

Neurological Symptoms Associated with Longstanding Orbital Foreign Body

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Abstract

A 63-year-old male with a longstanding left orbital metallic welding slag foreign body from a welding injury in the late 1970s presented with fatigue, imbalance, memory difficulties, intermittent ocular pain, photopsias and subjective “fluttering” vision slowly worsening over the last 6 years. Examination revealed best-corrected visual acuity of 20/30 in the affected eye with full extraocular motility and normal anterior and posterior segment findings. Optical coherence tomography of the macula and retinal nerve fiber layer, as well as Humphrey visual field testing, were within normal limits. Computed tomography demonstrated a metallic fragment embedded in the anterior sclera near the medial rectus insertion. Given the accessible location and persistent symptoms, the patient was strongly motivated to proceed with surgical removal after extensive counseling regarding risks. Intraoperatively, a 3 mm metallic foreign body was identified and removed, with repair of a full-thickness scleral defect. On postoperative day 1, the patient reported significant improvement in balance, ocular discomfort and visual disturbances. At postoperative month 1, visual acuity improved to 20/25 with complete resolution of photopsias and subjective visual symptoms. Metallic intraorbital foreign bodies are often managed conservatively, as ocular complications are typically related to initial trauma rather than delayed toxicity; however, anterior or accessible foreign bodies may be considered for removal in symptomatic patients. This case is unique in demonstrating immediate and sustained symptom resolution following removal of a longstanding retained metallic intraorbital foreign body despite normal preoperative objective testing.

Keywords: Retained Intraorbital Foreign Body; Metallic Orbital Foreign Body Removal; Orbital Foreign Body Management; Welding Injury Orbital Foreign Body; Delayed Removal Orbital Foreign Body

Abbreviations

ESR: Erythrocyte Sedimentation Rate; CRP: C-Reactive Protein

Introduction

Intraorbital foreign bodies are commonly encountered in oculoplastic practice and may be broadly categorized as organic or inorganic. Organic materials are associated with a high risk of infection and typically warrant prompt removal, whereas inorganic materials, particularly metallic foreign bodies, are often considered relatively inert and may be managed conservatively depending on location and symptomatology [1]. The majority of morbidity associated with intraorbital foreign bodies is attributed to the initial traumatic event rather than delayed complications [2]. Posterior or intraconal metallic foreign bodies are frequently observed due to the high surgical risk of removal, while anterior or accessible lesions can be considered

for removal with lower threshold, particularly in symptomatic cases [1,3].

Welding-related injuries represent a unique subset of metallic foreign bodies, as welding slag is a heterogeneous material composed of iron oxides, silicates, manganese and chromium, raising concern for local or systemic toxicity. However, there remains limited evidence supporting clinically significant delayed toxicity from retained intraorbital metallic foreign bodies [2,3]. We present a case of a longstanding metallic foreign body, presumed welding slag, associated with persistent subjective neurologic and visual symptoms despite extensive normal ophthalmic testing, with immediate symptomatic improvement following surgical removal.

Case Description

A 63-year-old male presented with a known history of a left orbital metallic foreign body sustained during a welding injury in the late 1970s. The patient reported that the fragment had been retained for decades and had been evaluated by multiple ophthalmologists across the United States, none of whom recommended surgical removal. At current presentation, the patient endorsed a constellation of symptoms including fatigue, headaches, imbalance, ataxia, memory difficulties, intermittent left eye pain, photopsias and subjective “fluttering” visual disturbances. His activities of daily living were significantly impaired and he strongly believed these symptoms were attributable to the retained foreign body and requested surgical removal. Ophthalmic examination demonstrated best-corrected visual acuity of 20/30 in the affected left eye. Extraocular motility was full without restriction. Anterior and posterior segment examinations were unremarkable. Ancillary testing, including optical coherence tomography (macula and retinal nerve fiber layer) and Humphrey visual field testing, were within normal limits. Computed tomography of the orbits revealed a small metallic foreign body embedded in the anterior sclera adjacent to the medial rectus insertion (Fig. 1). Inflammatory markers including ESR and CRP were normal.

Given the anterior and accessible location of the foreign body and after extensive discussion of risks, benefits and the uncertain relationship between the foreign body and systemic symptoms, the patient elected to proceed with surgical removal. Intraoperatively, a 3 mm metallic fragment was identified embedded near the medial rectus insertion (Fig. 2). Removal revealed a full-thickness scleral defect, which was repaired. At the post-operative day one visit, the patient reported immediate subjective neurological improvement in balance, gait, ocular discomfort and visual disturbances. At postoperative month 1, visual acuity improved to 20/25 and the patient reported complete resolution of photopsias and “fluttering” vision changes, expressing high satisfaction with the outcome.

