

## FAITS CLINIQUES

# Infectious complications of open globe injuries with vegetal intraocular foreign bodies

Complications infectieuses des traumatismes à globe ouvert avec corps étranger végétal intraoculaire

Zgolli Hsouna, Abdelhedi Chiraz\*, Fekih Olfa, Mekni Manel, Malek Ines, Zghal Imene, Nacef Leila.

Department A, Hedi Raies Institute of Ophthalmology (Tunis, Tunisia)  
Faculty of Medicine of Tunis, University of Tunis El Manar, Tunis, Tunisia

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| <b>Key-words</b><br>intraocular foreign body; vegetal; infections; open globe injury | <b>Abstract</b><br><p><b>Purpose.</b> This study aims to discuss the risk factors, microbiological microorganisms, and therapeutic strategies for infectious complications associated with intraocular vegetal foreign bodies.</p> <p><b>Methods.</b> Nous avons réalisé une étude retrospective, analytique et comparative incluant 100 patients qui ont été opérés d'ésotropie concomitante. Cinquante cas ont été inclus respectivement dans le groupe Cuppers (Cu) et le groupe chirurgie classique (CC). Les angles pré et post opératoire ont été mesurés aux prismes. Chaque groupe a été divisé en 2 sous-groupes homogènes en selon la valeur de l'angle préopératoire. L'angle post opératoire a été évalué à 3, 12 et 18 mois de suivi. Le succès chirurgical a été défini par un angle post opératoire <math>\leq 10</math> Dp.</p> <p><b>Results.</b> Five cases were identified during the study period. The first case involved endophthalmitis secondary to an open globe injury with an intraocular wooden foreign body. The second case was a subretinal abscess caused by a penetrating vegetal spine. The third case was a panophthalmitis complicating an open globe injury with a posterior vegetal intraocular foreign body. The fourth and fifth patients developed endophthalmitis as a complication of a corneal spine wound</p> <p><b>Conclusion.</b> Infections resulting from vegetal intraocular foreign bodies represent a severe complication and pose a significant threat to visual function, often leading to a reserved prognosis.</p> |
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| <b>Mots-clés</b><br>Orbite, phtyose, kécorps étranger intraoculaire, végétal, infections, plaie à globe ouvert | <b>Résumé</b><br><p><b>Objectif.</b> Cette étude vise à discuter les facteurs de risque, le profil microbiologique et les stratégies thérapeutiques des complications infectieuses liées aux corps étrangers intraoculaires végétaux.</p> <p><b>Méthodes.</b> Une étude prospective a été menée sur une série de patients hospitalisés et pris en charge dans le service A de l'Institut Hedi Raies d'Ophthalmologie de Tunis pour des corps étrangers intraoculaires végétaux entre mars 2020 et mars 2021.</p> <p><b>Résultats.</b> Cinq cas ont été recensés. Le premier cas était une endophtalmie secondaire à une lésion à globe ouvert avec un corps étranger intraoculaire en bois. Le deuxième cas était un abcès sous-rétinien causé par une épine végétale pénétrante. Le troisième cas était une panophtalmie compliquant une lésion à globe ouvert avec un corps étranger intraoculaire végétal postérieur. Les quatrième et cinquième patients ont développé une endophtalmie en complication d'une plaie cornéenne.</p> <p><b>Conclusion.</b> Les complications infectieuses liées aux corps étrangers intraoculaires végétaux sont des complications sévères qui représentent une menace importante pour la fonction visuelle, avec un pronostic réservé.</p> |
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## Introduction

Open globe injury is a leading cause of visual morbidity and blindness, particularly affecting the working population and leading to a significant economic burden [1,2]. Intraocular foreign bodies (IOFBs) are associated with open globe injuries in 18% to 41% of cases [2]. A considerable portion of these IOFBs (58% to 88%) lodge in the posterior segment [2], increasing the risk of visual loss and infectious complications. Vegetal intraocular foreign bodies resulting from open globe injuries pose specific challenges: firstly, they are difficult to detect by tomography as they can mimic air, secondly, they may expose the patient to a higher risk of infectious complications [3].

