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Central serous chorioretinopathy resolution after traumatic cyclodialysis repair

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ABSTRACT

Purpose: To report a rare case of central serous chorioretinopathy resolution after traumatic cyclodialysis repair. Observation: A 66-year-old Japanese woman was referred to our hospital with a visual disturbance in her right eye (OD). She had a history of blunt ocular injury when hit by a carton box 3 years previously, but the best-corrected visual acuity (BCVA) was 1.0. At the initial visit, the BCVA was 0.3 OD and 1.2 in the left eye (OS). Optical coherence tomography (OCT) showed a serous retinal detachment (SRD) in the macula; the submacular choroid was thicker OD (316 μm) than OS (246 μm). Fluorescent fundus angiography showed a subretinal macular leak. Gonioscopy and anterior-segment OCT showed angle recession and a cyclodialysis cleft at the temporal angle and cyclodialysis in the four quadrants. One month after focal photocoagulation was applied to the leakage point, the retinal detachment had not improved and the BCVA worsened to 0.2. After subsequent surgical repair of the cyclodialysis using an ab interno approach, the ciliochoroidal detachment resolved by 1 month with a simultaneous rapid decrease in the SRD and complete resolution by 2 months. At the final visit, 5 months postoperatively, the BCVA was 1.0 OD. During this period, the choroidal thickness decreased to 264 μm OD but was unchanged at 247 μm OS. Conclusion and Importance: Traumatic cyclodialysis, presumably via choroidal venous overload, can cause CSC. Since the presence of mild cyclodialysis and/or ciliochoroidal detachment may be difficult to find, post-traumatic CSC during the chronic phase of ocular trauma might be overlooked.

1. Introduction

Central serous chorioretinopathy (CSC) is a common and multifactorial chorioretinal disease characterized by a serous retinal detachment (SRD) that most commonly involves the macular region. CSC, which occurs more often in men aged 20–40 years, is associated with the type A personality, psychosocial stress, increased levels of corticosteroids, pregnancy, and use of psychopharmacologic medication.[1] Accidental[2–9] and surgical[10–12] traumas have been reported as rare causes of CSC.

Cyclodialysis results from separation of the longitudinal ciliary muscle fibers from the scleral spur, which creates an abnormal pathway between the anterior chamber and the suprachoroidal space. Cyclodialysis clefts usually occur as a complication of blunt trauma or anterior segment ocular surgery.[13] We report a patient with CSC that developed in an eye with a long-standing traumatic cyclodialysis. In this case, CSC resolved rapidly after the cyclodialysis was repaired.

2. Case report

A 66-year-old Japanese woman was referred to our hospital with a visual disturbance in her right eye (OD). The patient had an ocular history of small-incisional cataract surgery and intraocular lens implantation OD 4 years previously. She had a history of blunt ocular injury caused by a carton box 3 years previously; the visual acuity (VA) OD remained 1.0 and the intraocular pressure (IOP) remained in the normal range. Although mild hyphema was observed, cyclodialysis was not clearly found, and no retinal detachment or other abnormal retinal lesions were noted by the local ophthalmologist. Her history was negative for systemic hypertension, diabetes mellitus, or smoking, and she had not been treated with systemic steroids before the onset of CSC. At the initial visit, the best-corrected VA (BCVA) was 0.3 OD and 1.2 in the left eye (OS), and the IOPs were 12 and 15 mmHg, respectively. A wide-field fundus camera (Optos 200Tx, Tokyo, Japan) showed choroidal folds and tortuosity of the retinal vessels in the inferotemporal region of the peripheral fundus (Fig. 1A, arrowheads). Fluorescent

