray, electrocardiogram and other immune inspections. The diagnosis of Scleral staphyloma was given and an operation of Sclera patch graft was performed. In the period of 30 months following-up, the BCVA was 10/20 and the foreign body sensation disappeared in the left eye. Slit-lamp examination revealed no scleral rejection and conjunctival dissolution.

Case 2 (*Figure 2*): a 60-year-old woman was admitted in our hospital with a history of pterygium excision and conjunctival autograft without MMC in the right eye at local hospital 5 years ago. No history of systemic or other ocular diseases was reported. She complained of foreign body sensation and prick pain on the operational eye 2 weeks post operatively, which could not be alleviated by local artificial tears, corticosteroid hormone eye drops, nonsteroidal anti-inflammatory drug, tacrolimus eye drops, and autologous serum eye drops. BCVA was 12/20 in the right eye and IOP was 14 mmHg. Slit-lamp examination revealed a 2 mm × 3 mm scleral partial dissolution and local conjunctiva was dissolved. Corneal fluorescein staining showed negative and Tear break-up time was 9 seconds in the cornea. Other examination showed no abnormality. BCVA was 16/20 and clinical examination showed no obvious abnormalities in the left eye. Laboratory examinations results were normal, including blood-R, urine-R, blood biochemistry, hemostatic, HIV, HCV, HBSAg, RPR, chest X-ray, electrocardiogram and other immune inspection. The diagnosis of scleral staphyloma after pterygium surgery was given and an operation of scleral patch graft and autologous conjunctival pedicle transposition were performed. Topical corticosteroids, immunosuppressants, artificial tears continued for 3 months. In the period of 24 months follow-

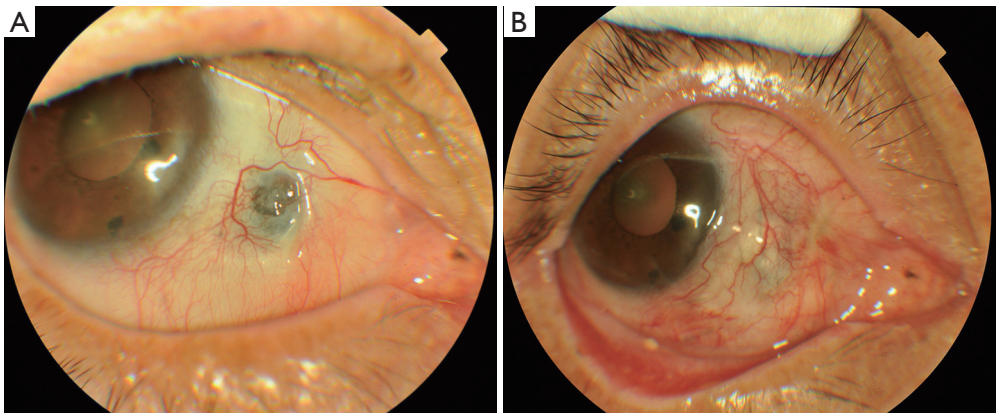

Figure 2 Scleral staphyloma after pterygium excision and conjunctival autograft without MMC. (A) Pre-op; (B) post-op. MMC, Mitomycin C.

