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ABOUT COVER

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WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

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Choroidal metastatic mucinous abscess caused by *Pseudomonas aeruginosa*: A case report

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Abstract

BACKGROUND

Pseudomonas aeruginosa (*P. aeruginosa*) is considered a common pathogenic bacterium. Choroidal metastatic mucinous abscess caused by *P. aeruginosa* is rarely reported.

CASE SUMMARY

We describe the diagnostic and treatment processes of a case involving a complex choroidal space-occupying lesion. Our analyses of early clinical manifestations revealed a high possibility of choroidal melanoma, as indicated by the choroidal space-occupying lesion and uveitis. Further magnetic resonance imaging results revealed no positive evidence for the diagnosis of choroidal melanoma. The exact properties of the space-occupying lesion could not be ascertained prior to surgery. However, the lesion was subsequently confirmed as a metastatic abscess by diagnostic vitrectomy. The occupying lesion was found to occupy 75% of the vitreous cavity in the surgery. The entire white viscous tissue was completely removed, and the necrotic retina was cleaned up. After surgery, microbiological culture revealed mucoid *P. aeruginosa*, which was sensitive to a variety of antibiotics. The bacterial infection grew and disseminated towards the outside of the eye. After the fifth injection, the left eye was successfully retained.

CONCLUSION

This is a peculiar case because a huge, local, space-occupying lesion had formed due to the dissemination of low-toxic mucinous *P. aeruginosa* in the blood from the lungs to the choroid. After surgical removal, the bacteria were able to re-grow; thus, local infection re-spread following surgery. The patient lost vision, but we managed to retain the full structure of the eyeball and eliminated the focus of infection.

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Core Tip: *Pseudomonas aeruginosa* (*P. aeruginosa*) is considered a common pathogenic bacterium. We present herein a rare case of choroidal metastatic mucinous abscess caused by *P. aeruginosa*. This case is peculiar because the abscess formed due to the dissemination of bacterial infection from the lung to the eye and was confined to the choroid. Analysis of blood from the lungs revealed that the *P. aeruginosa* had disseminated into the choroidal blood vessels. Due to the reduced blood flow, the bacteria had reproduced in the choroid and formed a mucinous abscess.

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INTRODUCTION

Pseudomonas aeruginosa (*P. aeruginosa*) is considered a common pathogenic bacterium. We present herein a rare case of choroidal metastatic mucinous abscess caused by *P. aeruginosa*.

CASE PRESENTATION

Chief complaints

A 52-year-old female patient of Han nationality was admitted to hospital on December 18, 2020 due to the primary symptom of pain in the left eye and loss of vision for over 2 wk (Table 1). The patient had felt pain in the left eye since the December 1, 2020 and experienced reduced levels of vision in this eye without any other predisposing factors or causes.

History of present illness

The patient went to a local hospital and was diagnosed with iridocyclitis of the left eye. The patient's symptoms eased after the administration of semi-retrobulbar triamcinolone acetonide injections and hormone eyedrops. However, the symptoms subsequently reappeared with an intensified headache. The acupuncture department of the local hospital performed acupuncture and moxibustion treatment while blocking the trigeminal nerve branch. However, the patient's conditions worsened, and she lost vision in her left eye. Computed X-ray tomography (CT) and magnetic resonance imaging (MRI) examinations identified a space-occupying lesion in the left eye (Figure 1). Consequently, the patient was referred to our hospital for specialist treatment.

History of past illness

Hypertension.

Personal and family history

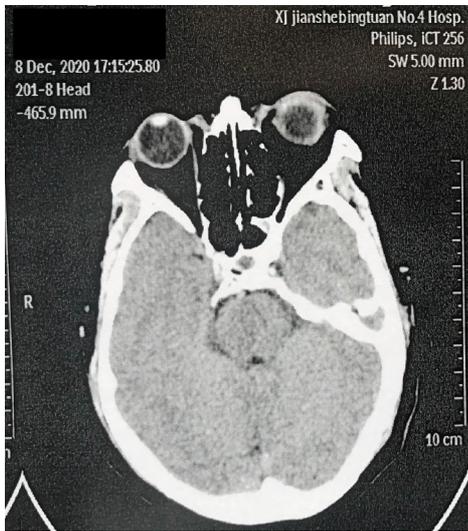
There was no personal and family history.

Physical examination

Physical examination revealed that the visual acuity in the right eye was 0.6; the left eye was reactive to light and the skin on the left upper eyelid was bruised. We also observed conjunctival congestion, a transparent cornea, visible floating cells in the anterior chamber with a small amount of empyema below, mydriasis (5 mm), adhesion to the posterior anterior capsule, and a large number of pigment granules

Table 1 General condition of the patient

	Age	Sex	Occupation	Family history	Previous condition
Patient information	52	Female	Farm worker	None	Hypertension

**Figure 1** Computed X-ray tomography examination in the previous hospital.

adhered onto the surface of the capsule, with a yellow and turbid lens (Figure 2). We were unable to visualize the fundus. There was slight conjunctival congestion in the right eye, a transparent cornea, a clear anterior chamber, a round pupil, positive optical feedback, high lens density, a visible flat retina in the fundus, and unseen light reflection in the central fovea.