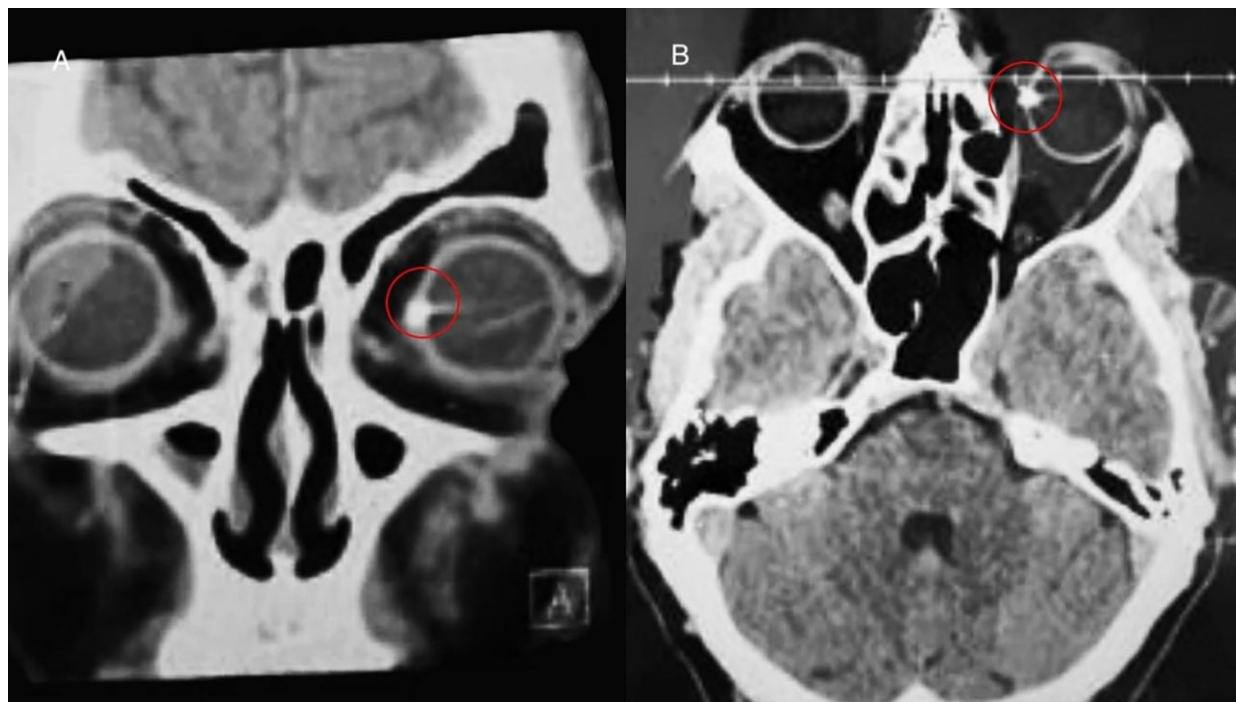


Figure 1: Computed tomography of the orbits revealed a small metallic foreign body embedded in the anterior sclera.