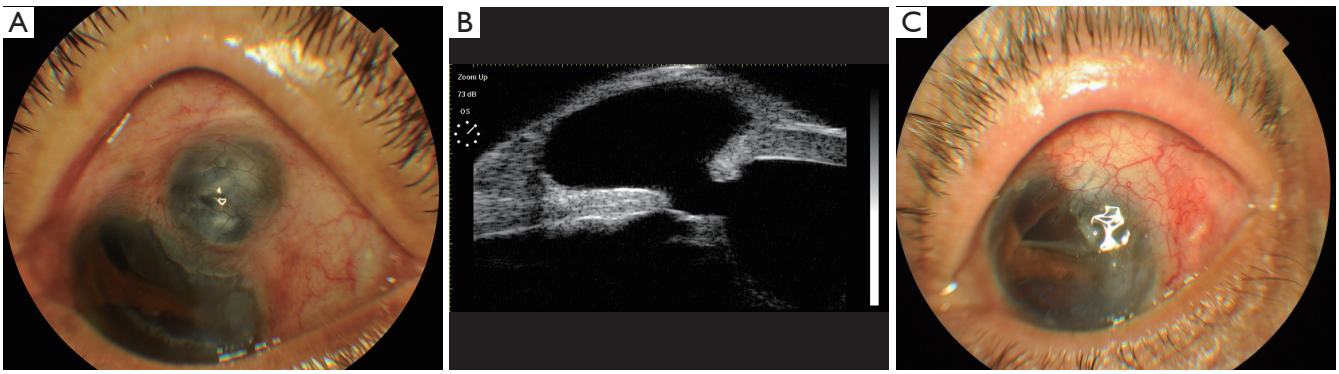

Figure 3 Scleral staphyloma after traumatic cataract surgery. (A) Pre-op; (B) UBM pre-op; (C) post-op. UBM, ultrasound biomicroscopy.

up, the BCVA was 12/20 and the symptoms disappeared in the right eye. Slit-lamp examination revealed no scleral rejection and conjunctival dissolution.

Case 3 (*Figure 3*): a 63-year-old man was referred to our hospital with a history of explosive injury and cataract surgery at local hospital in the left eye 20 years ago. No other history was reported except cerebral thrombosis and hypertension for five years. He had complained of red eye, pain, foreign body sensation, symptoms increase for 1 year. BCVA was hand movement in the left eye and IOP was 12 mmHg. Slit-lamp examination revealed a 6 mm × 6 mm brown protruding bulge on the superior temporal limbus. The cornea was opacity (+), and the anterior chamber depth is normal. There was iridodialysis from 4:00 to 9:00 clock, and the pupil was irregular and crystal was absent. Fundus examination showed no abnormality. The BCVA was 16/20 and clinic examination showed no obvious abnormalities in the right eye. Laboratory examination results were normal, including blood-R, urine-R, blood biochemistry, hemostatic, HIV, HCV, HBSAg, RPR, chest X-ray, electrocardiogram and other immune inspection. The diagnosis was obviously of left eye: (I) scleral staphyloma; (II) iridodialysis; (III) aphakia; (IV) obsolete explosive injury. The operation of scleral patch graft and autologous conjunctival pedicle transposition were performed .In the 9 months follow-up, BCVA was hand movement, scleral graft was in position and conjunctival flap completely covered the sclera without dissolution.

Case 4 (*Figure 4*): a 74-year-old woman was admitted to our hospital with a history of cataract surgery at local hospital in the right eye 12 years ago. She had neither systemic history nor other ocular disease except eyeball atrophy in the left eye, because of standing retinal detachment. She had complained of a black bulging material which gradually increases in the right eye postoperatively. She did not come to a doctor because of money until she suffered from obvious eye pain and foreign body sensation for 1 year. BCVA was hand movement in the right eye

