

# Complications in transorbital penetrating injury by bamboo branch

## A case report

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### Abstract

**Rationale:** Wooden transorbital penetrating injury is an uncommon and serious trauma that may cause multiply complications.

**Patient concerns:** Here we describe a 62-year-old Chinese woman with a transorbital penetrating injury caused by a long bamboo branch.

**Diagnosis:** Computed tomography scan and magnetic resonance imaging showed the presence of a wooden foreign body.

**Interventions:** Cerebrovascular digital subtraction angiography and temporary balloon occlusion were performed with general anesthesia. Anti-inflammatory therapy was subsequently administered.

**Outcomes:** Retention of wooden foreign body, orbital cellulitis, and traumatic aneurysm at the right internal carotid artery were diagnosed 1 month later. Coil embolization of the right internal carotid artery aneurysm and endoscopic sinus surgery were then performed, and postoperative condition was monitored and recorded.

**Lessons:** Penetrating transorbital injury complications may occur because of retained wooden foreign bodies near the intracranial arteries. Reasonable surgical intervention and special attention should be performed in this kind of trauma.

**Abbreviations:** CT = computed tomography, CTA = computed tomography angiography, DSA = digital subtraction angiography, ICA= intracranial carotid artery, MRI = magnetic resonance imaging.

**Keywords:** carotid artery aneurysms, foreign body retention, orbital cellulitis, transorbital penetration, wooden foreign body

## 1. Introduction

Wooden transorbital penetrating injury is an uncommon and serious trauma, involving damage of both the orbit and its surrounding areas.<sup>[1]</sup> Its complications and clinical features vary depending on the size, shape, and exact position of foreign body penetration. Specifically, a wooden foreign body cannot be easily detected and its residues are commonly retained post-treatment, even after performing radioactive examinations. Subsequently, these wooden foreign bodies may be nidus for orbital infection.

In case of severe complications of wooden transorbital penetrating injury, a multidisciplinary surgical intervention should be immediately performed as an emergency treatment. As case reports on these complications are limited in the literature,<sup>[2,3]</sup> patients were not given discrete recommendations for initial emergent management, and surgical intervention and postoperative care were not properly employed. Therefore, this study aimed to present a case of a patient with penetrating orbital injuries caused by a long bamboo branch and discuss the treatment process of its associated multiple complications.

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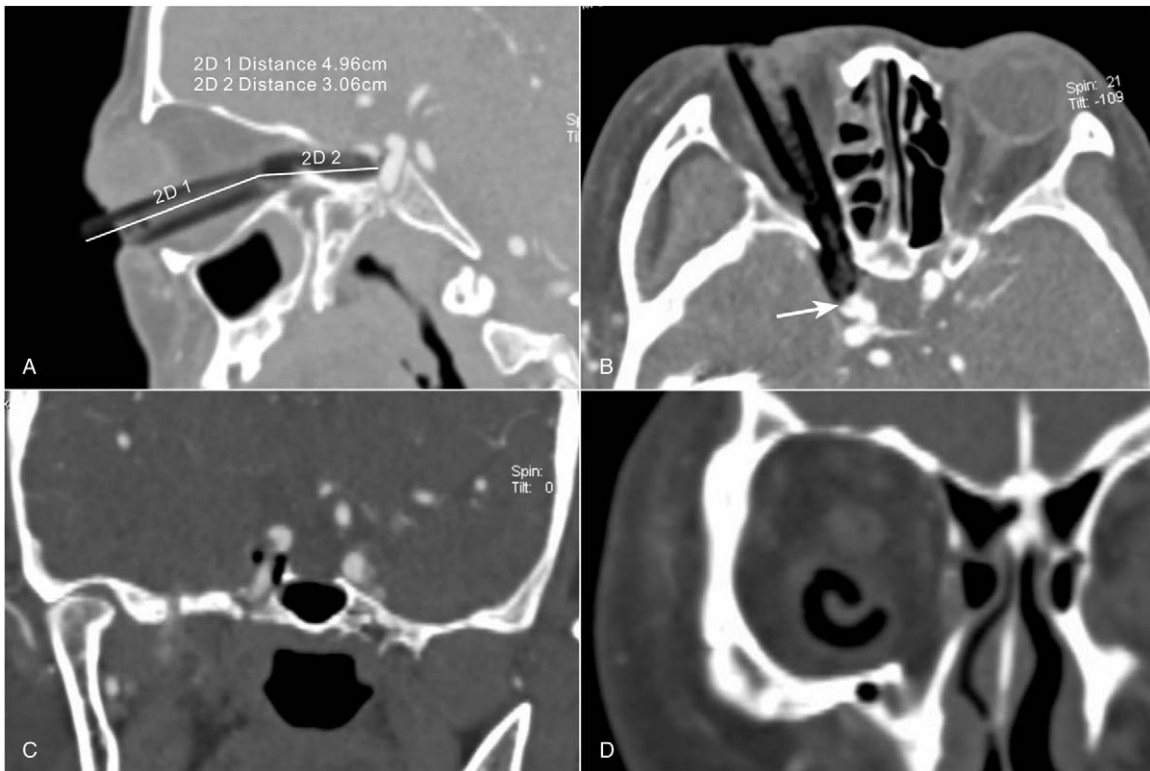
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## 2. Case report

