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A case of globe rupture crossing calcified senile scleral plaque

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ABSTRACT

Purpose: To report a rare case of globe rupture with broken calcified senile scleral plaque (SSP).
Observations: A 94-year-old male patient presented with left eye pain and severely decreased left vision immediately after the injury while farming. Examination of the left eye revealed edematous cornea, diffuse subconjunctival hemorrhage, total hyphema and iris prolapse. Preoperative computed tomography (CT) scan revealed calcified SSP in both eyes, and the calcified SSP was found to be broken during surgery. Although it was impossible to thread the broken calcified SSP, threading and suturing with long bites outside of the broken calcified SSP was effective for wound closure. Postoperatively, we were able to observe the broken calcified SSP and the wound closure using anterior segment optical coherence tomography (AS-OCT).
Conclusions and importance: In a case of globe rupture with calcified SSP on preoperative CT, the possibility that the SSP has also ruptured should be considered. AS-OCT is also useful to observe the wound in a case of globe rupture with broken SSP during follow-up.

1. Introduction

Senile scleral plaque (SSP) refers to well-defined, flat, slate gray, oval-shaped areas located anterior to insertions of the horizontal rectus muscles. SSP is more prevalent in people aged 70 years and older and its incidence increases with age.[1] Histologically, SSP shows decreased scleral cellularity and often contains calcifications.[2] The overall prevalence of calcified SSP ranges from 3% to 6.2 %, with a prevalence of 22.6 % in patients over age 70.[3] Although most cases of calcified SSP are asymptomatic and clinically insignificant, we report a case of globe rupture with broken calcified SSP.

2. Case report

A 94-year-old male patient presented to our hospital with left eye pain, subcutaneous hemorrhage in the left orbital region, and reduced left visual acuity immediately after the blunt tip of a hoe struck his left eye while farming. His history included cataract surgery on both eyes, but no other ophthalmic or systemic disease. The patient had light perception visual acuity in the left eye. No lacerations were noted on the eyelids and slit-lamp examination of the left eye revealed edematous cornea, diffuse subconjunctival hemorrhage, total hyphema and iris prolapse. Due to intense pain, ocular examination including IOP measurement was not done, as posterior segment evaluation was not possible. Computed tomography (CT) of the orbits revealed a high-density area of suspected vitreous hemorrhage in the left eye, calcified SSP located anterior to the insertions of the horizontal muscles in both eyes and no foreign material. CT showed no findings suggestive of intraocular lens (IOL) dislocation or drop into the vitreous cavity (Fig. 1).

Under general anesthesia, the patient underwent emergency repair of the ruptured globe. After disinfection, the exposed iris and vitreous were excised (Fig. 2A). After the medial rectus muscle was dissected at the insertion, we found the 18 mm long full thickness wound of the sclera was continuous from the previous cataract surgery incision through the insertion of the medial rectus muscle and under the medial rectus muscle, crossing the calcified SSP (Fig. 2B). Whenever vitreous leaked from the scleral wound, it was excised with micro-scissors, and viscoelastic material was injected into the vitreous cavity through the leaking site to avoid extremely low IOP. When suturing the scleral wound, the vitreous at the suture site was pushed back into the vitreous cavity with viscoelastic material to avoid suturing the vitreous. Wound closure of the sclera outside of the calcified SSP was achieved by suturing the wound edges with nonabsorbable thread (8-0 SILK, trape spatula 6.5mm; MANI, inc., tochigi, Japan). Due to persistent leakage through the fissure of the broken calcified SSP, suture of the wound

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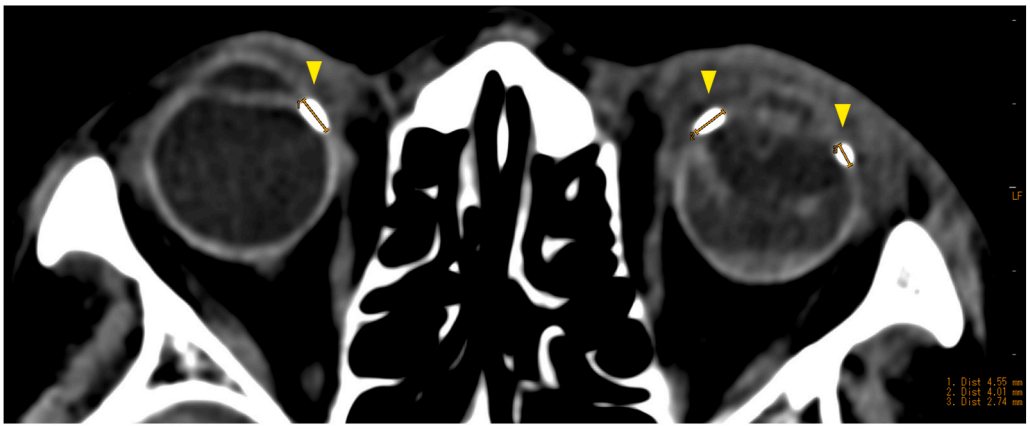

Fig. 1. CT appearance of SSP. Calcified SSP located anterior to the insertions of the medial and lateral rectus muscles in the left eye and medial rectus muscle in the right eye.