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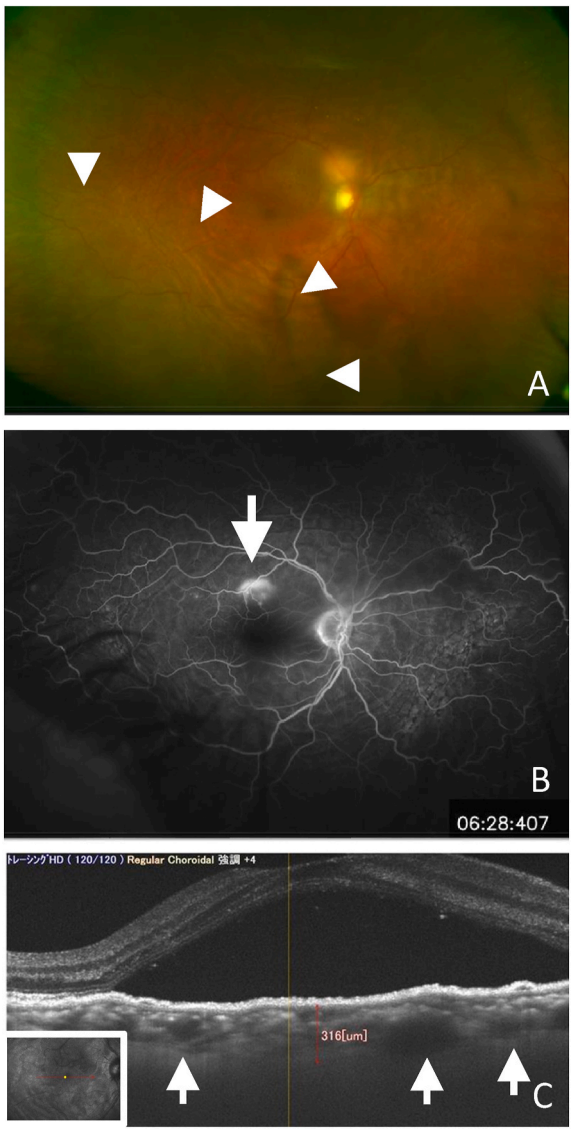

Fig. 1. Fundus imaging at the initial visit OD. (A) A wide-field fundus camera photograph shows choroidal folds and tortuosity of the retinal vessels at the peripheral fundus of the inferotemporal region (arrowheads). (B) Fluorescein angiography shows a clear leakage point in the macula superior to the fovea (arrow). (C) Enhanced-depth imaging of OCT confirms a serous macular detachment, expansion of the large choroidal vessels (arrows), and choroidal thickening (316 μm) in the submacular region. Inset, scan direction.

fundus angiography showed a subretinal leakage point in the macula (Fig. 1B, arrow). Optical coherence tomography (OCT) (RS3000 Advance 2, Nidek, Gamagori, Japan) showed a SRD in the macula and expansion of large choroidal vessels (Fig. 1C, arrows); the submacular choroid was thicker OD (316 μm) than OS (246 μm). Slit-lamp examination showed the absence of anterior chamber inflammation. Gonioscopy showed angle recession and a cyclodialysis cleft (from 7 to 9 o'clock) OD (Fig. 2A, arrowheads). Anterior-segment OCT (Casia 2, Tomey Corporation, Nagoya, Japan) showed a cyclodialysis cleft at the temporal angle (arrow) and cyclodialysis in the four quadrants (Fig. 2B). The ophthalmic examinations did not detect any pathology OS, and systemic investigations showed no evidence of underlying vascular, inflammatory, or infectious diseases. Based on these findings, she was diagnosed with recently developed CSC concomitant with traumatic cyclodialysis due to the previous blunt trauma OD. Since the leakage point was not in the fovea, focal photocoagulation was applied to the leakage point using a yellow laser (MC-500 Vixi, Nidek) (spot size, 150

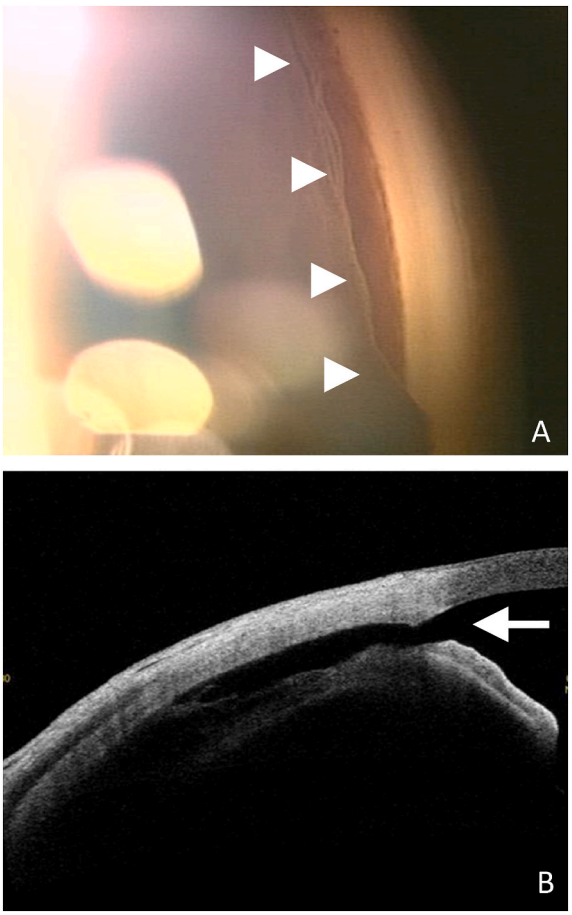

Fig. 2. Presurgical gonioscopic findings. (A) Gonioscopy shows angle recession and cyclodialysis (arrowheads) in the temporal angle. (B) Anterior-segment OCT clearly visualizes the cyclodialysis cleft and ciliochoroidal detachment in the temporal angle (arrow).

