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Total Exposure of a Hydroxyapatite Orbital Implant, Five Years after Evisceration: Case Report and Review of the Literature

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Objective: To describe a case of implant complication after evisceration.
Results: The patient was 28 years old with ocular trauma history and evisceration of the left eye five years previously, and placement of an intraocular ball who consulted to the emergency department with left retro-orbital pain and progressive worsening for one month, associated with abundant purulent oozing secretions. The examination of the left orbital cavity revealed palpebral edema, externalization of the deteriorated hydroxyapatite ball, absence of sclera and conjunctiva, and abundant purulent yellowish secretions. The patient underwent emergency lavage. Antibiotic therapy and revision surgery were performed. The evolution was favorable.

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Keywords: Evisceration; beads; antibiotherapy; implant; ball.

1. INTRODUCTION

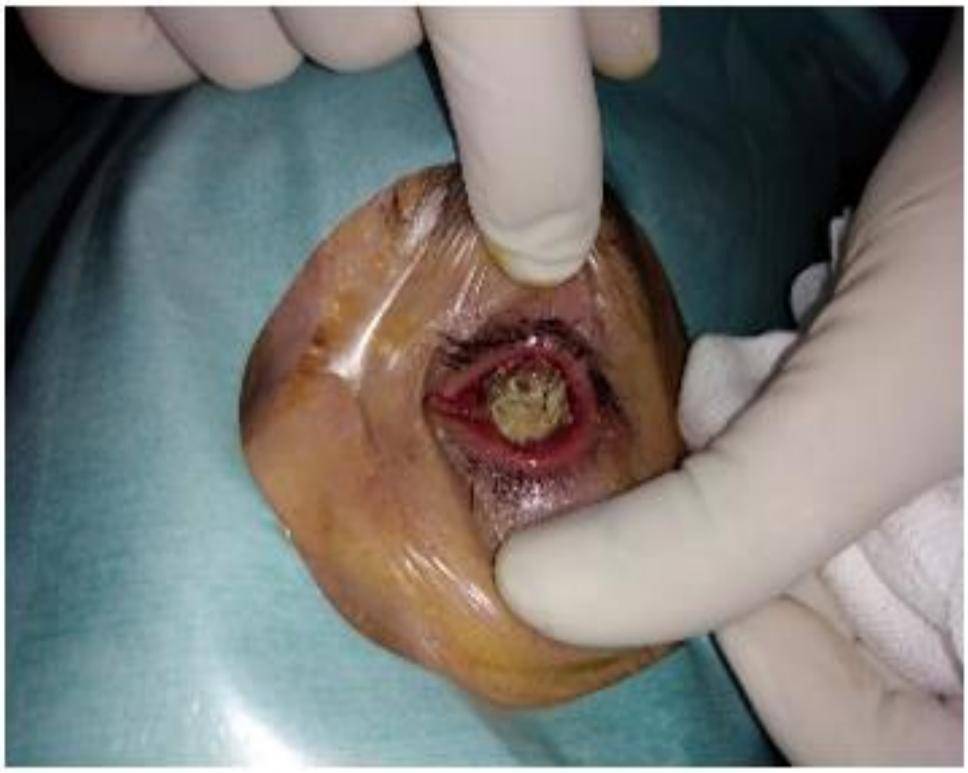
The evisceration is a surgical procedure designed to remove the contents of the eyeball in cases of non-functional, unsightly, painful or phthisic eyes. After evisceration, the orbital volume needs to be reconstituted to restore normal anatomy, which is essential for aesthetic and stable rehabilitation over time. We report the case of a patient admitted for a post-evisceration complication. The aim of our study was to review the potential complications associated with orbital implants and to emphasise the importance of choosing these implants before surgery.