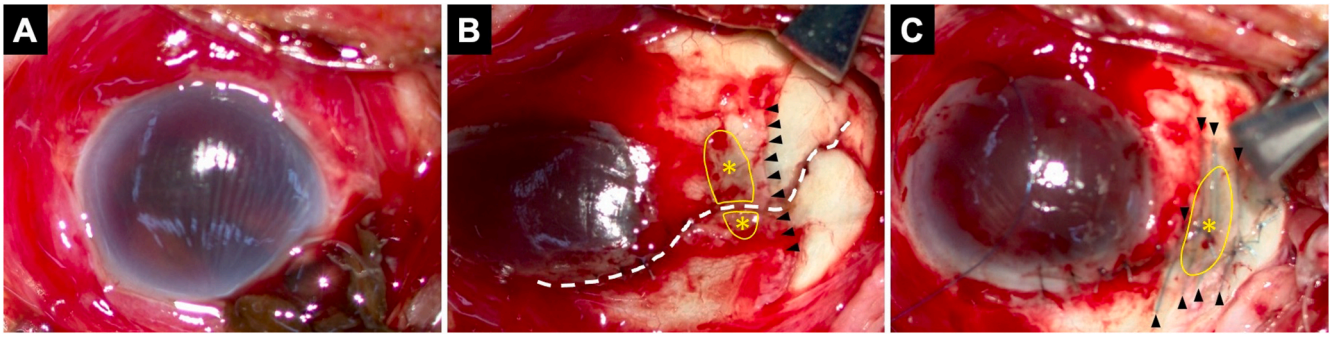

Fig. 2. Intraoperative findings at the start of the primary surgery. (A) Edematous cornea, diffuse subconjunctival hemorrhage, hyphema, and prolapse of the iris and vitreous were observed. (B) After the medial rectus muscles were dissected at the insertion (black arrowheads). The white dotted line indicates the full thickness wound of the sclera. Yellow lines and asterisks indicate broken calcified SSP. (C) After four Semilaminar threads was threaded through the normal scleral area outside of the calcified SSP (yellow line and asterisk) and sutured with long bites. Black arrowheads indicate the needle entry sites.

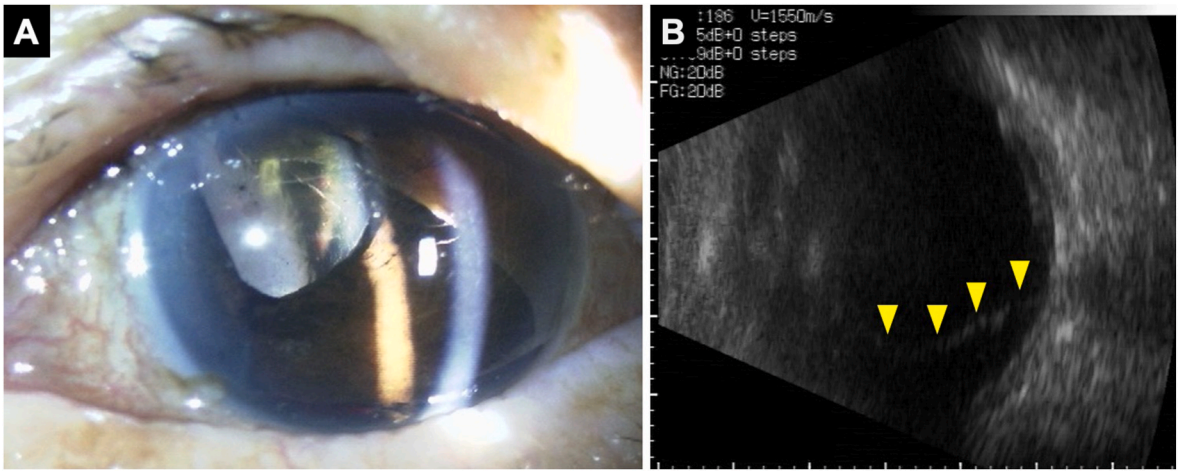

Fig. 3. Findings 1 month after surgery. (A) Slit-lamp examination. (B) Ultrasound echography indicated retinal detachment (yellow arrowheads).