Laboratory examinations

None.

Imaging examinations

Ultrasonic biomicroscopy (UBM) examination revealed swelling of the iris root in both eyes, an expanded turbid anterior chamber in the left eye, shallow partial detachment of the ciliary body, and positive suprachoroidal effusion. Anterior segment optical coherence tomography (OCT) revealed closure of the left eye from 7 to 10 o'clock, along with edema and infiltration of cornea. Ultrasound revealed a normal optical axis in both eyes, vitreous opacity in the right eye, and vitreous turbidness in the left eye (potentially indicating hemorrhage). Ultrasound also revealed a choroidal lesion in the left eye. Color Doppler ultrasound revealed a normal optical axis in the left eye and a solid space-occupying lesion within the left eyeball. No valid data could be acquired from the corneal endothelium in the left eye (Figure 3).

Abdominal ultrasound further revealed a fatty liver and a frizzy gallbladder wall, although no abnormalities were detected in the spleen.

Eye CT (with enhancement) revealed slight enlargement as well as prolapse of the lacrimal gland in the left eye (Figure 4). Fusiform images showed a slightly higher density on the inner temporal side of the left eyeball when compared to the right eyeball. MRI examination revealed a thickened left eyelid, an enlarged and prolapsed lacrimal gland, a little oozing around the eyeball, and potential evidence for infectious disease. MRI also revealed a fusiform shadow of abnormal signals on the temporal side of the left eyeball, for which prolapse and hematoma of the choroid or retina were considered (Figure 5). Chest CT examinations revealed bronchiectasis and infection of both lungs, along with the formation of mucus plugs in the inferior lobe of the right lung (Video).



Figure 2 Anterior eye segment photography (left).

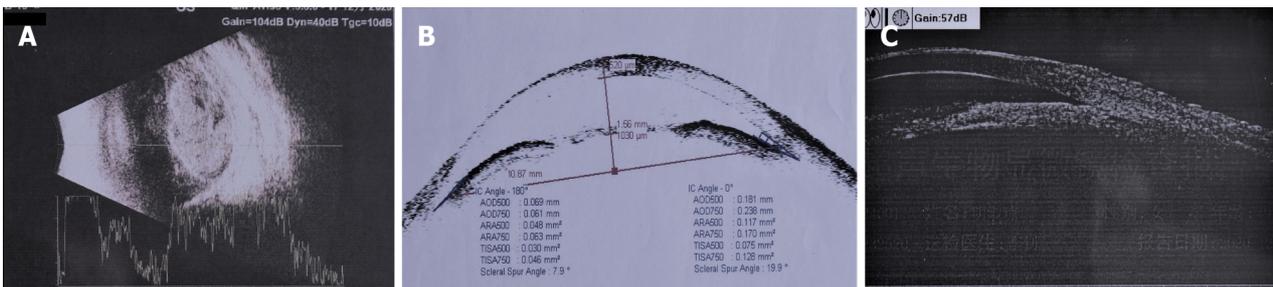


Figure 3 Ultrasonic biomicroscopy examination. A: Ocular ultrasonography showing a normal optical axis in both eyes, vitreous opacity in the right eye, and vitreous turbidness in the left eye (potentially indicating hemorrhage); B: Anterior segment optical coherence tomography showing closure of the left eye from 7 to 10 o'clock, along with edema, and infiltration of the cornea; C: Ultrasonic biomicroscopy showing swelling of the iris root in both eyes, an expanded turbid anterior chamber in the left eye, shallow partial detachment of the ciliary body, and positive suprachoroidal effusion.

