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Surgical removal of subretinal cysticercosis in conjunction with administration of intravenous methylprednisolone: A case report

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ABSTRACT

Purpose: Intraocular cysticercosis in the sub-macular location is a rare but potentially blinding disease. The management requires immediate surgical management and anti-parasitic medications. We present a case of subretinal cysticercosis that was managed with a novel method of intravenous methylprednisolone administration before and after it was surgically removed.

Observations: A 17-year-old Indian female patient presented to our clinic with a history of vision deterioration through the last 27 days in her left eye (OS). Best-corrected visual acuity (BCVA) was 20/20 in the right eye (OD) and hand motion OS. Fundus examination showed a healthy-appearing OD and a whitish glow in the macular region OS. She was diagnosed with subretinal cysticercosis and underwent pars plana vitrectomy with *in toto* removal of the cyst along with pre/post-surgical intravenous methylprednisolone and anti-parasitic medications. A significant visual recovery of 20/60 was achieved three weeks following the surgery in OS.

Conclusion and importance: The index case shows a favorable visual recovery in a patient with a subfoveal cyst of relatively long duration. We hypothesize that intravenous methylprednisolone in conjunction with routine treatment may have led to favorable visual outcomes.

1. Introduction

Cysticercosis can involve various intraocular or extraocular structures.[1] Intraocular cysticercosis involving the subretinal space is a rare but rather challenging scenario.[2–4] The diagnosis and treatment of subretinal cysticercosis is vital as the rupture of the cyst releases potentially blinding toxins and can cause irreversible vision loss.[1] Sub-retinal/macular cysts require vitreoretinal surgery and despite successful surgery and appropriate management, they often have relatively poor visual outcomes.[3,5,6] We herein present a case of subretinal cysticercosis managed with pars plana vitrectomy and *in toto* removal of the cyst, followed by pre/post-surgical anti-helminthic treatment and pulse intravenous methylprednisolone therapy.

2. Case report

A 17-year-old girl from East India presented with painless, progressive diminution of vision in her left eye (OS) for 27 days. She mentioned noticing a whitish glow, which had gradually increased during the last 15 days in the same eye while looking at the mirror (Fig. 1). There were no other relevant present or past ocular symptoms or systemic diseases. The patient was a vegetarian by diet. There was no history of contact with pets. There were no similar complaints among other family members.

On ocular examination, the best-corrected visual acuity (BCVA) in the right eye (OD) was 20/20; N6 and was hand motion (HM); N < 36 OS. Ocular movements were full in all directions of gaze. Applanation tonometry recorded an intraocular pressure (IOP) of 11 mmHg in OD

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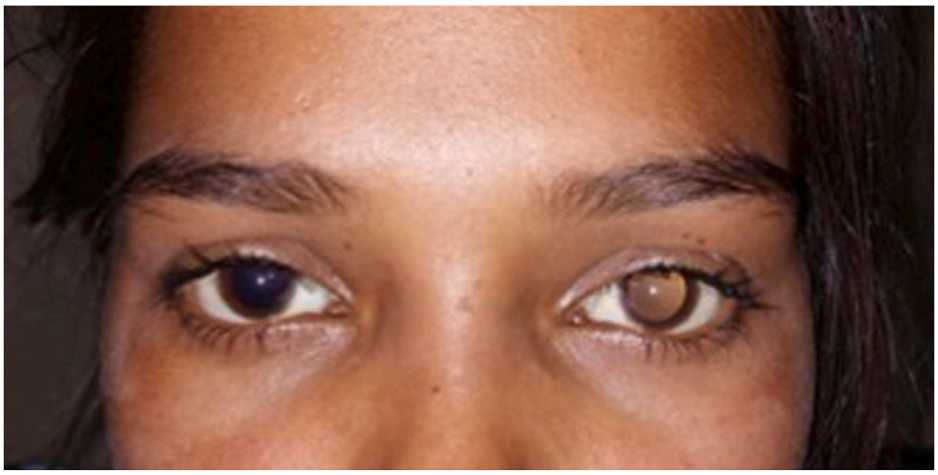

Fig. 1. Photograph of the patient showing white reflex in the left eye.