In this paper, we present a series of five cases involving open globe injuries with vegetal intraocular foreign bodies. Through these case observations, we explore the various types of infectious complications related to vegetal IOFBs.

## Methods

The study was conducted in compliance with the principles out-

lined in the Declaration of Helsinki. Informed consent was obtained from all participants before their inclusion in the study. A prospective study was carried out, involving consecutive cases of patients hospitalized and managed in Department A of the Hedi Raies Institute of Ophthalmology in Tunis, who presented with complicated vegetal intraocular foreign bodies between March 2020 and March 2021. All patients were admitted following emergency consultations, and appropriate antibiotic therapy was initiated. The decision to perform vitrectomy was based on the progression of the condition under antibiotic treatment.

## Results

### Case 1

A 21-year-old man presented to our emergency room with ocular trauma. The patient accidentally sustained an injury to his left eye from being poked by a tree branch two hours before seeking medical attention. The ophthalmological examination revealed

\*Corresponding author:

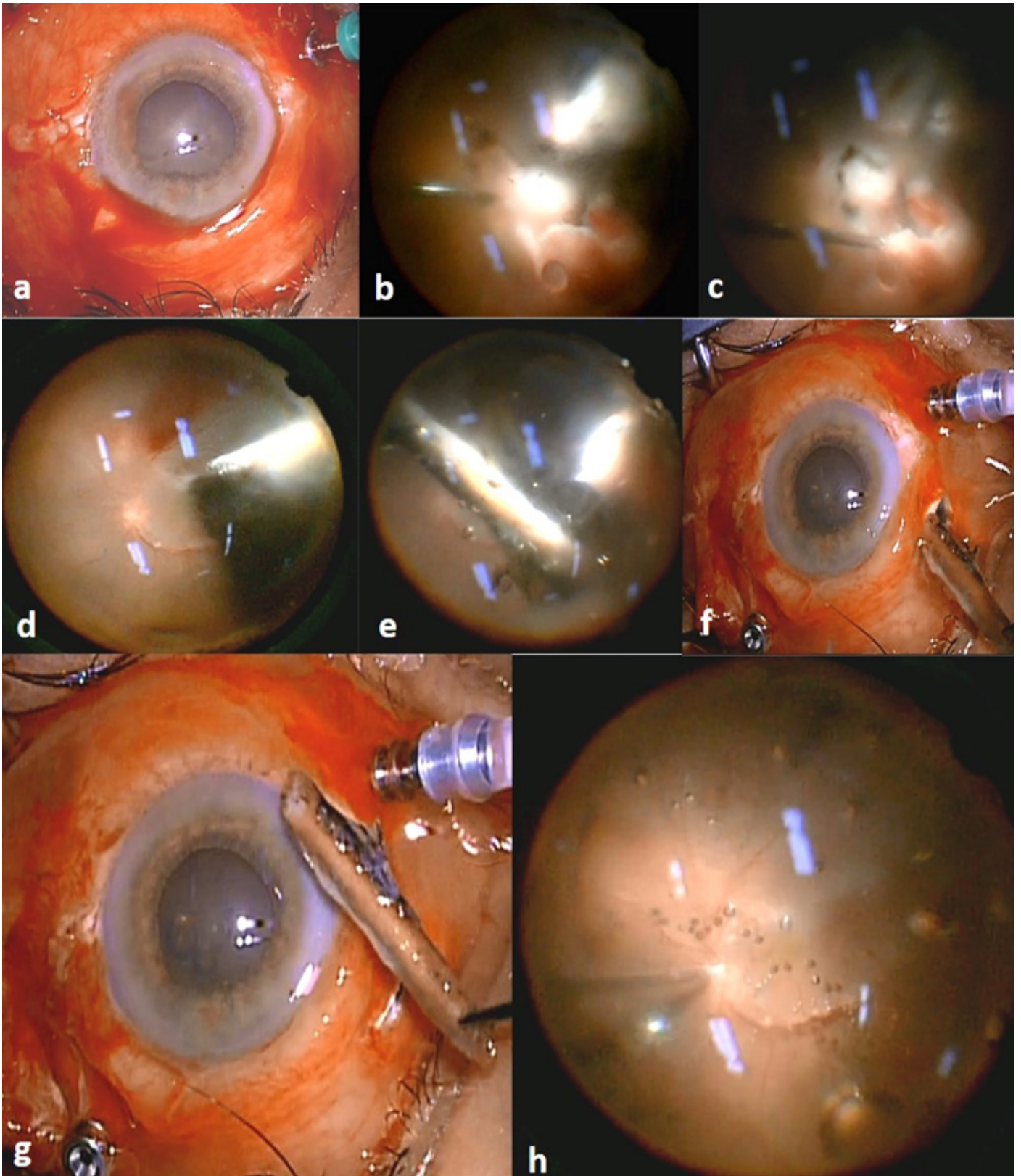
Chiraz Abdelhedi

E-mail: chirazabdelhedi1992@gmail.com

Department A, Hedi Raies Institute of Ophthalmology, Faculty of Medicine of Tunis, University of Tunis El Manar, Tunis, Tunisia