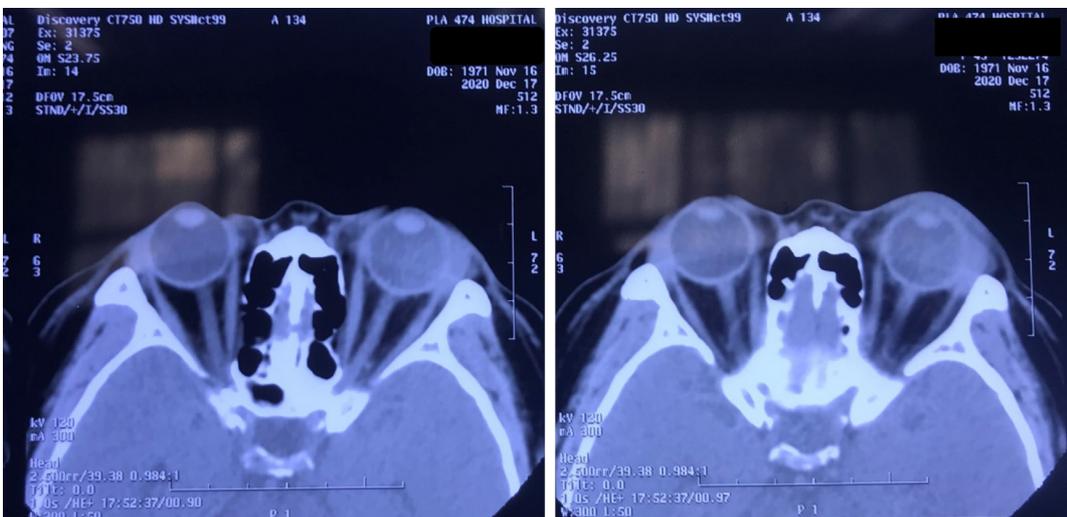


Figure 4 Computed X-ray tomography examination results.

FINAL DIAGNOSIS

According to the diagnosis of uveitis and intraocular placeholder of the left eye and treatment in the local hospital, the conditions of the eye anterior segment, and the auxiliary examination results, our initial considerations for diagnosis were as follows: (1) Masquerade syndrome of the left eye; (2) a choroidal occupying lesion in the left eye [1] (indicating a high possibility of choroidal melanoma); (3) secondary glaucoma of the left eye; or (4) cataract of the left eye. The patient initially presented with uveitis and imaging results revealed choroidal occupation; these observations were in line with the diagnostic criteria for masquerade syndrome. There was a high possibility of

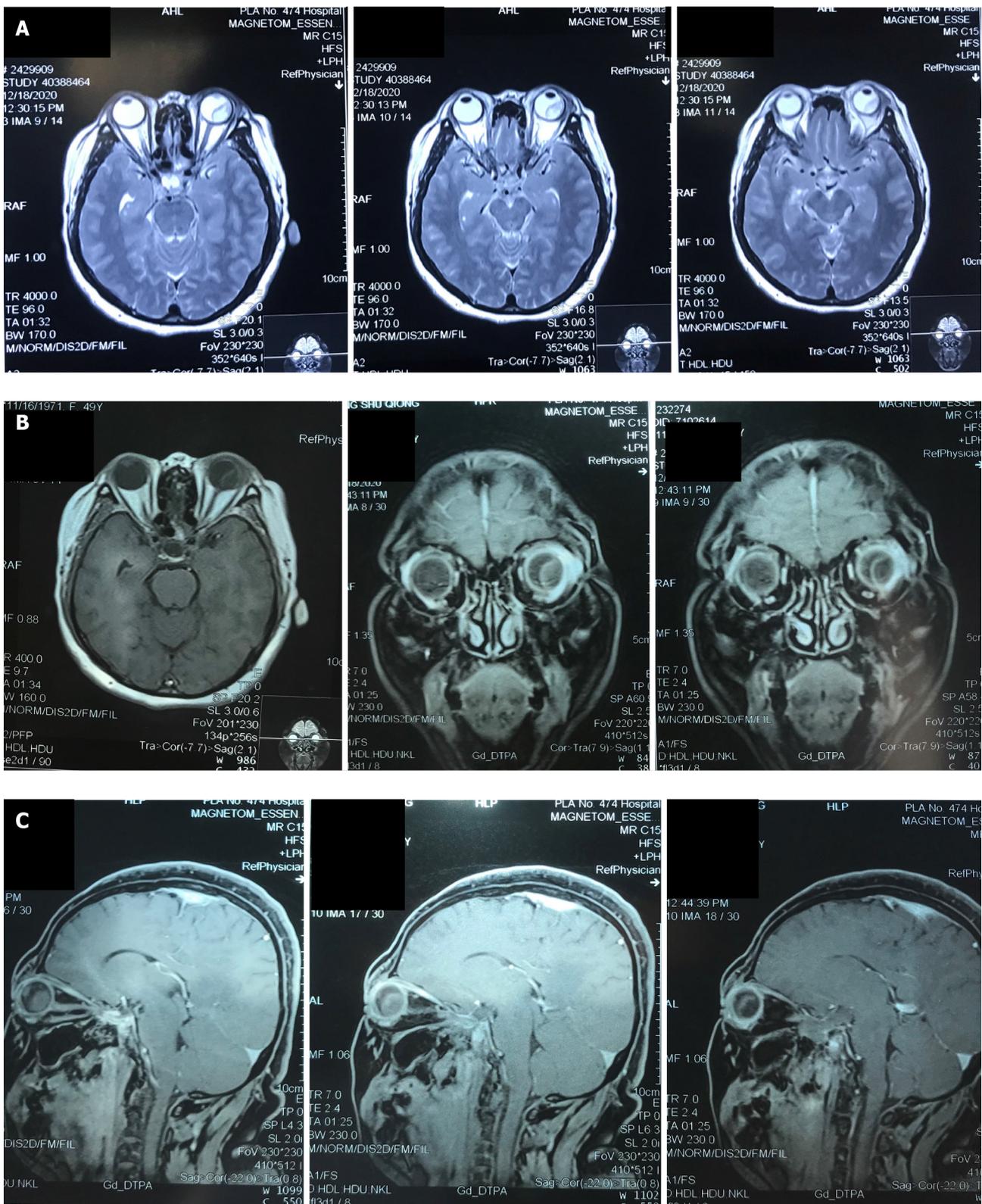


Figure 5 Magnetic resonance imaging examination results. A: Coronal image; B: Sagittal image; C: Transverse image.