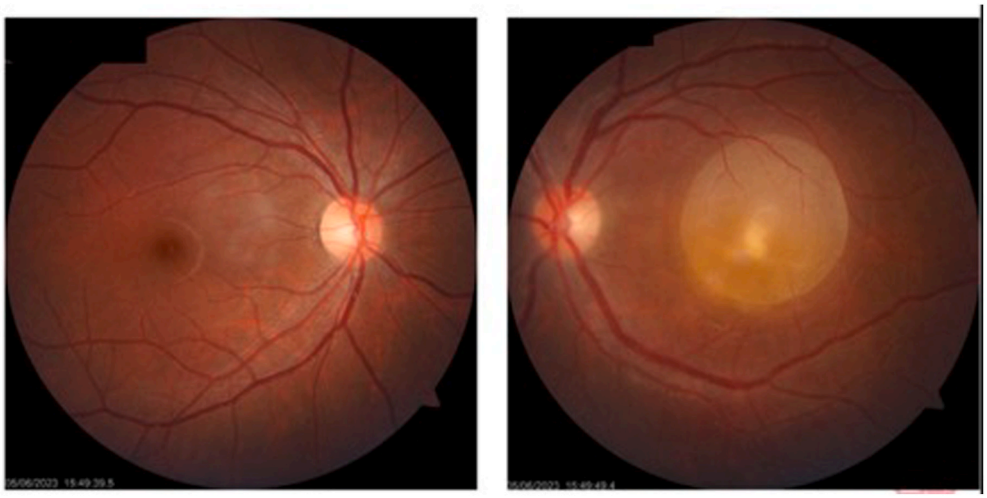

Fig. 2. Color fundus photographs of both eyes. The right fundus appears normal, and the left fundus photo shows "whitish" sub-retinal material at the macula. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

and 14 mmHg in OS. On slit-lamp examination, the anterior segment was normal in OD. The conjunctiva and cornea were healthy in OS. However, a rapid afferent pupillary defect (RAPD) was detected in OS. There were 1+ cells and 1+ flare in the OS. The media was clear in both eyes (OU). On fundus examination, OD was found to be normal. In OS, there was a 1+ vitreous haze. The disc and the vessels appeared normal. In the macula, there was a yellowish raised cystic lesion measuring about 2 to 3-disc diameter in size with surrounding localized subretinal fluid (SRF) (Fig. 2). Undulating movements on exposure to light suggested it to be a live cyst. Spectral-domain optical coherence tomography (SD-OCT) depicted a well-demarcated hypo-reflective cyst with hyperreflective wall in the subretinal area with obscuration of the underlying choroidal vasculature due to acoustic shadowing (Fig. 3). Brightness-scan (B-Scan) of the same eye also demonstrated a well-demarcated hypoechogenic cyst within the hyperechoic wall in the subretinal area, which is a classic finding for subretinal cysticercosis (Fig. 4).

A diagnosis of subretinal cysticercosis was made, and the patient underwent radiological investigations, including magnetic resonance imaging (MRI) of the brain and ultrasound of the abdomen and pelvis, which were normal. Laboratory investigations were negative or within normal limits, barring the immunoblot for cysticercosis antigen, which was positive.