2. CASE PRESENTATION

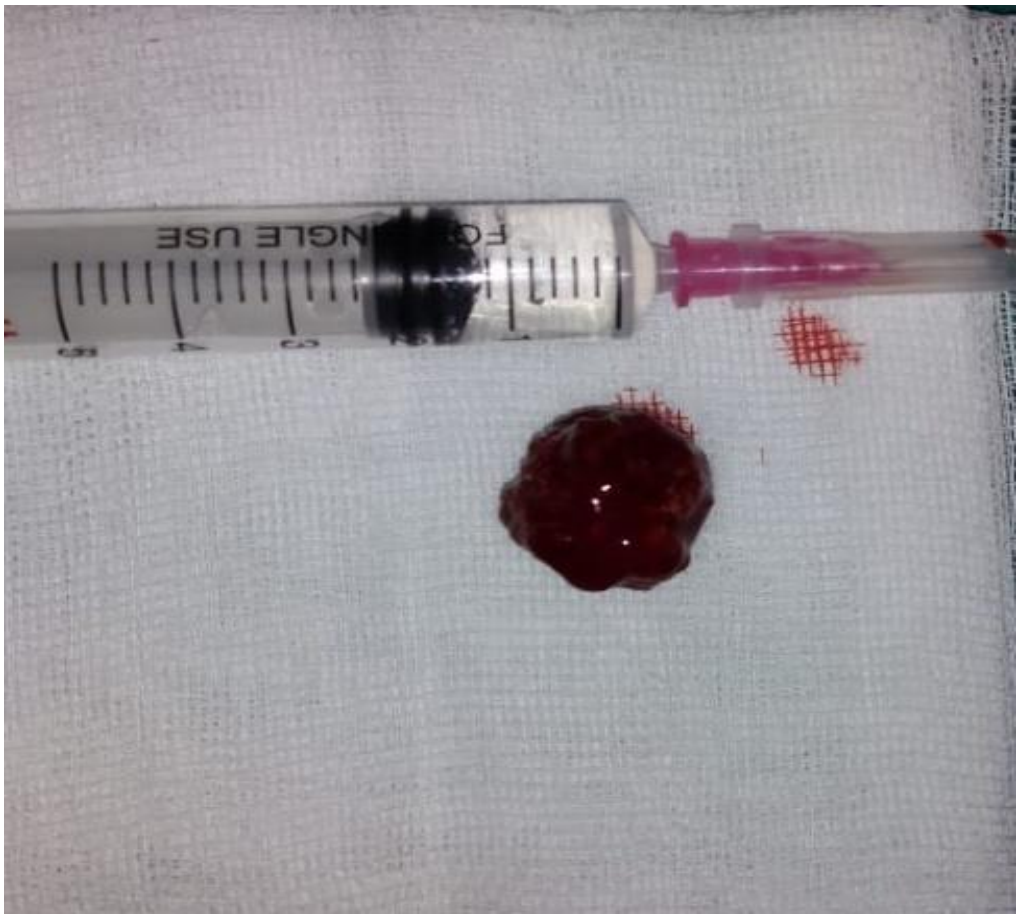
This was a 28-year-old unemployed patient with a history of left eye evisceration performed five years ago following ocular trauma with placement of an intraocular ball. No other pathological history was found. The patient went to emergency with left retro-orbital pain that had been progressively worsening for a month, with redness of the conjunctivae and no other associated signs. As the symptoms worsened with the appearance of secretions, the patient was referred to our centre for treatment. The patient did not report any follow-up after the first year post-surgery.

Examination of the left eye revealed an exposed hydroxyapatite implant with purulent secretions (Picture 1). Examination of the right eye was normal, with visual acuity of 10/10.

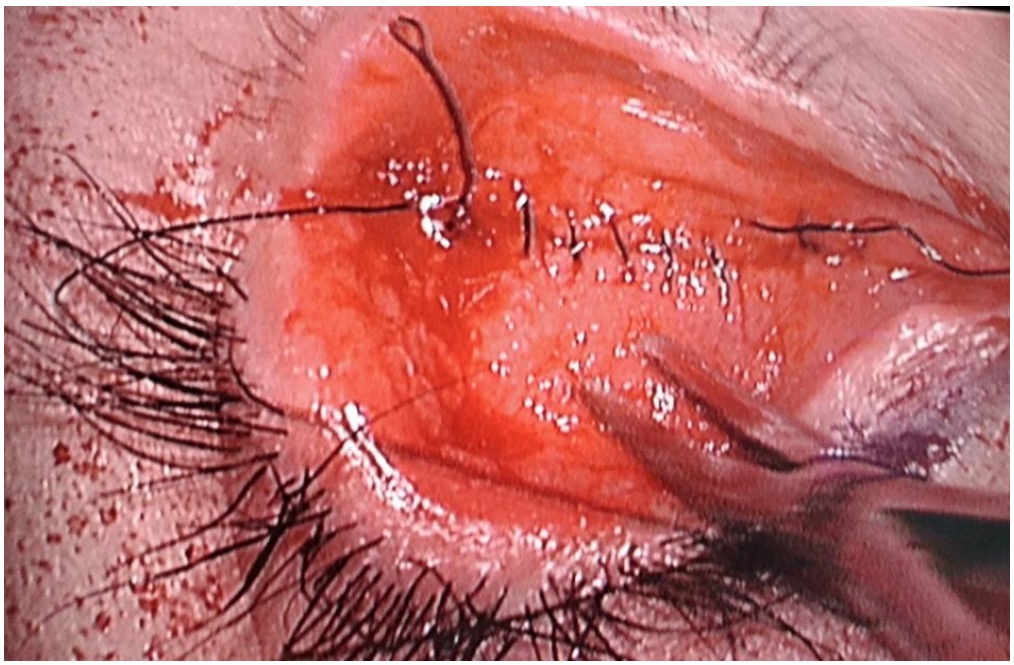
The patient underwent lavage with dilute povidone-iodine and 0.9% isotonic saline, and received probabilistic oral and local antibiotic therapy (Ciprofloxacin eye drops). Surgical revision was performed within a week of treatment and involved removal of the hydroxyapatite ball (Picture 2) and replacement with a silicone ball, suturing of the muscle lamellae (Picture 3) and fitting of a conformer while awaiting a conjunctival graft (with a sublabial flap) planned at a later date. The outcome was favourable.



