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Case Report

Submacular Cysticercosis Successfully Treated through Conservative Management: Case Report

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Abstract
Appropriate medical management can be an alternative in those patients with submacular cysticercosis in whom achieving good visual outcome with vitreoretinal surgery is not possible. We report the case of a 25-year-old female who presented complaining of blurred vision in her left eye associated with photopsias and metamorphopsias of 3 months duration. Initial visual acuity in the right eye was 20/20 and 20/100 in the left eye. Upon indirect ophthalmoscopy in the left eye, a yellow-white, dome-shaped, elevated lesion with foveal involvement was observed. The rest of the ophthalmological examination proved normal. With clinical findings and images, submacular cysticercosis was diagnosed, and vitreoretinal surgery was suggested. Nevertheless, the patient did not accept the treatment; therefore, medical management was initiated. Central nervous system involvement was ruled out, and treatment with praziquantel and systemic prednisolone was initiated. Cysticercosis was resolved with significant improvement of her symptoms and visual acuity.

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Introduction

Cysticercosis is a parasitic disease caused by the *Taenia solium* cestode, a larva with a high tissue-invading capacity. It is endemic in countries of Africa, Latin America, and Asia where conditions such as poor hygiene, poor health habits, and poverty contribute to the transmission of the disease [1, 2]. Cysticercus can affect any of the ocular structures; in approximately 10% of the cases, the central nervous system is compromised [3]. The frequency and type of symptoms depend on the location of the cysts. Intravitreal location was reported in 59.5% of the cases and subretinal location in 40.5% of the cases [4]. Ocular manifestations may be devastating as the cysticercus grows. The parasite's death brings on a marked release of toxic products, giving rise to an acute inflammatory reaction. Destruction of the larva on-site by photocoagulation, cryotherapy, and diathermy has been attempted with some success; however, early surgical removal of the parasite is the treatment of choice. Medical treatment of ocular cysticercosis with anthelmintics such as praziquantel is being discussed and is not recognized as a curative treatment [5].

In this paper, we report the case of a patient with submacular cysticercosis who did not accept surgical treatment, opting for medical treatment with anthelmintics and systemic and local corticoids, achieving an adequate response with good visual and anatomical outcomes.

Case Presentation

A 25-year-old female presented complaining of blurred vision in her left eye associated with photopsias and metamorphopsias of 3 months duration. The patient did not report any systemic, ophthalmologic, or family history-related medical incidents during the initial assessment.

The best-corrected visual acuity was 20/20 in the right eye and 20/100 in the left eye. Slit-lamp examination of the anterior segment of the eye was normal in both eyes, and intraocular pressure was also found to be normal. Indirect ophthalmoscopy in the right eye was normal; however, in the left eye, a dome-shaped elevated lesion was observed in the center of the macula, approximately 2-disc area size, translucent and with a yellow-white opacity in the inferonasal sector of the fovea (Fig. 1). The rest of the eye examination was normal.

B-scan ultrasonography revealed a cystic lesion with eccentric echogenic mural nodule in the subretinal space, spectral domain optical coherence tomography (SD-OCT) documented normal macular architecture in right eye, and in the left eye it showed a cystic subretinal lesion of low reflectivity. The wall located towards the neurosensory retina was continuous and well-defined, while the wall located towards the retinal pigment epithelium was discontinuous and poorly defined. The scolex was observed to be an area of high reflectivity, coming out from the base and directed toward the highest point of the cystic lesion. The inner layers of the retina did not show abnormalities (Fig. 2). With clinical findings and images, submacular cysticercosis was diagnosed, and vitreoretinal surgery was suggested. Nevertheless, the patient did not accept the treatment and therefore, medical management was initiated. A brain magnetic resonance imaging was conducted with normal results, and treatment was started with praziquantel, prescribing a total dose of 50 mg/kg per day divided into three doses for 2 weeks. Oral prednisolone was added to treatment at 50 mg per day for 2 weeks, and subsequently the gradual dose reduction was performed.