a choroidal occupying melanoma. Typical manifestations of high T1 signals and low T2 signals in MRI images, with enhancement, can be used for the specific diagnosis of choroidal melanoma[2]. While preparing for the enucleation of the suspected choroidal melanoma, further MRI results revealed no positive evidence for the diagnosis of choroidal melanoma[3].

The final diagnosis of the presented case is as follows: (1) Choroidal metastatic mucinous abscess of the left eye caused by *P. aeruginosa*; (2) endophthalmitis of the left eye; (3) secondary glaucoma of the left eye; and (4) cataract of the left eye.

TREATMENT

Treatment plan

Further CT and MRI scans (with enhancement) were conducted to fully examine the eyes, brain, and lungs. We also performed eye ultrasound of the corneal endothelium, anterior OCT, UBM, and optometry, and measured the intraocular pressure.

Final treatment

In order to further confirm the differential diagnosis responsible for the tumor and hemorrhage, we performed color Doppler ultrasound examination of the left eye[4]. Blood flow signals were seen in the entire periphery of the occupying lesion (Figure 6). However, there were no obvious blood flow signals in the solid portion in the middle of the lesion. This reduced the likelihood of the lesion being a tumor, although this could not be ruled out completely at this stage. It was not possible to visualize the vitreous cavity in the left eye due to the presence of a cataract. Consequently, we planned to observe the vitreous fundus following phacoemulsification of the cataract and subsequently analyze the nature of the occupying lesion and determine the appropriate treatment method.

As the intraocular pressure increased and foggy edema appeared in the cornea of the left eye, it was considered that if the occupying lesion represented hemorrhagic disease, explosive suprachoroidal hemorrhage might occur if the anterior chamber was placed under pressure during phacoemulsification surgery. If the occupying lesion was a malignant tumor, there was also a risk that the phacoemulsification surgery might lead to the dissemination of tumor cells to the anterior chamber. Therefore, we considered it inappropriate to conduct phacoemulsification surgery.

After comprehensively analyzing the imaging results of the occupying lesion, and by considering the relative advantages and disadvantages, and obtaining the patient's consent, we chose to remove the lens from the left eye and perform diagnostic vitrectomy supported by perfusion of the anterior chamber. This form of surgery could help us to remove the lens while maintaining a relatively safe status and offer opportunities to explore the possible nature of the occupying lesion. This would provide doctors with critical evidence to formulate subsequent decision-making. In addition, this form of surgery could also help us to detect whether the occupying lesion is a tumor or not. As soon as the results were confirmed, it would be possible for us to perform an immediate optical enucleation so as to minimize the risk of tumor cell dissemination.

After careful preparation, surgeons successfully implanted a perfusion system into the corneoscleral tunnel. Once the anterior chamber was stable, surgeons were able to remove the lens. The occupying lesion was found to occupy 75% of the vitreous cavity. It was also found that the surface of the retinal tissues was necrotic and exhibited edema. Following dissection, a large amount of white viscous semi-solid tissue was found in the occupying lesion. The peripheral retina was also necrotic and denatured. The entire white viscous tissue was completely removed, and the necrotic retina was cleaned up. Only a small portion of the normal retinal tissue remained on the nasal side, accounting for approximately 20% of the vitreous cavity. The vitreous cavity was then filled with silicone oil. Necrotic tissues were extracted, and the white viscous tissue was sent for pathological examination and microbial culture (Figure 7).

OUTCOME AND FOLLOW-UP

Three days after surgery, the cornea became bright, and the vitreous cavity turned clear. The scleral tissue, a small portion of the retina, and a small amount of the white viscous tissue became visible (Figures 8 and 9). We then administered an intravenous infusion of cefuroxime to prevent infection. Five days after surgery, pathological analysis was carried out (Figure 10); this revealed necrotic and inflammatory cell infiltration within the tissues of the left eye. Six days after surgery, microbiological culture revealed mucoid *P. aeruginosa*, which was sensitive to a variety of antibiotics (Tables 2 and 3). However, the conditions in the patient's left eye suddenly deteriorated; the anterior chamber showed wide coverage of white turbidity. We were not able to visualize the iris clearly and there was moderate edema in the left eyelid, conjunctival congestion, edema, and headache. MRI revealed thickening of the eye ring and abnormal hillock signals in the rear of the eyeball. After analysis, it was believed that the lesion in the patient's eye was infected with *P. aeruginosa*. Considering the patient's past medical history and the results of CT examination, the patient was diagnosed