margin was attempted. However, threading was impossible because the broken calcified SSP was very stiff. Therefore, semilaminar threads was threaded using the same 8-0 SILK suture as above through the normal scleral area outside of the broken calcified SSP and sutured with long bites about 1 mm apart taking care not to overlap the wound edges at the top and bottom, which finally closed the fissure of the calcified SSP (Fig. 2C). We then injected irrigating solution into the vitreous cavity to increase the IOP, and after confirming that there was no leak from the scleral wound, we sutured the dissected medial rectus muscle to the original insertion and sutured the conjunctiva to cover the wound to complete the surgery. We used the intraocular irrigating solution contained 0.2 mg/ml of Vancomycin and 0.4 mg/ml of Ceftazidime for intraoperative anterior chamber formation and IOP adjustment.[4]

After the surgery, the patient was treated with systemic (intravenous administration of Cefozopran 1g every 12 h for 5 days followed by oral administration of Cefaclor 0.5g three times a day for 10 days) and

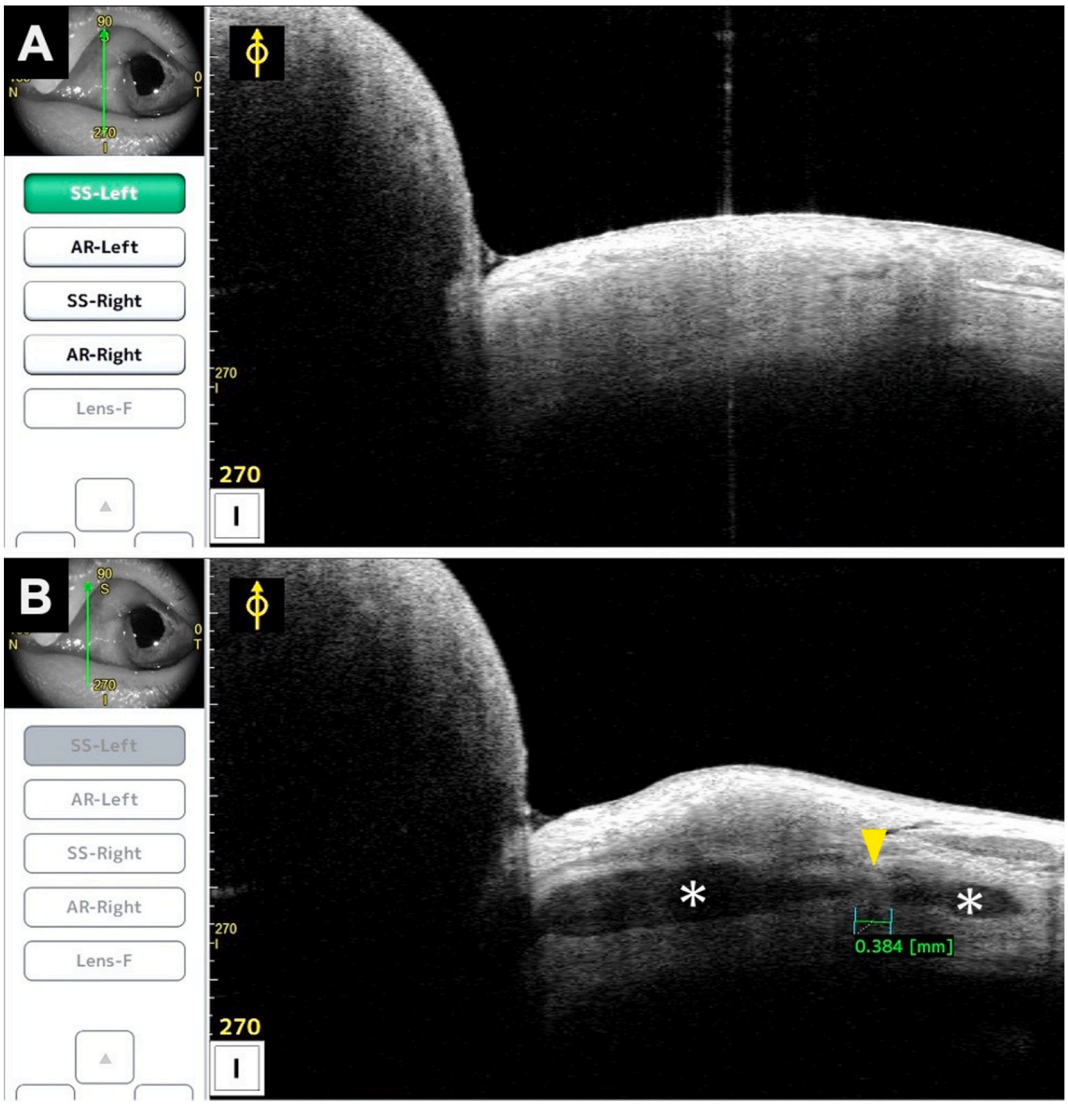

Fig. 4. Anterior-segment optical coherence tomography findings. (A) The image of the area of the corneal side of the broken SSP where the SSP was not present in the same patient and in the same eye. (B) Asterisks and yellow arrowheads indicate the broken calcified SSP and the connective tissue sealing the fissure, respectively.