Picture 1. Image showing the patient's orbital cavity with total exposure of the hydroxyapatite ball



Picture 2. Image showing the hydroxyapatite ball after extraction from the orbital cavity



Picture 3. suture of muscle lamellae after silicon ball implantation

3. DISCUSSION

Mutilating surgery of the eyeball occupies a special place in ophthalmological surgery. It must be performed by an experienced team in order to limit post-operative complications and easily adapt a quality prosthesis [1]. The main cause of anophthalmic surgery is trauma [2].

The most frequent complication is exposure of the implant [3]. The choice of orbital implant remains an important step. It depends on: The diameter of the globe, the surgical technique used (non- or conservative evisceration, table evisceration) [1]. Various types of intraorbital implants exist, but nowadays the biocolonisable implants are the reference: Synthetic hydroxyapatite (HA), alumina, covered beads [1]. According to some authors, the risk of exposure is greater with hydroxyapatite beads [3].

However, it can be difficult to introduce a biocolonisable porous orbital implant of sufficient volume after conventional evisceration. This is why X. Morrel proposed the "four squares" surgical technique, which allows petal-like closure, thus facilitating the implantation of large beads. According to a study of 15 patients, the <<four squares>> technique proved to be effective, with no complications noted for a 12.4-month setback [4]. Furthermore in 2014 Delmas found in his study that the two-stage Müller muscle flap technique allows local treatment of ball exposure using a pedicled autologous flap from the homolateral upper eyelid with good results (68% success rate) [5].

Several complications have been described, the choice of beads must take into account the characteristics of the different beads, the size of the bead but also the long-term cost and therefore the socio-economic level of the patients to avoid additional surgeries for the patients.

Implant exposure is a frequent complication of hydroxyapatite beads [3]. Pathological examination of explanted implants shows intense inflammation adjacent to the area of exposure and proliferation of epithelial cells within the pores of the bead, putting the container at risk of contraction. Rapid intervention and coverage of large exposures will minimise conjunctival contraction [6].

Explantation guarantees the elimination of irritating hydroxyapatite spicules from buried inflammatory and epithelial cells [6]. The rough surface of hydroxyapatite implants causes chronic inflammation, leading in some cases to destruction of the sclera and conjunctiva [7].

Most beads made of glass, PMMA (poly methyl methacrylate) or silicone carry the risk of rejection, infection or allergy, but also because these materials are not capable of being vascularised and colonised by the surrounding tissues and therefore do not allow the oculomotor muscles to be attached directly to the bead [8].

Current intra-orbital beads are made of natural or synthetic hydroxyapatite (HA) [9,10]. This material has the advantage of being partially biocompatible, non-toxic, non-allergenic to humans [11,12] and above all vascularisable and colonisable by the surrounding fibro-vascular tissues due to the existence of intercommunicating pores of regular diameter. There are also intraorbital beads made of hydroxyapatite and tricalcium phosphate, which are not only integrated by the body, but also "digested" and transformed into bone by the body [8].

Nunery studied 137 eyes, comparing the risk of exposure from hydroxyapatite and silicone implants, and found that hydroxyapatite implants were more likely to be exposed after implantation, and this would be due to the greater inflammation they generate [12], unlike some studies which found less exposure with hydroxyapatite beads [4]. The statistical analysis did not include implant size as an exposure factor [12]. Risk factors for exposure include: superficial placement of the implant, absence of sutures, too tight sutures of Tenon's fascia and conjunctiva, infection, use of antimetabolites or radiotherapy [13] , and finally the evisceration itself [14].

Zhao et al. found that after enucleation, ball implantation without xenogene sclera grafting was more beneficial for patients in terms of operative time and cost and reduction in postoperative complications [15]. Wu et al. treated bead exposure with an Enduragen patch graft to cover the implant with successful bead coverage without complications [16]. Some teams use the scleral patch graft and Vicryl mesh as double barriers between the anterior surface of the implants and the overlying soft tissue; this

technique has significantly reduced the rate of exposure in their operations [17]. It should also be noted that Aggarwal had a similar case in a young girl from whom he removed the hydroxyapatite ball and reconstructed it with the amniotic membrane before secondary implantation [18].

4. CONCLUSION

The use of a hydroxyapatite implant is particularly well tolerated, including in the paediatric population. A compromise must be found between the indication, the technique and a sufficient implant diameter for a good aesthetic result to avoid complications.

CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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