limited visual acuity with only light perception, a linear scleral wound measuring 2 mm in length, and clean edges. A piece of intravitreal tree branch was visible through the wound and the globe was slightly hypotonic. The cornea, iris, and lens appeared normal. Initial treatment involved emergency suturing of the sclera. Due to the difficulty of extracting the piece of tree branch through the wound, it was left in the vitreous cavity. However, three days after the surgery, the patient developed clinical endophthalmitis (**Figure 1a**). An immediate pars plana vitrectomy was performed,

during which the intraocular wood was removed through the sclera (**Figure 1b, c, d, f, g**). To prevent the risk of retinal detachment, silicone oil tamponade was used (**Figure 1h**). Intravitreal antibiotics were administered at the end of the vitrectomy. Both vitreous sampling and mycobacteriological examination of the vegetal spine revealed the isolation of *Staphylococcus aureus* sensitive to ceftriaxone (third-generation cephalosporin). The patient received broad-spectrum intravenous antibiotics and responded well to the treatment.



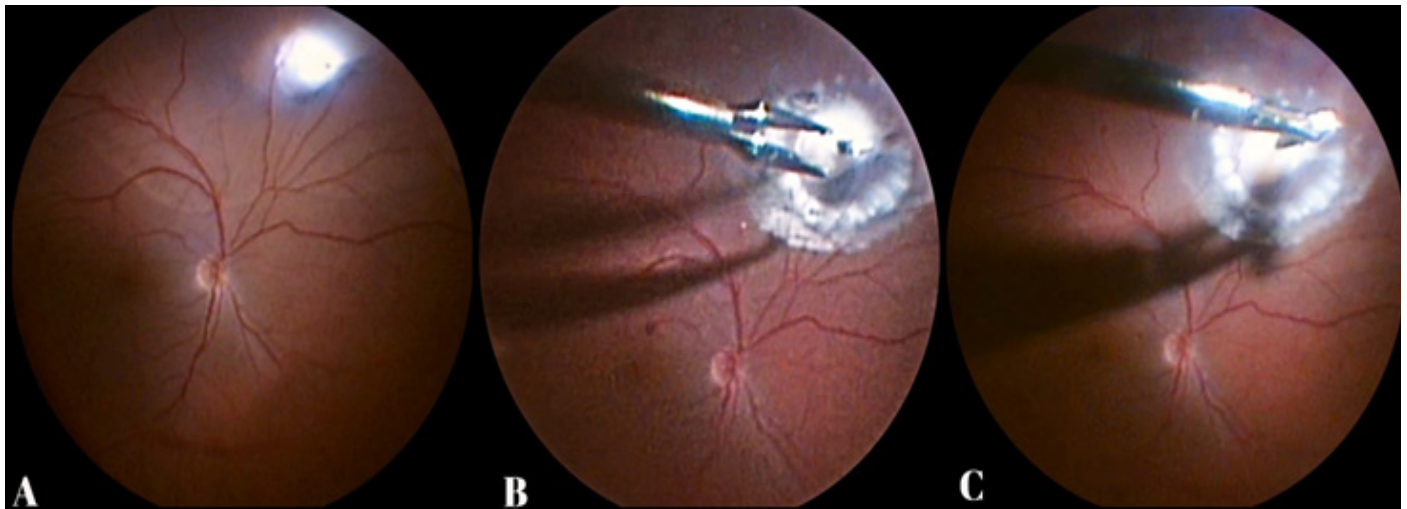
**Figure 1.** A 21-year-old man accidentally poked in the left eye with a tree branch. (a) clinical endophthalmitis; (b) central and peripheral vitrectomy. (c) posterior hyaloid dissection. (d,e,f,g) foreign body extraction with foreign body forceps by T sclerotomy. (h) silicone oil tamponade.