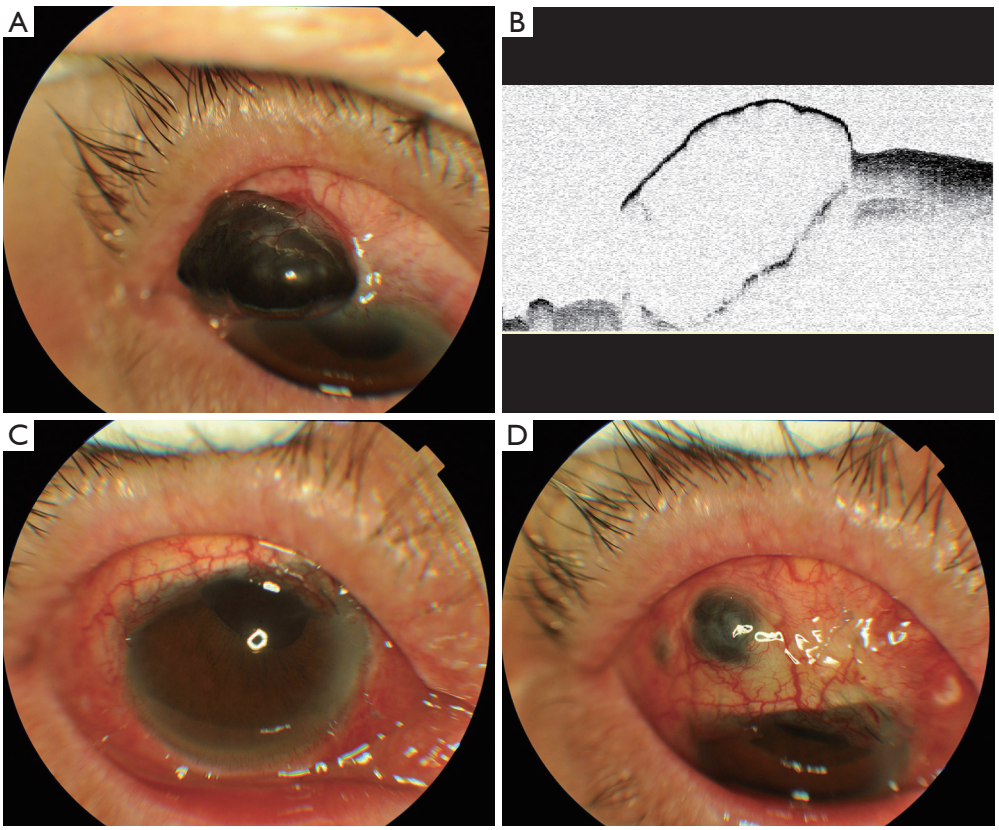

Figure 4 Scleral staphyloma after cataract surgery. (A) Pre-op; (B) anterior segment optical coherence tomography (AS-OCT) pre-op; (C) post-op; (D) 1 month post-op.

and IOP was 12 mmHg. Slit-lamp examination revealed a 6 mm × 10 mm brown protruding bulge on the superior temporal. The pupil shift upward and the crystal were absent. Fundus examination showed no abnormality. BCVA was no light perception, and slit-lamp examination showed corneal leucoma and eyeball atrophy in the left eye. The anterior segment OCT of right eye showed: Line-like bulge strong reflection, and underneath was cystic, showed low internal reflection area. Laboratory examination results were normal, including blood-R, urine-R, blood biochemistry, hemostatic, HIV, HCV, HBSAg, RPR, chest X-ray, electrocardiogram and other immune inspection. The diagnosis of scleral staphyloma and aphakia was given of right eye. The operation of scleral patch graft and autologous conjunctival pedicle transposition was performed. In the half year of follow-up, BCVA was hand movies, eye pain and foreign body sensation alleviate. Unfortunately, she showed scleral rejection and partial dissolution (2 mm × 2 mm) 1 month postoperatively. Topical corticosteroids lasted for 1 month taking into account that the corticosteroids may cause sclera dissolution aggravate, and Topical immunosuppressants, artificial tears continued. We suggest the contralateral eye autologous sclera patch graft if necessary but it was not accepted by the patient's family. No further treatment was accepted except local eye drops. Fortunately, scleral dissolution presented no further aggravation, and the patients had no foreign body sensation, pain, or other symptoms. This patient is still in follow-up now.

Discussion

Anatomically corneal dermoids have been classified into three grades: Grade I limbal or epibulbar dermoid are lesions with a superficial tumor measuring less than 5 mm. Grade II limbal dermoids are of larger size and extend into the corneal stroma down to Descemet's membrane. Grade III limbal dermoids involve the whole cornea and structures of the anterior chamber. Visual acuity may be reduced due to the presence of coexisting amblyopia, astigmatism, and obscuration of the visual axis by the tumor. Irritation by