Table 2 Bacterial culture and drug susceptibility test results (bacterium name: *Pseudomonas aeruginosa*)

Antibacterial drug	MIC (mg/L)	Sensitivity	Antibacterial drug	MIC (mg/L)	Sensitivity
Cefepime	26	S	Amikacin	20	S
Ciprofloxacin	22	S	Gentamicin	18	S
Imipenem	30	S	Meropenem	26	S
Polymyxin	19	S	Piperacillin	24	S
Piperacillin/Taz	32	S	Ceftazidime	20	S
Aztreonam	24	S	Cefoperazone/Sul	32	S
Ofloxacin	18	S			

MIC: Minimum inhibitory concentration; S: Sensitive.

Table 3 Bacterial culture results of white tissue in the eyeball (bacterium name: mucinous type of *Pseudomonas aeruginosa*)

Antibacterial drug	Method	Outcome	Sensitivity	Antibacterial drug	Method	Outcome	Sensitivity
Aztreonam	KB (mm)	30	S	Piperacillin/Taz	KB (mm)	32	S
Ampicillin	KB (mm)	6	R	Cefepime	MIC (mg/L)	≤ 1	S
Levofloxacin	MIC (mg/L)	1	S	Amikacin	MIC (mg/L)	≤ 2	S
Gentamicin	MIC (mg/L)	≤ 1	S	Imipenem	MIC (mg/L)	2	S
Compound trimethoprim	KB (mm)	6	R	Tobramycin	MIC (mg/L)	2	S

MIC: Minimum inhibitory concentration; S: Sensitive; R: Resistive.

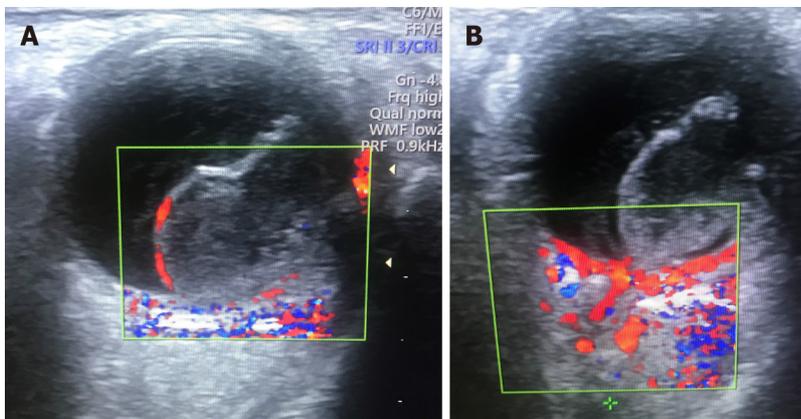


Figure 6 Color Doppler ultrasound examination of the left eye. A: Blood flow signals were seen in the entire periphery of the occupying lesion; B: There were no obvious blood flow signals in the solid portion in the middle of the lesion.

with bronchiectasis and infection. Analysis of blood from the lungs subsequently revealed that the *P. aeruginosa* had disseminated into the choroidal blood vessels[5]. Due to the reduced blood flow, the bacteria had reproduced in the choroid and formed a mucinous abscess. The abscess was removed during surgery. This, combined with the application of silicone oil, and the systemic administration of antibiotics led to the local control of infection. However, the bacterial infection grew and disseminated towards the outside of the eye. This induced inflammation in the eye and the surrounding tissues. Following discussion, we adjusted the systemic medication and administered more sensitive antibiotics and performed five consecutive injections of ceftazidime, vancomycin, and dexamethasone into the vitreous cavity[6]. If the infection had not been controlled effectively, we would have had to enucleate the left eye. Fortunately, after the use of systemic antibiotics, the patient’s symptoms improved significantly, particularly after the third injection into the vitreous cavity