μm; duration, 0.2 sec; power, 0.15 W; and spot number, 3 shots). By 1 month after the laser treatment, the retinal detachment had not improved and the BCVA worsened to 0.2. Since the thickened choroid was suspected to be associated with the presence of an annular ciliochoroidal detachment, surgical repair of the cyclodialysis was performed OD. Initially, under the observation of the angle using a Swan-Jacob gonioprism lens (Ocular Instruments, Bellevue, WA), the extent of the cyclodialysis cleft was marked with the surgical pen (Video 1). Three mattress sutures were put between the ciliary sulcus and supraconjunctiva to secure the dialyzed angle to the scleral wall (Fig. 3A and B, Video 2). For this purpose, a double needle suture was prepared by tying two single needle sutures (PC-9, Alcon Surgical, Fort Worth, Texas). Postoperatively, the cyclodialysis was repaired (Fig. 4A), and the ciliochoroidal detachment resolved by 1 month postoperatively (Fig. 4B). Simultaneously, the SRD decreased rapidly and completely resolved by 2 months. At the final visit 5 months postoperatively, the BCVA and IOP OD were 1.0 and 15 mmHg, respectively. During this period, the choroidal thickness decreased to 264 μm OD (Fig. 4C) and was unchanged at 247 μm OS. Sutures placed on the conjunctival surface were covered by conjunctiva spontaneously (Fig. 4D, arrows).

Supplementary video related to this article can be found at https://doi.org/10.1016/j.ajoc.2022.101507

3. Discussion/conclusion

The current case was characterized by a unilateral SRD visualized by OCT and the typical unilateral "smokestack" appearance by fluorescein

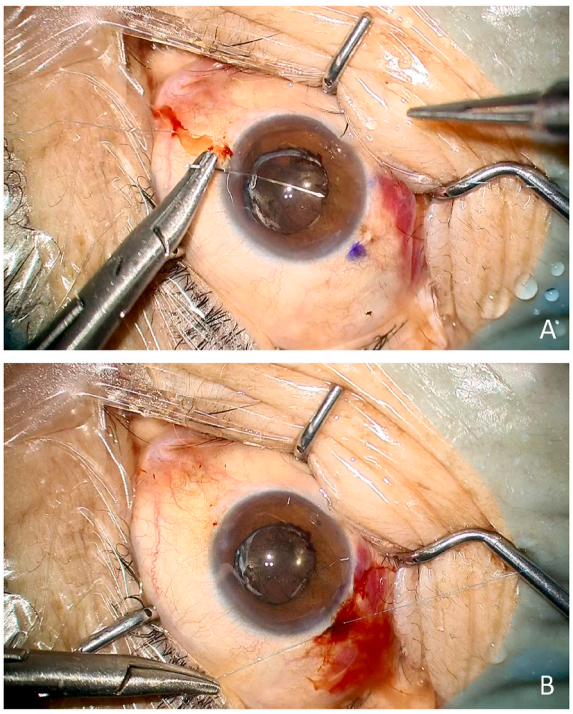

Fig. 3. Surgical findings of ab interno repair of cyclodialysis using a double needle suture. (A) After marking the extent of the cyclodialysis (violet spots), a curbed needle is inserted into the anterior chamber via the corneal incision opposite to the cyclodialysis cleft, passes the ciliary body at the ciliary sulcus level, and exits from the site on the conjunctival surface 1 mm posterior to the corneal limbus. (B) After needles are pierced, the suture is tied to place a mattress suture. In this case, three mattress sutures are placed to cover the entire extent of the cyclodialysis. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