The patient underwent a 25-gauge pars plana vitrectomy with removal of the sub-macular cysticercosis following acquiring the informed consent. After core vitrectomy, triamcinolone assisted posterior vitreous detachment, and peripheral vitrectomy was completed. All manipulations in the posterior pole were avoided as much as possible, and a retinotomy was performed at the supertemporal edge of the cyst using diathermy, avoiding the cyst's wall to prevent it from rupturing (Fig. 5A and B). The cyst was aspirated using a soft-tip cannula (Fig. 5C). The trocars were removed, and a larger sclerotomy wound was created using a micro-vitreoretinal knife to assist in easy expulsion of the cyst *in toto* from the vitreous cavity (Fig. 5F) and sent for histopathology. Fluid air exchange (FAX) was done followed by barricade photocoagulation of retinotomy (Fig. 5D). 1000 Centistoke (Cs) silicon oil was injected for tamponade (Fig. 5E), and the enlarged port was sutured using 8–0 vicryl. The patient was advised to maintain a prone position for 8–10 hours a day for two weeks. The patient received 1000 mg of intravenous methylprednisolone for three days (the first dose started preoperatively), followed by oral steroids 1 mg/kg in tapering doses along with albendazole 400 mg orally for 30 days. Topical medications consisting of moxifloxacin 0.5 %, prednisolone acetate 1 %, and atropine 1 % were prescribed according to routine post-operative protocol. Regarding the corticosteroid tapering regimen, the patient received 60 mg of prednisone for 5 days, 40 mg for 5 days, 30 mg for 10 days, 20 mg for 15 days, 10 mg for 20 days, and 5 mg for a month.

A histopathological examination report of the cyst was received in 48

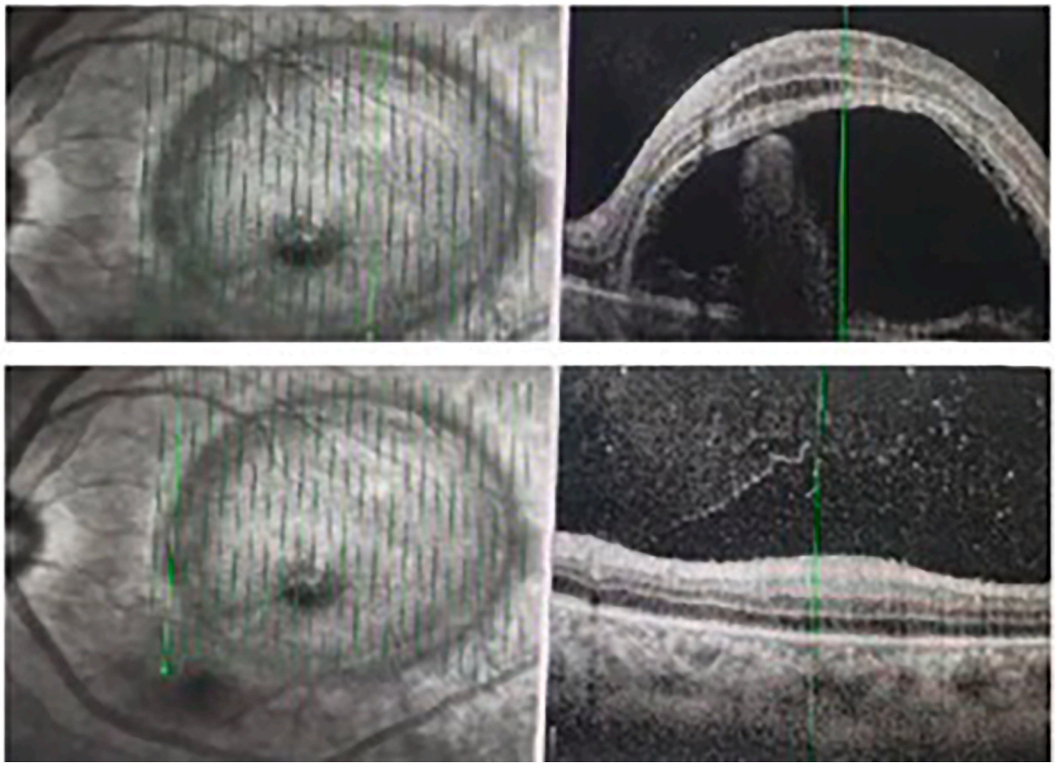

Fig. 3. Spectral-domain optical coherence tomography (SD-OCT) images show a well-demarcated hypo-reflective cyst with a hyper-reflective wall in the sub-retinal area.