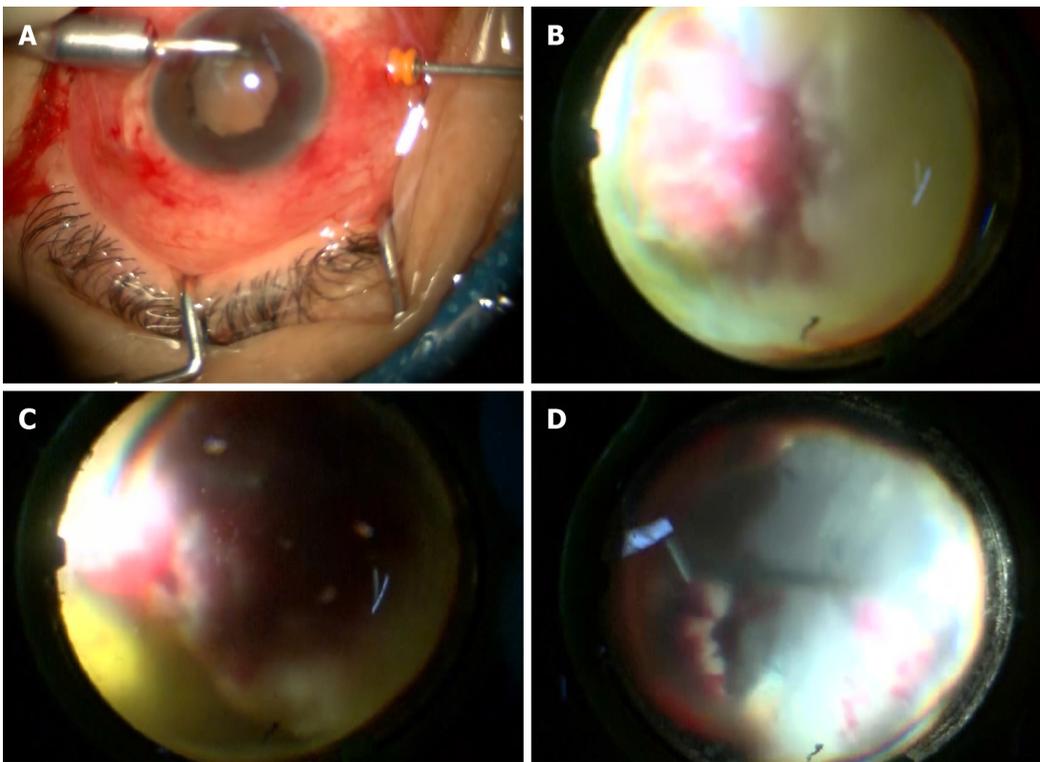


Figure 7 Imaging screenshots during surgery. A: Placement of a perfusion system into the corneoscleral tunnel; B: The occupying lesion was found to occupy 75% of the vitreous cavity; C: The peripheral retina was necrotic and denatured; D: The entire white viscous tissue was completely removed, and the necrotic retina was cleaned up.

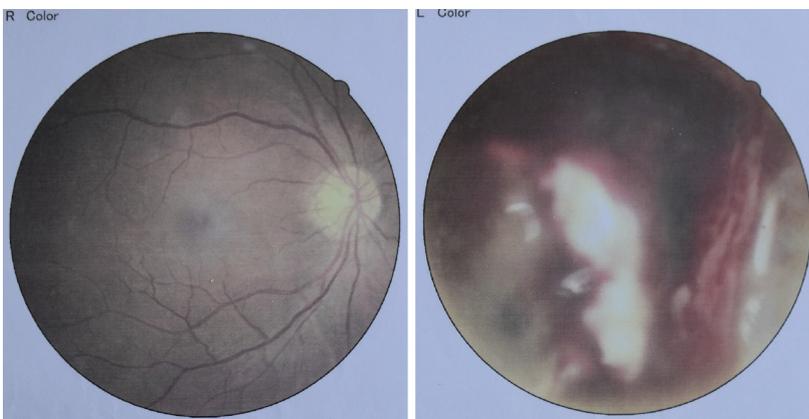


Figure 8 Fundus imaging photographs taken 3 d after surgery.

injection. After the fifth injection, there was further improvement and the condition stabilized (Figure 11). The left eye was successfully retained, and the patient was discharged 3 d later.

DISCUSSION

The patient was admitted to the hospital with an occupying lesion in the left eye. In the context of unsupported imaging evidence, we considered other measures to analyze and diagnose the nature of the occupying lesion. However, as the patient's condition was complicated by a severe cataract, the nature of the occupying lesion could not be diagnosed by observation through the fundus and observing its appearance. Therefore, the key to addressing the occupying lesion is to consider the balance between eliminating the occupying lesion, preserving the eyeball, and diminishing the chance of dissemination if the occupying lesion is malignant[7]. It is