### Case 2

A 46-year-old man presented to the emergency room with visual blurring in the left eye (LE). The patient reported being hit with hay four days ago. The visual acuity of the LE was 6/10. Slit-lamp examination of the LE revealed a temporal black spot located less than 4 mm from the limb, with a transparent cornea and a normal anterior chamber. On fundus examination, a deep whitish solid granuloma was observed in the upper nasal area, centered around a blackish head, and associated with superior retinal detachment (**Figure 2a**). A diagnosis of vegetal intraocular foreign body with retinal abscess was made. The patient received intravenous antifungal and antibiotics treatment. A pars plana

vitrectomy was performed 48 hours later. The procedure involved central vitrectomy, extraction of a hay thorn using forceps, and minimal aspiration of a greyish-gelatinous liquid from the granuloma (**Figure 2b**). Silicon oil tamponade was performed after aspirating the subretinal liquid through an iatrogenic retinal tear. Retinopexy of the tear and the granuloma was also carried out. The myco-bacteriological examination of the subretinal liquid revealed the presence of *Candida albicans*. The patient was prescribed oral fluconazole at a dose of 400mg daily for 10 days. The patient's condition showed significant improvement with good functional and anatomical outcomes, resulting in a final visual acuity of 8/10 and disappearance of the subretinal abscess, which was replaced by retinal atrophy.

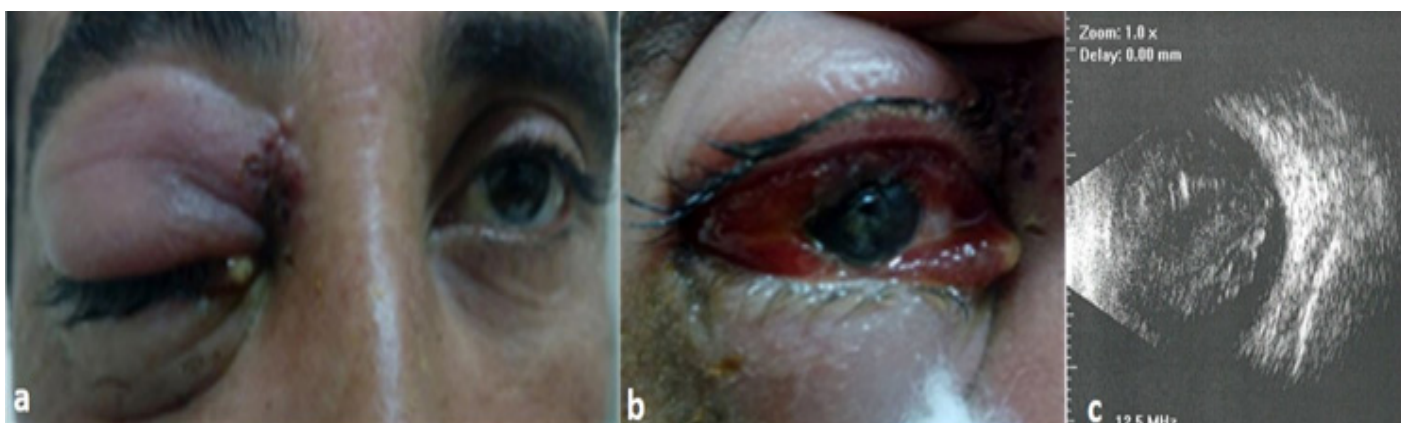


**Figure 2.** Retinal abscess. (A) deep, solid white granuloma reaching the inner layers of the retina, centered by a vegetal spine localized in the upper nasal periphery of the retina, associated to a localized retinal detachment. (B,C) With a 20G forceps, vegetal spine was extracted through sclerotomy.