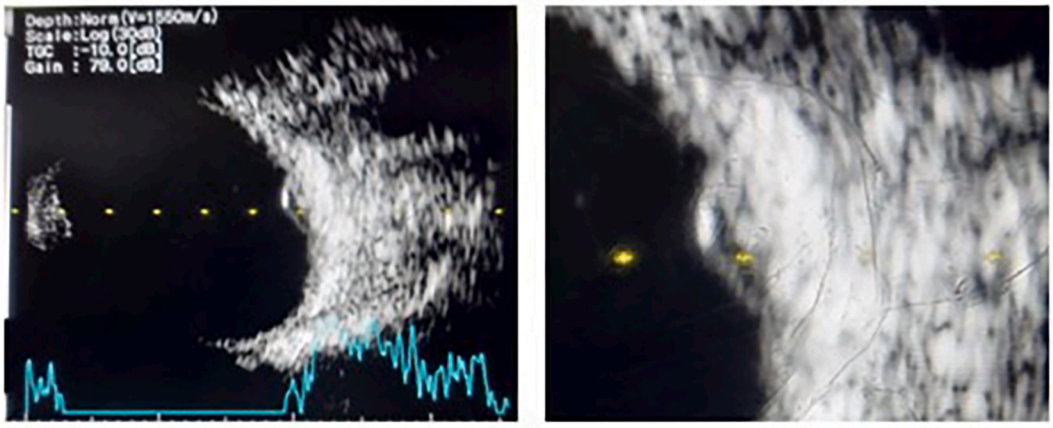

Fig. 4. B-scan of the left eye shows a well-demarcated hypo-echogenic cyst with a hyper-echogenic wall in the sub-retinal area.

hours. Membranous structure surrounded by eosinophilic material, but the structure itself containing no hook lets, suckers, or papillary invagination in its body suggested that it was a case of cysticercosis with possible dissemination from a systemic source-which remained occult (Fig. 6). Considering the subfoveal location of the cyst, the post-operative 3-week visual acuity improvement was rather impressive to 20/60 in OS with an IOP of 14 mmHg and a well-attached retina (Fig. 7).

3. Discussion

Humans are an accidental host for *Taenia solium*. The larva pierces the intestinal wall into the bloodstream, enters the posterior segment of the eye through the short posterior ciliary arteries, and reaches the subretinal space.[4]

The management of a patient with a live submacular parasite warrants an urgent surgical intervention to remove the worm from the subretinal space in order to avoid severe vision loss due to photoreceptor loss.[7–9] The *in toto* excision of the cyst is important, and the spilling of contents should be avoided. The cyst can either be externalized using the scleral port or aspirated using a high aspiration rate and low-cut rate.[8,9] Complications in surgery include rupture of a cyst with retained matter, retinal tear, retinal detachment, retinal hemorrhage, vitreous hemorrhage, and postoperative uveitis.

In a comprehensive review by Wender et al. the authors studied approximately 300 patients with intraocular cysticercosis and reported that the visual outcomes in patients with intraocular cysticercosis have historically been quite poor.[9] A case series by Cardenas and associates from 1992 reported a final BCVA of less than 20/200 in 81 % of eyes