A 62-year-old Chinese woman was transferred to our clinic because of a transorbital penetrating injury caused by a long bamboo branch that had penetrated the right orbit when she fell down on the previous day. Appropriate informed consent in accordance with the Declaration of Helsinki and the Zhejiang Institutional Review Board was obtained from the patient. Head computed tomography (CT) scan in other institution revealed exophthalmus of the right eye and a suspected wooden foreign body through the inferior orbit. Magnetic resonance imaging (MRI) confirmed the presence of a transorbital wooden foreign body. An emergency assessment was immediately implemented. The patient was conscious with stable vital signs. However, the visual acuity of her right eye worsened to no light perception with fixed dilated pupil. The direct light reaction of her left eye was normal, and the consensual light reaction disappeared. She was then diagnosed with optic nerve trauma caused by orbital wooden foreign body penetration. Reconstruction computed tomography angiography (CTA) images demonstrated that a



**Figure 1.** Carotid CT angiography. (A) Sagittal image showing the foreign body with 2 segments.  $D_{2D1}=4.96$  cm,  $D_{2D2}=3.06$  cm. (B) Axial image showing the distal part of the foreign body pushed the right ICA (arrow). (C) Coronal image showing some gas distributed around the cavernous segment of right ICA. (D) Coronal image showing the shape of the bamboo in the orbit forming Letter C. CT=computed tomography, ICA=intracranial carotid artery.

long tubular nonmetallic foreign body passed through the inferior orbital fissure and injured the right cavernous sinus, pushing the right intracranial carotid artery to the rear (Fig. 1). Cerebrovascular digital subtraction angiography and temporary balloon occlusion were performed with emergent general anesthesia, revealing that the length of the wooden foreign body was 7 cm. We isolated the damaged portion of the internal carotid artery prior to removing the foreign body by temporary balloon occlusion. The foreign body was removed from the orbit with minimal blood loss, and angiography showed undamaged internal carotid arteries.

The patient's vital signs were stable postoperatively, with temperature of 37°C and blood pressure of 97/60 mm Hg. Vancomycin 1000mg q12h and ornidazole 0.5g q12h were administered as anti-inflammatory therapy. Blood tests showed that the white cell count was within normal limits and C-reactive protein was 118.9mg/L on the first postoperative day. After treatment, the patient still complained of no light perception. Postoperative MRI with contrast found abnormal signal intensity in the right orbit apex, which was difficult to differentiate whether it was caused by the residues of a wooden orbital foreign body or just the blood and fat. Considering the risk of further examination for wooden residues, anti-inflammatory therapy and close observation were proposed. The patient was finally discharged after 10 days.

She took cephalosporins for 2 weeks as home medications. One week after completing the course of antibiotics, the patient visited our clinic again with complaints of progressive swelling and pain in her eyelid and mouth and nose bleeding for 4 days. MRI scan showed retention of the wooden foreign body in the right orbital cavity and orbital cellulitis (Fig. 2A–D), and reconstructed CTA