### Case 3

A 33-year-old man presented to the emergency room 12 hours after sustaining a penetrating ocular trauma to his right eye (RE) from a tree branch. Slit-lamp examination of the RE revealed inflamed eyelids, episcleritis, a soiled corneal wound, and hyphema. The patient underwent immediate surgery, which included wound trimming, washing of the anterior chamber, aspiration of crystalline masses, and suturing of the corneal wound. Postoperative B-mode ultrasound revealed hyper-echogenicity in the vitreous (**Figure 3a**). The patient received immediate treatment with cefotaxime 1 gram every 8 hours, along with a fluoroquinolone and vancomycin, in addition to ceftazidime locally.

Two days after surgery, the patient developed a painful edema on the right side of his face with massive palpebral edema, exophthalmos, chemosis, and ophthalmoplegia (**Figure 3b, c**). An emergency CT scan was performed, confirming the diagnosis of post-traumatic panophthalmitis. An intravitreal foreign body was suspected based on the CT images. Despite aggressive intravenous antibiotics and eye drops, the patient's condition rapidly deteriorated, leading to the loss of light perception after 24 hours. Vitrectomy was performed, and a vegetal spine was extracted from the eye. A silicone oil tamponade was applied to preserve the integrity of the globe and prevent subsequent evisceration.

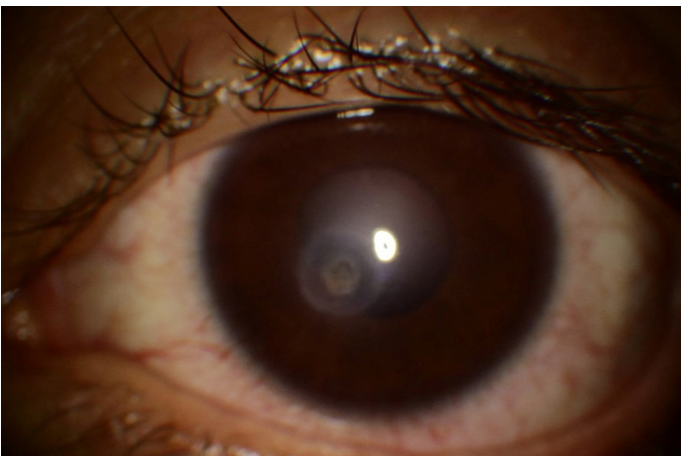


**Figure 3.** Panophthalmitis (a,b) Right hemifacial edema with a massive palpebral edema, exophthalmia, chemosis and ophthalmoplegia, (c) echography B showing hyper-echogenic vitreous with mounded intravitreal collections.

#### Case 4

A 66-year-old woman presented to the emergency room five days after sustaining a trauma to her right eye from a vegetal spine. Her visual acuity in the right eye (RE) was limited to light perception. Slit-lamp examination revealed a linear corneal wound approximately half the corneal diameter in size, athalasia, a cyclitic membrane, and dense cataract. The patient underwent emergency surgery, which involved simple suturing of the wound after trimming and washing the anterior chamber. The anterior capsule of the lens remained intact. Following the surgery, B-mode ultrasound showed a vitreous filled with debris but with an attached retina. Post-traumatic endophthalmitis was diagnosed, and the patient received prophylactic bi-antibiotherapy. Subsequently, a phacoaspiration procedure was performed with implantation of a foldable acrylic lens in the bag, and a 23 G vitrectomy was carried out with silicon oil tamponade. The vitreous sample revealed mycelial filaments. The patient was prescribed voriconazole 400mg per day for 10 days. One month after surgery, the visual acuity in the RE improved to 1/10 on the Snellen chart, and the fundus examination showed an attached retina.