Thirty days after starting the treatment, the patient showed initial symptom improvement. In the right eye, best-corrected visual acuity was 20/20, while in the left eye it was

20/30. Indirect ophthalmoscopy of the left eye showed a hypopigmented parafoveal nasal lesion of approximately 0.5 disc diameters, corresponding to atrophy of the retinal pigment epithelium (Fig. 3A). The rest of the eye examination did not show alterations. In SD-OCT atrophy, and distortion of the outer layers of the retina was observed in the nasal macular subfields (Fig. 3B). Due to the patient's adequate progress and improvement of her symptoms, she is currently without medical treatment and continues to be monitored to follow-up on her progress.

Discussion

Cysticercosis is a parasitic disease caused by the *T. solium* cestode, a larva with a high tissue-invading capacity. It is endemic to countries of Africa, Latin America, and Asia where conditions such as poor hygiene, poor health habits, and poverty contribute to the transmission of the disease [1, 2]. Humans are the only natural definitive host of the tapeworm, and pigs are the main intermediary host; therefore, the prevalence of the disease depends on the relation and interaction between them. The consumption of undercooked pork meat infested with *T. solium* larvae can result in intestinal taeniasis. These tapeworms can survive up to 25 years in the small intestine, self-fertilizing and releasing large amounts of eggs in feces, which are extremely contagious. The invasive oncospheres (embryos) of the eggs are released through the action of gastric acid and intestinal liquids. They pass through the intestinal walls, entering the blood stream and traveling to other organs or tissue. Nevertheless, they are attracted especially to the brain, muscles, eyes, and subcutaneous tissue. In terminal small vessels, they form cysts that result in the cysticercus and reach their final size (approx. 1 cm) within 2–3 months. If left untreated, the parasite causes mechanical damage due to tissue compression and finally dies after 2–4 years [1, 6].

The cysticercus can affect any of the ocular structures, and frequency and type of symptoms depend on the location of the cysts. Although there are reports that describe the subconjunctival location as the most frequent, extensive epidemiological studies have shown that the intravitreal and subretinal locations are much more common than the involvement of the anterior segment and the eye annexes [4, 7].

The distribution of intraocular cysticercosis by gender varies slightly, according to geographical location. Four publications in India and one in Mexico have revealed a slight predominance in males [4, 5, 8–10]. Nevertheless, some series published in Brazil revealed a predominance in females [4]. The condition is most common in middle-aged subjects, occurring generally between 20 and 40 years of age; nevertheless, cases have been reported in teenagers and children. Most of the cases are unilateral.

Symptoms and complications are related to the inflammatory process triggered by the cysticercus in the vitreous cavity or subretinal space. After settling in the intraocular level, the toxins and the proteins in the vesicle are released through the cyst's wall, generating an inflammatory reaction. The first stage of cysticercosis exhibits retinal edema, exudation, and hemorrhage. Infiltration of macrophages and eosinophils can be observed in each of the retinal layers. As the lesion develops, lymphocytes and plasma cells infiltrate the vitreous body, retina, and choroid, causing severe uveitis, vascular occlusion, vitreoretinal proliferation, and exudative retinal detachment. Once the vesicle breaks and the parasite dies, a great amount of toxins are released into the vitreous body, causing increased intraocular inflammation that can lead to complications such as glaucoma and cataract [11].

Signs of anterior uveitis can be observed in approximately 30% of the cases. The most common posterior segment findings are vitritis in 84–100% of the cases, retinal detachment in 54%, rupture of the cyst, vitreous traction, epiretinal membrane, optic nerve edema, and other less frequent symptoms such as retinal neovascularization, vitreous hemorrhage, and vasculitis. The most common symptom in patients with intraocular cysticercosis is decreased vision that occurs in 93% of the cases [4, 5]. Other symptoms that may appear are conjunctival hyperemia and pain. The majority of patients have visual acuities of 20/200 or worse at the time of the diagnosis; however, the range is between 20/20 and luminous perception [4, 5, 7].

The majority of authors agree that the treatment of choice is surgical management. Different techniques have been described through time according to the location of the cysts. A transscleral approach has been followed in those cases where the cyst is located anterior to the equator. However, the main problem with this technique is the movement of living cysts in response to light stimulus upon conducting an indirect ophthalmoscopy to determine their location. An anatomic success rate of 75% and a functional success rate of 50% have been reported with this surgical approach [5, 12].