topical antibiotics (Levofloxacin 1.5 % drops three times a day for 1 month and Cefmenoxime 0.5 % drops 4 times a day for 1 week), topical betamethasone sodium phosphate 0.1 % drops three times a day for 1 month and Bromfenac sodium hydrate 0.1 % drops three times a day for 1 month. Transient postoperative hyphema was noted, but completely disappeared by 1 month postoperatively. There was a defect on the supranasal part of the left iris, the cornea was clear, and the IOL was well fixed (Fig. 3A). One month after primary surgery, the patient had hand motion visual acuity in the left eye, although fundus observation was impossible due to the fibrous membrane on the posterior of the IOL. Ultrasound echography 1 month after the primary surgery revealed retinal detachment (Fig. 3B). However, the patient declined a second surgery because of his advanced age and the fact that his right eye was still functional.

3. Discussion

We experienced a rare case with broken calcified SSP, diagnosed as a rupture in the Birmingham Eye Trauma Terminology (BETT) system.[5] Although it was impossible to thread and suture the broken SSP due to the calcification, the wound was closed by threading and suturing the normal sclera outside of the calcified SSP with long bites.

In the present case, the area of the broken SSP required special attention during the surgery. If the sutures were loose, the vitreous body could easily prorapse from the broken SSP, and if the sutures were too tight, the edges of the SSP would overlap and the vitreous body would prorapse through the gap between the overlapping plaques. Therefore, it was necessary to adjust the strength of the suture many times while adjusting the intraocular pressure by injecting intraocular irrigating solution or viscoelastic material into the vitreous cavity as needed so that the plaque edges would fit together perfectly. In addition, to prevent postoperative endophthalmitis, the wound was completely covered with conjunctiva to avoid ending the surgery with the sclera exposed.

In cases where time allows and standby surgery is possible, it may be possible to apply a scleral patch graft to the broken calcified SSP to close the wound.[6] If there had been a backup scleral patch graft in the present case, it might have been appropriate the broken SSP was surgically removed and covered the remaining thin inner scleral tissue layers with a scleral patch graft and conjunctiva.[7] On the other hand, the graft must be properly trimmed so that the shape of the graft matches the area where the SSP was removed. If the graft is too small or too large, wound closure may be inadequate. In addition, the sclera is expected to be extremely thin after removal of the SSP, and great care must be taken to avoid scleral perforation when suturing the graft. Furthermore, it may

be important to cover the graft completely with the conjunctiva, as it will be easily infected until the graft is ingrafted.

There are previous reports that calcified SSP is observable on CT.[1] In the present case, we were also able to observe the calcified SSP by CT before surgery, although we could not determine whether the calcified SSP was broken. Furthermore, slit-lamp examination could not determine whether the scleral laceration crossed the calcified SSP due to severe subconjunctival hemorrhage and difficulty opening the eyelid due to intense pain. In cases of globe rupture with calcified SSP on preoperative CT, the possibility that the wound crosses the calcified SSP should be considered during surgery.

Beck et al. reported that SSP displays as a hypo-reflective structure and calcifications within SSP are visible as hyper-reflective structures on anterior-segment optical coherence tomography (AS-OCT).[8] We previously reported that the process of connective tissue closure of a scleral incision made during vitrectomy can be observed using AS-OCT.[9] In the present case, we were able to observe broken calcified SSP using AS-OCT (CASIA2; Tomey, Nagoya, Japan) 1 month postoperatively and confirmed that the crack in the SSP was closed by connective tissue using AS-OCT (Fig. 4). Therefore, we believe that AS-OCT is suitable for postoperative assessment of SSP in patients with globe rupture. Although it was not possible in the present case, it may be possible to observe the status of SSP preoperatively in cases where the eyelid can be sufficiently opened and there is minimal subconjunctival hemorrhage.

In the present case, small duration of follow-up is a limitation.

4. Conclusions

Although this report describes mostly asymptomatic and clinically insignificant SSP, it underscores the importance of the possibility of broken calcified SSP in cases of globe rupture with calcified SSP, and the usefulness of AS-OCT for postoperative follow-up of the SSP.

Patient consent

Witten informed consent for the publication of this case was obtained from the patient.

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CRediT authorship contribution statement

Makoto Gozawa: Writing – review & editing, Writing – original draft, Data curation, Conceptualization. **Yusuke Orii:** Writing – review & editing, Data curation, Conceptualization. **Yoshihiro Takamura:** Writing – review & editing. **Masaru Inatani:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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