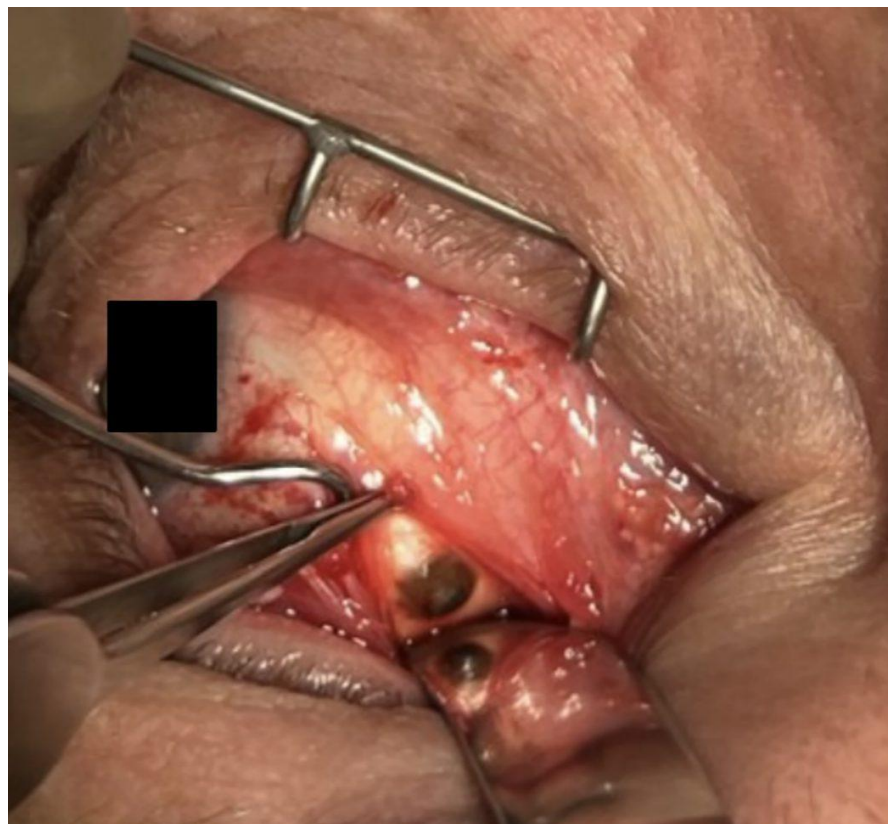


Figure 2: Medial rectus insertion.

Discussion

Management of intraorbital foreign bodies is guided by material composition, location and clinical presentation. Metallic foreign bodies in the orbit are traditionally considered relatively inert and prior studies emphasize that morbidity is most often related to the initial injury rather than delayed toxicity [1]. As a result, posterior or asymptomatic metallic intraorbital foreign bodies are frequently managed conservatively, with surgical intervention typically reserved for cases involving mechanical complications such as motility restriction, optic nerve compression, pain or infection [1-3]. However, this paradigm does not fully account for all clinical scenarios. Anterior or embedded metallic foreign bodies represent a distinct subset, as they are more accessible surgically and may produce subtle or poorly characterized symptoms that are not captured by standard ophthalmic testing. In addition, removal of foreign bodies may be indicated when magnetic resonance imaging is clinically necessary. In the present case, the foreign body was in the anterior sclera near the medial rectus insertion, a location where even minimal movement or local tissue interaction could plausibly result in intermittent irritation or micro-mechanical effects.

Welding slag further complicates this framework due to its heterogeneous composition. Unlike homogeneous metallic pellets, welding slag contains a mixture of iron oxides, silicates, manganese and highly oxidized chromium, raising the possibility of localized oxidative reactions or low-grade inflammatory responses. Iron-containing foreign bodies are known to cause ocular siderosis in intraocular locations, characterized by progressive retinal toxicity [4]. Although similar effects are not well established in intraorbital tissues, the potential for localized tissue interaction remains incompletely understood, particularly over prolonged periods. Although clinical studies of retained orbital metallic (primarily airgun pellets) have demonstrated normal systemic lead levels, systemic toxicity related to welding materials is primarily described in the context of chronic inhalational exposure (e.g., pulmonary siderosis or “welder’s lung”) [2,3,5]. Additionally, welding slag may contain hexavalent chromium (Cr^{6+}), a known neurotoxin and *in-vivo* studies have demonstrated its capacity to cross biologic barriers and induce oxidative stress-mediated neuronal injury, raising theoretical concern for chronic exposure effects [6]. Notably, the patient in this case had a decades-long history of a retained foreign body with normal structural and functional testing yet reported persistent symptoms that were subjectively significant. The immediate and sustained resolution of the patient’s signs and symptoms following removal suggests that standard ophthalmic imaging and functional studies may not fully capture the

clinical impact of certain foreign bodies. While a causal relationship cannot be definitively proven, the temporal association between removal, symptom resolution and functional improvement supports a clinically meaningful effect.

Conclusion

This case highlights that while observation remains appropriate for many retained orbital metallic foreign bodies, symptomatic patients with anterior or accessible foreign bodies may benefit from surgical removal. This underscores the importance of individualized decision-making and suggests that patient-reported symptoms should be considered alongside imaging and clinical findings when determining management.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethical Statement

The study protocol was approved by the Ethics Committee of the Hospital Clínico San Carlos, Madrid, Spain.

Informed Consent Statement

Informed consent was obtained from all participants included in the study.

Authors' Contributions

All authors contributed equally to this paper.

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