Pars plana vitrectomy has been considered the treatment of choice in those cases in which the cysticercus is in a posterior location with respect to the equator; the complete separation of the cyst from the vitreous body and intact removal are the essential steps of this procedure.

Some authors point out that the medical treatment is controversial, as anthelmintic therapy carries a risk of systemic adverse effects and can cause exacerbation of intraocular inflammation when it causes the death of the parasite. However, some reports have found an adequate response to this management with successful visual results using systemic corticosteroids to mitigate intraocular inflammation. Lim et al. [13] reported the case of a 51-year-old male with neurocysticercosis and subretinal cysticercosis clinically and serologically confirmed. Best-corrected visual acuity was 20/400 in the right eye and 20/20 in the left eye. There was a well-defined, white, round subretinal lesion of approximately 5 disc diameters located at the superior nasal periphery of the right eye with overlying vitritis. The serologic test results were positive for cysticercosis antibody. Initial therapy with albendazole 400 mg twice daily for 4 days and 600 mg twice daily for 3 days, followed by 800 mg twice daily for 16 days with prednisolone 80 mg every day was started. The uveitis responded to prednisolone therapy and was tapered as the patient's vision improved over the next 2 months to 20/40. The vision in his right eye was 20/25 30 months after presentation, and the uveitis was quiescent without further treatment [13]. Singh and Singh [14] reported the case of a 24-year-old female who presented with abrupt loss of vision in the right eye of 1 week duration. Best-corrected visual acuity was 5/300 OD and 20/20 OS. In the right eye, a yellow-white subretinal lesion larger than 6-disc area size with adjacent satellite lesions, retinal, and subretinal hemorrhage, and a serosanguineous detachment of neurosensory retina was observed in the posterior pole. A motile larval parasite was seen protruding from the center of the lesion. Ultrasonography demonstrated a focal highly reflective subretinal lesion with aftershadowing. Serological tests were positive for anti-cysticercus. Treatment was initiated with prednisolone 60 mg per day to be tapered by 10 mg per day every week. Albendazole 400 mg twice daily for 2 weeks was advised to be started from day 3 of therapy. A dense, white, plaque-like lesion located at the site of the motile parasite was observed with no activity, indicating the response to albendazole therapy. The uveitis remained quiescent, and the patient's vision improved to 20/400 over the next 2 months.

In the case of this patient, praziquantel was used, which is indicated in cases of neurocysticercosis at a dose of 50 mg/kg/day for 2 weeks. It is a drug that affects the membrane's integrity and function, producing a spastic paralysis of the muscles and rapid vacuolization of

the syncytial tegument in the parasite through an increase in the membrane's permeability to calcium [15].

In this paper, we report the case of a patient with submacular cysticercosis in whom it was not possible to perform surgical management; medical management with anthelmintic was selected with adequate response and good visual results compared with those reported in some series subsequent to surgical management. We consider this to be an alternative treatment option to surgical management in those patients who cannot undergo vitreoretinal surgery. Systemic and local corticoids should be administered simultaneously or previously as they can help reduce the worsening of inflammation induced by the death of the parasite, and thus any associated complications.

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Statement of Ethics

This case study was performed in the Retina and Vitreous Service of the Mexican Institute of Ophthalmology of Santiago de Querétaro, Querétaro, Mexico. It adhered to the tenets of the Declaration of Helsinki and was approved by the Research Ethics Committee of the Mexican Institute of Ophthalmology. The patient gave written informed consent to publish this case, including publication of images.

Disclosure Statement

The authors have no conflicts of interest to declare.

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Author Contributions

All authors are accountable for all aspects of the work and contributed to the design, analysis, and interpretation of the case data, in addition to the drafting and revision of the paper, as well as providing final approval of the version to be published.