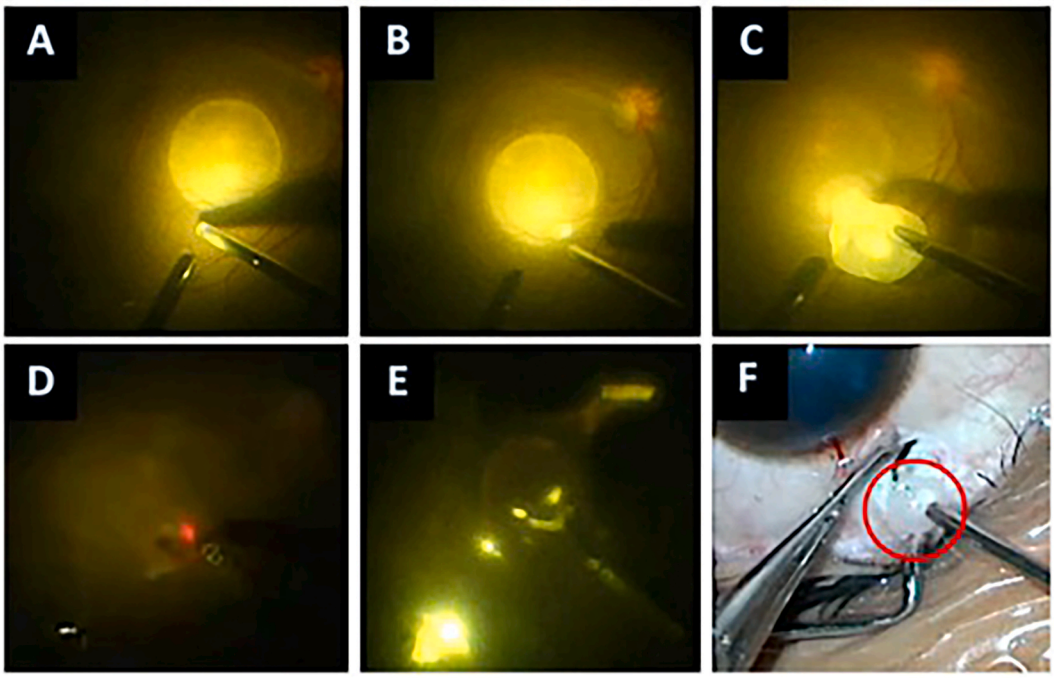

Fig. 5. Intra-operative images. Visualization of the submacular cyst (A). Drainage retinotomy is made at the base of the cyst (B). Cyst aspirated using a soft-tip cannula (C). Drainage retinotomy lasered (D). Silicon oil instilled (E). Cyst exteriorization *in toto* using the active scleral port (F). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

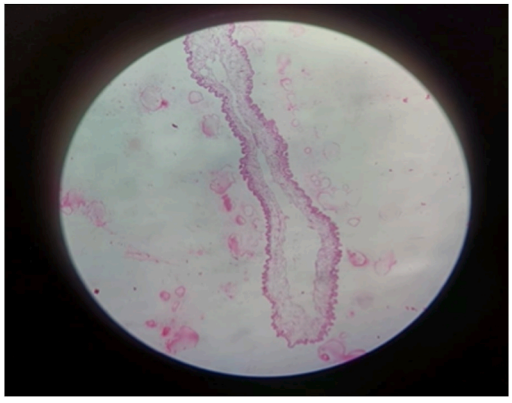

Fig. 6. The histopathology specimen of the cyst revealed a membranous structure surrounded by eosinophilic material. The structure itself contained no hooklets, suckers, or papillary invagination in its body.

despite "proper surgery".[11] More favorable visual outcomes have been reported during the past few years; however, this may be a result of improved surgical techniques for cyst removal.[6,7,10] Only 23.5 % of cases in a report had improvement to greater than 20/60 after vitreoretinal surgery for subretinal cyst.[7] The poor visual acuity in cases with sub-macular cysticercosis may be due to damage to the photoreceptors, atrophy of the underlying retinal pigment epithelium, or the toxins released. The chemical toxins that are released are known to cause inflammatory damage and are accentuated on its death.