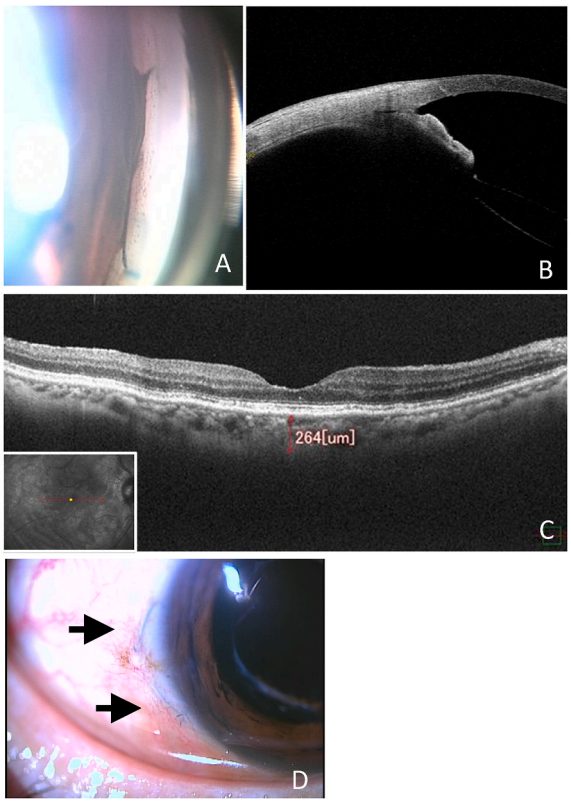

Fig. 4. Postsurgical findings. (A, B) Gonioscopy (A) and anterior-segment OCT (B) reveal successful closure of the cyclodialysis cleft and resolution of the ciliochoroidal detachment by 1 month postoperatively. (C) At 5 months postoperatively, a macular OCT scan shows resolution of the retinal detachment accompanied by decreased submacular choroidal thickness (264 μm). Inset, scan direction. (D) Sutures placed on the conjunctival surface are covered spontaneously by conjunctiva by 5 months postoperatively (arrows).

angiography in the traumatized eye, as in previously reported traumatic CSC cases.[2–6] Although the pathophysiology of traumatic CSC is not fully understood, choriocapillaris hyperpermeability[3–6] and/or damage to the retinal pigment epithelium (RPE)[2] might be associated with subretinal fluid accumulation that in turn facilitates development of CSC. The increased adrenergic and steroidal stimulation may cause dysfunctional degeneration of RPE cells as a result of choriocapillaris hyperpermeability.[1] Development of bilateral CSC after bilateral laser in situ keratomileusis (LASIK) for myopia also has been reported[10,11]; thus, mechanical stress such as transient IOP elevations during LASIK can cause CSC. Since CSC has developed in the fellow eye of unilateral ocular trauma[7–9] or bilaterally after unilateral surgical repair of a blowout fracture,[12] psychological stress, immune-mediated sympathetic ophthalmia, over stimulation of sympathoadrenomeullary system, and increased release of cortisol were considered as factors of CSC development in the fellow eye.[8] All of these previously reported cases developed CSC during the early traumatic phases (i.e., between 1 day and 1 month after the trauma), while in the current case the CSC developed 3 years after the trauma.

In most previous cases, the CSC resolved spontaneously within 4 months,[2–9,12] although some required photodynamic therapy.[10,11] In the current case, focal laser coagulation to the leakage point seemed ineffective, and the CSC resolved after subsequent surgical repair of the long-standing cyclodialysis. This accompanied normalization of the submacular choroidal thickness. The current report of the measurement of the choroidal thickness in traumatic CSC is unique in the literature. Accordingly, we speculated that increased choroidal vascular permeability and RPE dysfunction secondary to the prolonged presence of traumatic cyclodialysis and ciliochoroidal detachment may have been the underlying mechanism of the CSC in the current case. Increased choroidal vascular permeability may be explained by choroidal venous overload[14,15] due to the presence of communication between the anterior chamber-suprachoroidal space and/or venous stasis due to cyclodialysis-associated relative hypotony. In our case, IOP OD was slightly lower than that of OS. It is speculated that the lower pressure in the eye resulted in higher transvascular pressure, which drove fluid out of the choroidal vessels and caused secondary choroidal thickening. This assumption might explain the mechanism for the chronic onset of CSC in our case, whereas in previously cases, the early onset of CSC seemed to be related to the posttraumatic stress and direct damage to the RPE/choriocapillaris.

Traumatic cyclodialysis may resolve spontaneously,[16–18] while ciliary body suturing is required when the preservative treatment fails.[19,20] Previously, both ab externo[20] and ab interno[19] approaches have been reported as surgical procedures for ciliary body suturing. Because of the ab interno approach and no requirement for vitreous manipulation or conjunctival/scleral incisions, our procedure seems minimally invasive to the ocular tissues.