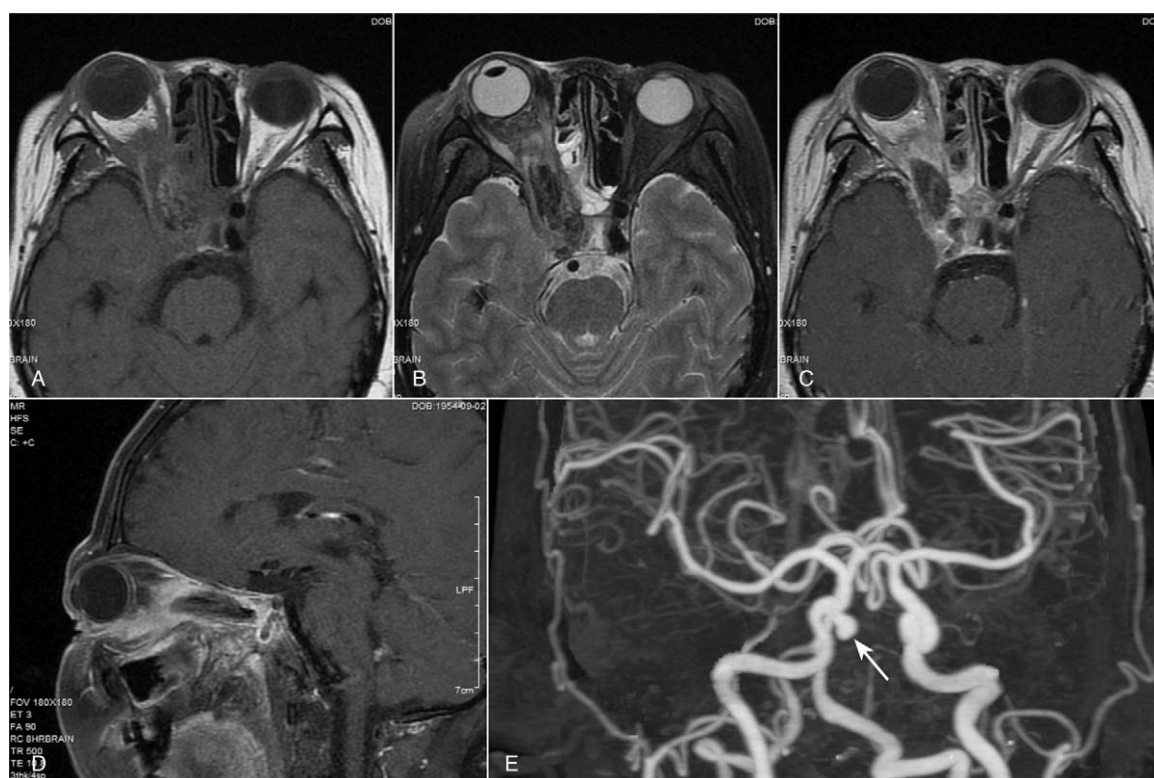
revealed a traumatic aneurysm at the right internal carotid artery (Fig. 2E). Coil embolization of the right internal carotid artery aneurysm was immediately performed. Post-embolization angiography showed non-development of the aneurysm. Endoscopic sinus surgery was performed, which confirmed foreign body retention. The wooden object was extracted during surgery, and the anti-inflammatory treatment was administered. No newly developed complications were observed during the postoperative follow-up conducted six times with 2-week interval, and the patient fully recovered, except for the loss of the right eyesight.

### 3. Discussion

The clinical prognosis of orbital traumas caused by foreign bodies differs depending on their compositions. Wooden foreign body is uncommon and may cause more severe complications than metallic substances, such as foreign body retention, orbital cellulites, and arterial aneurysm.<sup>[4]</sup> It may also cause unilateral optic atrophy through direct trauma and compression on the vascular structures or optic nerve.

Anatomically, the orbit is a skull cavity where the eye, optic nerve, and ophthalmic artery are situated. In case of transorbital penetrating injuries, objects often penetrate the roof of the orbit and damage the brain,<sup>[5]</sup> which commonly resulted in life-threatening effects. Therefore, orbital traumas due to a foreign body may be a neuro-ophthalmologic emergency.

Orbital wooden foreign body is sometimes difficult to diagnose based on radiographic evaluation alone.<sup>[6,7]</sup> CT scanning is usually performed in orbital trauma cases and when foreign body penetration is suspected. Metallic foreign bodies can be easily



**Figure 2.** Brain MRI with contrast. (A) Axial T1WI showing a residual bamboo with low signal intensity in the right orbital apex and right cavernous sinus. (B) Axial T2WI demonstrating even lower signal intensity within the lesion suggesting hemorrhage. (C) Axial contrasted image showing an inconspicuous enhancement pattern. (D) Sagittal contrasted image revealing the surrounding. (E) Brain CT angiography showing a pseudoaneurysm in the anterior knee of cavernous segment of the right ICA (arrow). CT=computed tomography, ICA=intracranial carotid artery, MRI=magnetic resonance imaging.

detected on CT scanning, because of their high density; however, wooden foreign bodies have low density, which makes them difficult to be seen or they were even invisible on CT scan, thereby often leading to misdiagnosis or missed diagnosis. After excluding the possibility of metal foreign bodies, MRI can be performed an open injury with wooden foreign body, which presents low-intensity images. The shape and location of the low-density lesion are extremely helpful in distinguishing retained wood foreign body from other low-density signals on MRI. Nevertheless, missed diagnosis and foreign body residues will still occur even after performing both CT scan and MRI.

Reasonable surgical operation and special attention should be implemented in such cases. First, the phenomenon of wooden foreign body residues commonly occurred. Wooden foreign bodies are also commonly broken when penetrating the orbital cavity or upon their removal. In our case, the bamboo stick was twisted into the shape of letter C. Second, because the wooden foreign body may move, late-onset carotid artery aneurysm, a life-threatening condition, should also be noted. Therefore, the patient should be closely monitored.

### Author contributions

**Conceptualization:** Lei Feng.

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**Investigation:** Biao Jiang.

**Resources:** Jian-ming Hua.

**Software:** Jie Chen.

**Writing – review & editing:** Xiaojun He.

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