4. Conclusion

In the present case, we highlight the desirable visual outcome, despite a sub-foveal live cysticercosis cyst of a relatively long-term duration of one month. We hypothesize that the administered pre/post-surgical high-dose intravenous methylprednisolone has played a role in decreasing the inflammation and subsequent damage from the toxins to the photoreceptor and other retinal structures. The outcomes of oral steroids as described in the literature has been variable. In our case, the application of pulsed intravenous methylprednisolone steroids may have contributed to a more favorable outcome even at a very short period of time. A larger, randomized study comparing the use of pulsed intravenous methylprednisolone, perhaps involving multiple centers may help strengthen the hypothesis. However, given the rarity of such presentation, the clinicians who may encounter similar scenarios for the time being have at least been presented with a possible additional therapeutic option to their armament.

CRediT authorship contribution statement

Amrit Banstola: Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptualization. **Sachin Iyer:** Writing – review & editing, Writing – original draft, Investigation, Data curation. **Amir Akhavanrezayat:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation. **Tanya Jain:** Writing – original draft, Investigation, Data curation. **Muna Kharel:** Writing – original draft, Methodology, Investigation. **Ankur Sudhir Gupta:** Writing – original draft, Methodology, Investigation. **Jia-Horung Hung:** Writing – original draft, Methodology, Investigation. **Woong-Sun Yoo:** Writing – original draft, Methodology, Investigation. **Quan Dong Nguyen:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Conceptualization. **Anadi Khatri:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Data curation, Conceptualization.

Patient consent

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

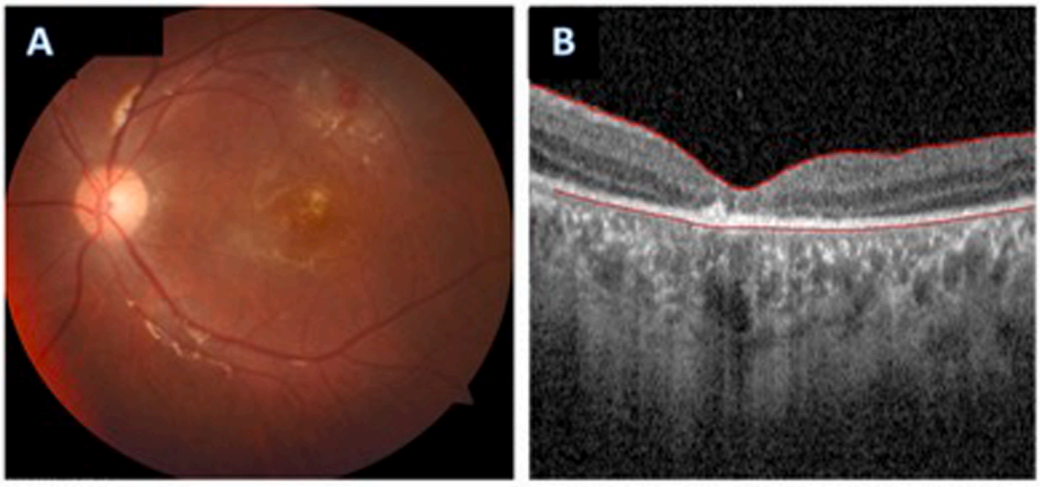

Fig. 7. Post-operative color fundus photograph (A) and corresponding spectral domain optical coherence tomography (SD-OCT) image (B) of the left eye in the sixth week show a well-attached retina. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

Meeting presentation

None.

Authorship

All authors attest that they met the current ICMJE criteria.

Ethical clearance

Verbal and written consent was obtained from the patient to report the case in an anonymous manner.

Claims of priority

After conducting a literature review on 8/29/2024 utilizing PubMed and Google Scholar using the keywords (Subretinal Cysticercosis; Intravenous Methylprednisolone; Removal Surgery; Management), we did not find any prior reports of "Surgical Removal of Subretinal Cysticercosis in Conjunction with Administration of Intravenous Methylprednisolone"

Intellectual property

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

Research ethics

Written consent to publish potentially identifying information, such as details or the case and photographs, was obtained from the patient(s) or their legal guardian(s).

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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.

Acknowledgement

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ajoc.2025.102280.

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