In conclusion, the current case suggests that cyclodialysis can cause CSC. If mild, the presence of cyclodialysis and/or ciliochoroidal detachment may be difficult to identify. Thus, it is possible that the posttraumatic CSC that developed during the chronic phase of ocular trauma was overlooked previously.

Patient consent

Consent to publish this case report has been obtained from the patient in writing.

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Declaration of competing interest

All authors have no financial disclosures.

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References

1. Nkrumah G, Paez-Escamilla M, Singh SR, et al. Biomarkers for central serous chorioretinopathy. *Ther Adv Ophthalmol*. 2020;12, 2515841420950846.
2. Gunna NT, Parameswarappa DC, Rani PK. Bullous central serous chorioretinopathy and retinal pigment epithelium sequelae postblunt trauma. *BMJ Case Rep*. 2020;13 (9), e235882.
3. Jackson TE, Sood V, Haigh PM. Central serous chorioretinopathy secondary to trauma. *Oman J Ophthalmol*. 2012;5(1):51–52.
4. Ponce CM, Mohidat HM, Garcia CA. Central serous chorioretinopathy after blunt trauma. *BMJ Case Rep*. 2012;2012, bcr0120125626.
5. Steeples L, Sharma V, Mercieca K. Traumatic central serous chorioretinopathy. *Indian J Ophthalmol*. 2015;63(6):536–538.
6. Tekin K, Citirik M, Atalay M, Teke MY. Concomitant macular hole and central serous chorioretinopathy after blunt eye trauma. *Retin Cases Brief Rep*. 2018;12(3): 192–195.
7. Moschos MM, Gouliopoulos NS. Central serous chorioretinopathy after ocular trauma in the fellow eye during a water-polo game. *BMJ Case Rep*. 2015;2015, bcr2015210779.
8. Yu SY, Kim Y, Kwak HW, Kim M. Traumatic central serous chorioretinopathy in the fellow eye. *Indian J Ophthalmol*. 2016;64(2):170–171.
9. Ahmad S, Chen CJ, Campbell JP. Serous retinal detachment following enucleation. *JAMA Ophthalmol*. 2015;133(6):713–714.
10. Al-Dhibi H, Chaudhry IA, Al-Assiri A, Shamsi FA. Development of early choroidal neovascular membrane in a young myope after LASIK. *Eur J Ophthalmol*. 2007;17(2): 262–265.
11. Peponis VG, Chalkiadakis SE, Nikas SD, Makris NK, Ladas ID, Karagiannis DA. Bilateral central serous retinopathy following laser in situ keratomileusis for myopia. *J Cataract Refract Surg*. 2011;37(4):778–780.
12. Chang M, Baek S, Lee TS. Central serous chorioretinopathy after surgical repair of a blowout fracture. *J Craniofac Surg*. 2012;23(6):1923–1924.
13. González-Martín-Moro J, Contreras-Martín I, Muñoz-Negrete FJ, Gómez-Sanz F, Cyclodialysis Zarallo-Gallardo J. An update. *Int Ophthalmol*. 2017;37(2):441–457.
14. Imanaga N, Terao N, Nakamine S, et al. Scleral thickness in central serous chorioretinopathy. *Ophthalmol Retina*. 2021;5(3):285–291.
15. Spaide RF, Gemmy Cheung CM, Matsumoto H, et al. Venous overload choroidopathy: a hypothetical framework for central serous chorioretinopathy and allied disorders. *Prog Retin Eye Res*. 2021:100973.
16. Endo S, Mitsukawa G, Fujisawa S, Hashimoto Y, Ishida N, Yamaguchi T. Ocular ball bullet injury: detection of gonioscopically unrecognisable cyclodialysis by ultrasound biomicroscopy. *Br J Ophthalmol*. 1999;83(11):1306.
17. Shah VA, Majji AB. Ultrasound biomicroscopic documentation of traumatic cyclodialysis cleft closure with hypotony by medical therapy. *Eye*. 2004;18(8): 857–858.
18. Ishida A, Mochiji M, Manabe K, Matsuoka Y, Tanito M. Persistent hypotony and annular ciliochoroidal detachment after microhook ab interno trabeculotomy. *J Glaucoma*. 2020;29(9):807–812.
19. Li H, Cai J, Li X. Continuous ab interno repairing of traumatic cyclodialysis cleft using a 30-gauge needle in severe ocular trauma: a clinical observation. *BMC Ophthalmol*. 2019;19(1):266.
20. Nagashima T, Kohmoto R, Fukumoto M, et al. Ciliary body suturing using intraocular irrigation for traumatic cyclodialysis: two case reports. *J Med Case Rep*. 2020;14(1):121.