Case 5: A 56-year-old man presented with a plant thorn lodged in his right eye. He had previously undergone cataract surgery and was pseudophakic. The examination revealed limited visual acuity, only able to perceive counting fingers, an inferior nasal corneal abscess measuring 1mm in diameter, and vitreous opacities (**Figure 4**). A sample was taken from the cornea, and the patient was put on general antibiotic therapy along with local eye drops containing vancomycin, ceftazidime, and voriconazole. After 48 hours, a vitrectomy was performed with silicon oil tamponade. The corneal sample showed the presence of *Candida albicans*. The patient was prescribed triflucon 400mg daily for 10 days and received amphotericin B six times daily. One month after surgery, following sterilization of the corneal abscess, the visual acuity had improved to 3/10 on the Snellen chart. There was a peripheral corneal scar, but the retina remained clean and attached.



**Figure 4.** Intraocular deep corneal abscess

#### Discussion

We presented through this paper different figures of infectious complications related to intraocular wooden foreign bodies. IOFBs are a major cause of blindness [1]. Their surgical management remains a challenge for ophthalmologists, given their clinical characteristics and severe complications. The infectious complications, especially the endophthalmitis, a devastating complication of open globe injuries, can completely modify the visual prognosis despite rapid and adequate management [4]. Post traumatic endophthalmitis occurs in 2.7% to 17% of patients with open globe injuries [5]. It will be associated to an IOFB in 48% of cases [5,6]. In fact, the risk of endophthalmitis is great

with retained IOFB [4]. This rate is higher when the IOFB is composed of organic materials [2]. Furthermore, vegetal or wood intraocular foreign bodies associated to open globe injuries are considered as the main risk factors of post traumatic endophthalmitis [2,4]. Fungal or polymicrobial infections are mostly isolated in this concern [7]. However, Bhaduri and al. reported a case of vegetal IOFB, retained into the eye without any complications for 25 years [8]. This was due to a relatively inert foreign body [8]. Retinal abscess is typically defined as an endogenous endophthalmitis known for its poor functional and anatomical prognosis [9,10]. We reported the first case of an exogenous, fungal retinal abscess, related to a vegetal intraocular foreign body. Despite the retinal detachment associated to the abscess, the evolution was good after surgery with satisfying final visual acuity. According to the review of the literature, the subretinal abscess is a solitary, yellowish-white, circumscribed mass-like subretinal lesion associated with retinal hemorrhages and cellular vitreous reaction [10,11]. It is constantly associated to a general septicemia or a primary abscess (liver, lung, brain) [10]. Major risk factors of retinal abscess are immunodepression, diabetes, transplant recipient, patients with auto immune disease or under chemotherapy [12]. The causative microbiological organism is often a bacterium, including *Nocardia* asteroids, Gram-negative rods and *Streptococcus pneumoniae* [10]. Webber and al reported a case of subretinal abscess after lung transplantation. A *Pseudomonas aeruginosa* was isolated and the evolution was bad [13]. In our case, the isolated germ was a *Candida albicans*. Finally, the panophthalmitis, usually associated to intra-orbital foreign bodies, is a rare complication of an intraocular foreign body. It is considered as a dangerous infectious complication that can lead spontaneously to the enucleation. Weng and al reported the case of a chronic panophthalmitis caused by a vegetal IOFB. It was well treated by vitrectomy, extraction of the retinal vegetal spine and silicone oil tamponade with positive results [14]. However, the post traumatic panophthalmitis with vegetable IOFB, known as pyogenic aggressive infection, still an aggressive and devastating complication, which threatens not only the visual function but also the orbital integrity. The therapeutic attitude remains an emergency vitrectomy and extraction of the IOFB. The silicone oil tamponade is a must to prevent the recurrence of the infection. Large intravenous antibiotherapy is mandatorily associated to manage the post traumatic panophthalmitis [14,15].

#### Conclusion

In conclusion, this paper presented a case series of infectious complications associated with vegetal intraocular foreign bodies. The infections related to these foreign bodies are severe and pose a significant threat to visual function, with a reserved prognosis even after surgical intervention. Timely and appropriate management with an effective therapeutic strategy is crucial to achieve a satisfactory final visual recovery for these patients. The findings underscore the importance of early detection, prompt treatment, and vigilant post-operative care to minimize the impact of these infectious complications on visual outcomes. Further research and advancements in treatment modalities are needed to improve the overall management of intraocular foreign bodies and their related infections.

#### Disclosure statement

##### Declaration of conflicting interests

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