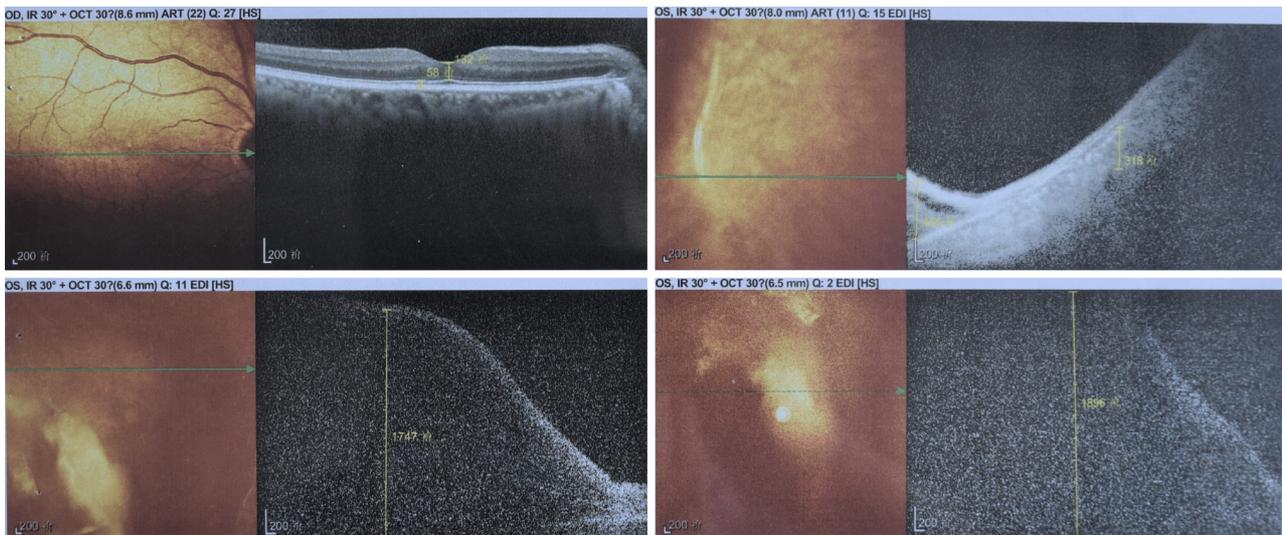


Figure 9 Optical coherence tomography imaging taken 3 d after surgery.

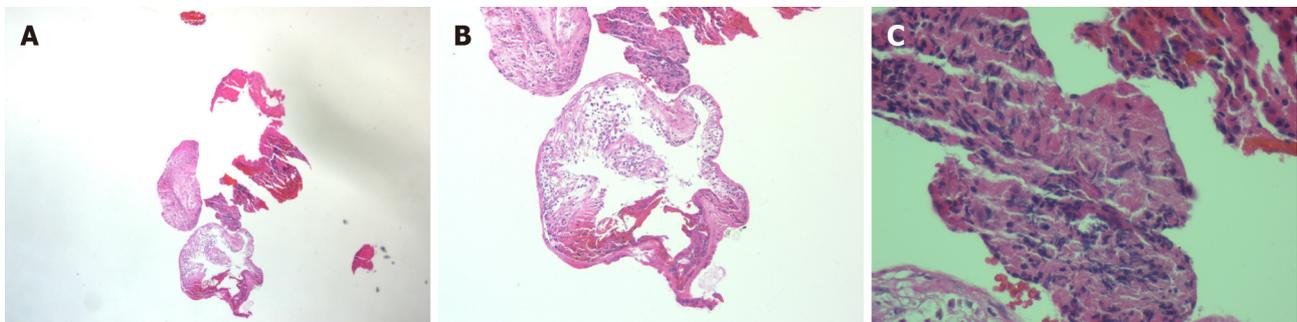


Figure 10 Pathological results derived from the removed lesion. A: Magnification of 10 × 5; B: Magnification of 10 × 10; C: Magnification of 10 × 40.

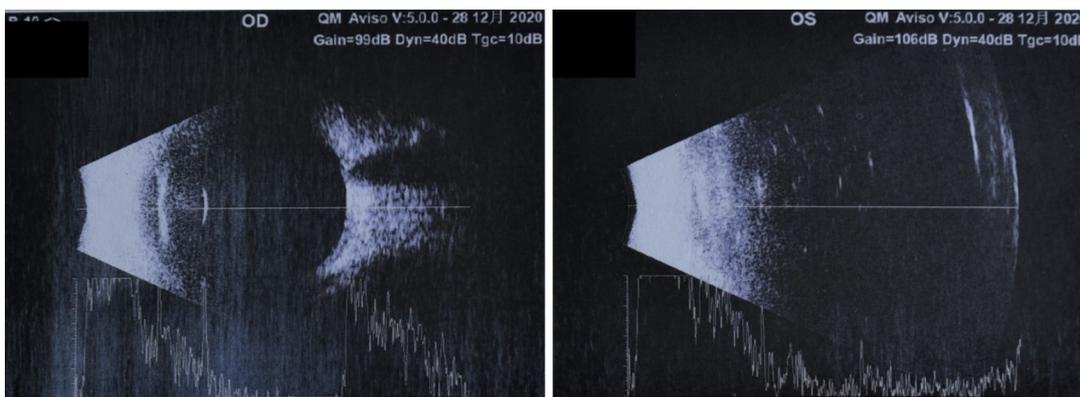


Figure 11 Postoperative ultrasound results.

important to consider these options to decide upon a definitive treatment option. By considering the available data[8], we decided to remove the lens and perform diagnostic vitrectomy to identify the nature of the tumor. If the tumor turned out to be malignant, it would be possible to perform enucleation immediately in order to reduce the chance of dissemination. This solution considered all associated factors in a systematic manner. During surgery, we observed a flocculent viscous tissue that had engulfed the retina. After complete resection, the tissue was sent for pathological examination and laboratory testing. Pathological analysis revealed the presence of *P. aeruginosa*. Comprehensive analysis of systemic conditions and preoperative examination results, in combination with the primary symptoms of bronchiectasis and