the protruding cilia may also be a presenting feature. In the past, several different surgical techniques for the removal of dermoids have been described (3). These techniques include bare excision, amniotic membrane transplantation, and even lamellar and penetrating keratoplasty. The adequate choice depends on the location and size of the lesion. Major risks of the excision of the limbal dermoid are intraoperative perforation, postoperative epithelial defects and peripheral vascularization of the cornea (3). Lamellar keratoplasty is reported to result in the improvement of visual acuity, but may also lead to graft opacification, graft ectasia, corneal donor melt, and astigmatism (4,5). The conventional method of treatment for dermoids is a simple excision or a shaving operation. However, complications including postoperative scars with neovascularization or pseudopterygium have been frequently noted (6). The prerequisite is superficial tumors and the remaining corneoscleral is thick enough. In this 3-year-old young girl, she presented scleral staphyloma 1 year after pterygium surgery. We speculate that the main cause may be a thin remaining sclera. In addition, the growth and development of the eye cannot be ignored.

Pterygium excision with conjunctival autograft is a commonly performed procedure for the treatment of primary and recurrent pterygia. Scleral necrosis and melting can occur after pterygium surgery due to the use of adjunctive irradiation, mitomycin C, or excessive cauterization of the sclera (2). It is also believed to be a delayed-type hypersensitivity response to surgical trauma or ischemia that exposes tissue antigens, thereby sensitizing the immune system (7). In this case, no radiation or mitomycin C was used, and No systemic history was reported. The patient presented foreign body sensation and prick pain on the operational eye 2 weeks postoperatively. No evidence of infectious scleritis presented. We speculate that Sclera cauterization and ischemia may play an important role. It could not alleviate the symptoms after systemic medicine. An operation was strongly requested because local discomfort seriously affects her life.

Cataract surgery was another cause of sclera staphyloma, even though very rare. Sutured incision was malaligned and the top of the iris prolapsed, formed an incarceration. Although the IOP was low, the tissues including the sclera, choroid, or the iris protruded, expanding outward and finally forming a scleral staphyloma that resembled a purple black grape-shaped bulge, all secondary to postoperative damage to the eyeball wall that led to reduced resistance (1). This may be the main reason for the formation of the anterior scleral staphyloma in those patients. The cases we report has similar characteristics to that described by Zheng and associates (1) that showed formation of a ciliary staphyloma induced by a corneoscleral tunnel incision cracking following cataract surgery.

Zheng Q (1) reported successfully treat sclera staphyloma by combined anterior sclera staphylectomy and vitrectomy. The patient might present greater postoperative astigmatism. In addition, it might increase the chance of retinal detachment. Yalçindag (8) reported to repair sclera staphyloma with dehydrated dura mater patch graft. Ozcan (9) reported successfully treat scleral defects using fascia lata, cornea, and sclera as graft materials. However, both dura mater and fascia lata were not easy got in our hospital. Polat (10) reported successfully use of an autologous lamellar scleral graft to repair a scleral melt, but it was limited to a relatively small graft. All our patients were still slow progress, and Symptoms could not be relieved even after systemic medicine. The operation of Sclera patch graft was performed in all four patients, three of them combined autologous conjunctival pedicle transposition. In the at least half a year follow-up, the BCVA of all the four patients were no worse than that of preoperative. Ocular symptoms disappeared, including eye pain, foreign body sensation, and so on. Unfortunately, the fourth patient showed partial sclera dissolution 1 month postoperative. We speculate that the main cause may be sclera rejection and ischemia. Fortunately, scleral dissolution did not aggravate after the systemic use of postoperative topical corticosteroids, immunosuppressants and Chinese traditional medicine for systemic vasodilatory. Surgical intervention was not accepted and the patient is still in follow-up.

Our study has some limitations, including its retrospective design, the small number of patients, and the lack of a control group. Despite this, we can conclude that scleral staphyloma must be considered in the patients following corneal dermoid, pterygium, and cataract surgery, even rare. Allogeneic scleral patch is one of the methods for treating scleral staphyloma. However, scleral rejection and dissolution should be considered postoperatively.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest

to declare.

Ethical Statement: All patients provided informed consent, and this study adhered to the tenets of the Declaration of Helsinki [Ethic Approval ID: EC 20160616(4)-A12].

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