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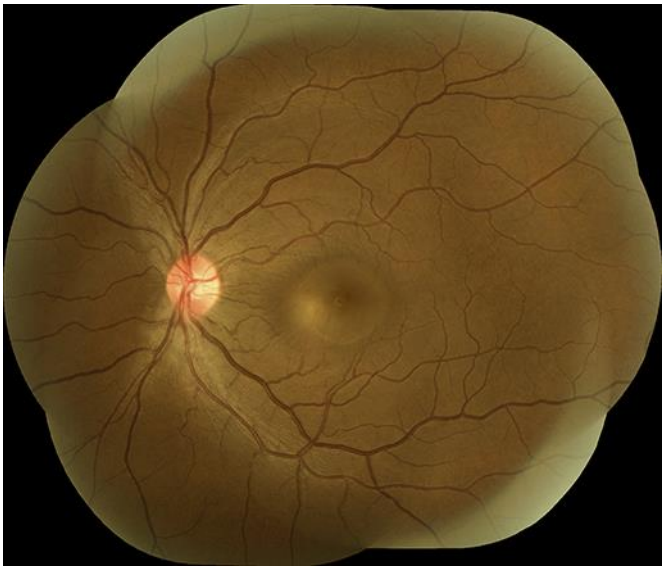

Fig. 1. Fundus photograph of the left eye showing a dome-shaped subretinal lesion in the center of the macula of approximately 2-disc area size. Within this lesion, a whitish-yellowish opacity (scolex) is seen.

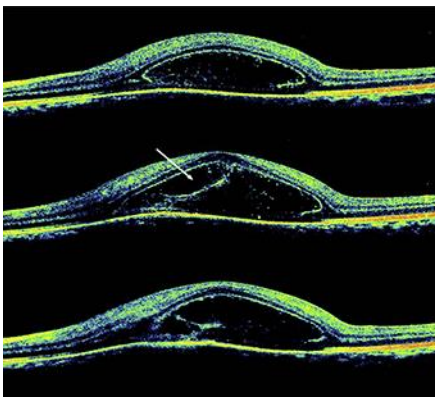

Fig. 2. SD-OCT of the left eye showing a cystic subretinal lesion with low reflectivity. The wall located towards the neurosensory retina is continuous and well-defined, whereas the wall located towards the retinal pigment epithelium is discontinuous and poorly defined. The scolex is seen as an area of high reflectivity in the interior of the lesion (white arrow).

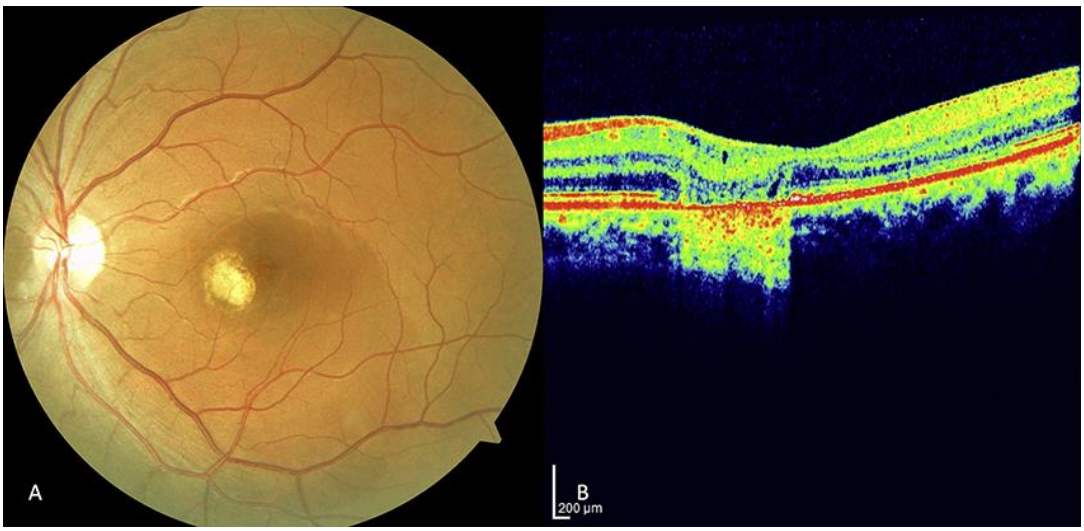

Fig. 3. **A** Fundus photograph of the left eye after conservative medical treatment. Atrophy of the retinal pigment epithelium in the parafoveal nasal region is observed. **B** SD-OCT of the left eye after conservative medical treatment. Note areas of atrophy of the external retina in the nasal macular subfields.