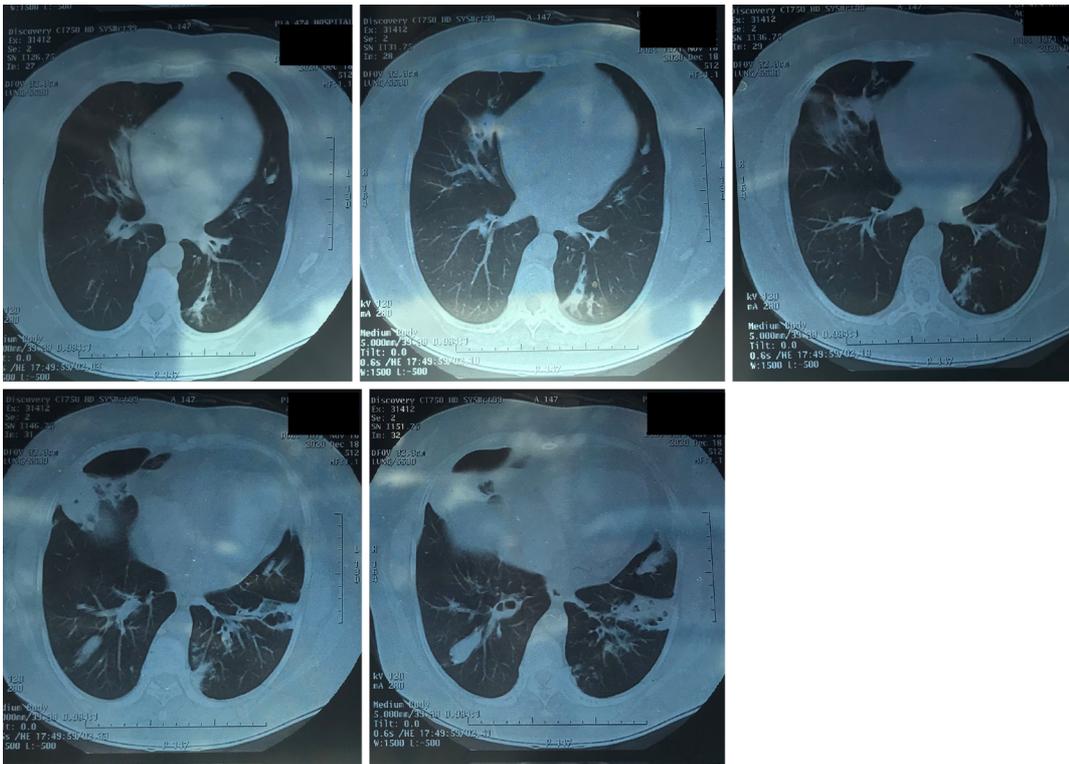


Figure 12 Retrospective lung computed X-ray tomography examination at admission.

infection with viscous emboli in the lung, revealed the clear potential for hematogenous dissemination. In addition, the structure in the choroidal cavity also limited inflammation in the eye and thus created an abscess cavity. This case is peculiar because the abscess formed due to the dissemination of bacterial infection from the lung to the eye and was confined to the choroid (Figure 10). Because this abscess occupied such a large space, it was impossible for us to diagnose its full nature by auxiliary means. After surgical removal, the abscess cavity was opened. As a consequence, the bacteria were able to re-grow; thus, local infection re-spread following surgery. Fortunately, microbial testing and drug susceptibility tests indicated the appropriate form of antibiotics to administer systemically. Furthermore, continuous injections into the eyeball were successfully able to control the infection. With the combined effect of silicone oil and antibiotics, the infection was finally controlled. Although the patient lost vision, we managed to retain the full structure of the eyeball and eliminated the focus of infection.

CONCLUSION

It is evident that there is an urgent need to identify the exact nature of any occupying lesion. If there is an insufficient body of evidence, diagnostic surgical treatment can be conducted, if surgical indications are satisfied. Moreover, when this type of surgical treatment is conducted, doctors must consider the possibility of re-infection, as seen in the present case. The present case indicates that ophthalmologists must be open-minded when diagnosing and treating their patients. While seeking solutions to ophthalmological problems, ophthalmologists should also consider systemic problems rather than solely focusing on problems associated with the eyes. Furthermore, the impact of systemic problems can extend into local areas. Consequently, it is important that physicians consider their options from both a local and systemic point of view. The successful treatment of the current case highlights the importance of analyzing difficult ophthalmic cases by combining multidisciplinary therapy diagnosis, different treatment options, and the relative benefits for the patient. These considerations will allow us to generate a feasible treatment plan that is safe and effective.

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