

Granuloma of graphite foreign body in conjunctiva simulates melanoma: a case report and literature review

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Dear Editor,

We present a rare case of conjunctival foreign body granuloma simulating melanoma caused by long-term retained pencil core. The pigmented conjunctival mass and eye injury caused by writing instruments are not rare, and retention of graphite pencil lead in different parts of the eye was also reported occasionally, especially in children^[1-4]. However, pigmented conjunctival mass due to graphite pencil lead is very rare. This case reminds us that graphite granuloma should be considered in the differential diagnosis of pigmented neoplasm of the conjunctiva, especially in patients with a previous history of pencil injury. The diagnosis and treatment conformed to the Declaration of Helsinki, and written consent was obtained from the patient.

A 43-year-old man was referred our hospital with a clinical diagnosis of conjunctival melanoma, complaining of a growing pigmented mass on the surface of his right for least 10y. He had no pain and the vision was normal. Carefully inquiring the medical history revealed that his right eye was stabbed accidentally with a pencil 30 years ago. About 10 years ago, a black lesion appeared on the temporal bulbar conjunctiva and enlarged gradually. No treatment was given for mild symptom. On examination, his vision was 20/20 bilaterally,

and intraocular pressure was 13 mm Hg in the right eye and 15 mm Hg in the left eye. Slit-lamp microscope examination showed a clearly defined black mass (approximately 4.0×4.0×1.5 mm³ in size) on the surface of the temporal bulbar conjunctiva of the right eye, which was about 1.0 mm into the limbus. Blood vessels could be seen on the surface of the mass, and the surrounding conjunctiva was hyperemic (Figure 1). The mass is soft in touch, unmovable and with no tenderness. Ultrasound biomicroscope (UBM) revealed thickening of the covering conjunctiva and a strong stripe echo with a length of about 1.5 mm in it, followed by acoustic shadows (Figure 2). His left eye was normal.

Based on the medical history and examination results, an initial diagnosis of conjunctival foreign body granuloma (subconjunctival foreign body) of the right eye was made. Under local anesthesia, the lesion was completely removed and a graphite pencil lead like foreign body with a length of about 1.5 mm was found in it (Figure 3). Histopathologic examination showed the presence of foreign body giant cells, benign manifestation of pigmented epithelioid cells and lymphocytes, etc., which was consistent with the chronic inflammatory changes caused by foreign bodies (Figure 4). The wound healed well and the post-operative vision was unchanged.

Eye injuries caused by writing instruments, such as pens and pencils are not rare, especially in children^[2]. Despite the fact that penetrating wounds are more common, the residues of pencil lead in different parts of the eye are reported occasionally^[1,3-4]. In addition to mechanical damage, graphite or ink deposition, inflammation, endophthalmitis, and granuloma due to restrained pencil lead are common pathological changes^[1-2,4]. The response of foreign bodies depends largely on its composition, and chemically active metals and substances tend to cause severer inflammatory reactions. The pencil lead is mainly composed of graphite and clay, and small amount of aluminum, animal fat, spindle oil, liquid paraffin and silicone oil are added as needed. Graphite is chemically stable and therefore rarely causes inflammation. Honda and Asayama^[1] reported a patient with a pencil lead on the retinal surface, and no obvious reaction was found after 6y of follow-up. In addition, the restrained pencil leads in the anterior chamber or cornea also causes less inflammation^[3,5].

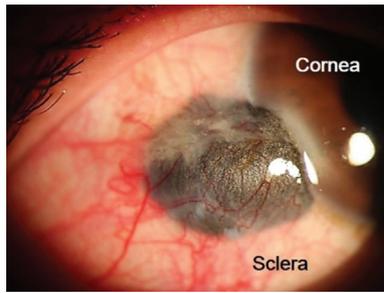


Figure 1 Slit lamp microscope photograph A grayish mass with twisted blood vessels could be seen on the surface of the temporal bulbar conjunctiva of the right eye.

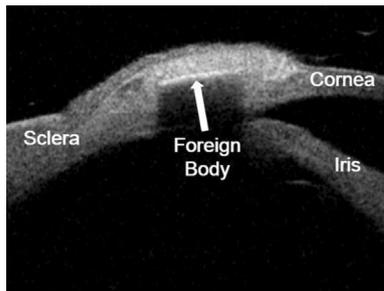


Figure 2 UBM examination image at the initial visit A strong stripe echo with a length of about 1.5 mm which indicated a foreign body (arrow) with a higher density was found in the mass.



Figure 3 Intraoperative specimen The completely removed lesion (top) and a graphite pencil lead like foreign body with a length of about 1.5 mm found in the mass (bottom).

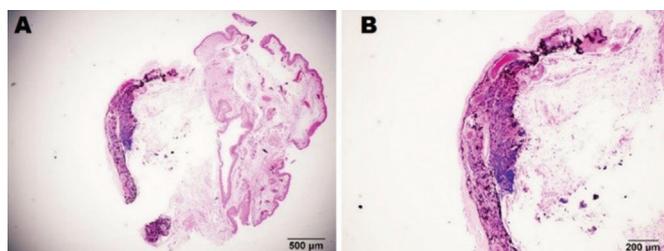


Figure 4 Postoperative histopathological image stained with hematoxylin-eosin A: Low power view showing infiltration of lymphocytes and foreign body giant cells in connective tissue; B: A pigmented membrane was partially visible.

However, there still has debate about the potential toxicity and inflammatory response of other ingredients. Hamanaka *et al*^[6] reported a case of endophthalmitis caused by pencil lead. The patient's vitreous was found to have no bacteria, but

a low concentration of aluminum was detected. Therefore, it is speculated that the endophthalmitis may be caused by the aluminum contained in the pencil lead.

In order to avoid further growing and for aesthetic purposes, the mass was completely removed under local anesthesia. During the operation, one black foreign object with the appearance of graphite pencil lead was found in the lesion, and the soft tissue around it was filled with pigment. Postoperative histopathologic result was consistent with the characteristics of foreign body granuloma, and the pigment was considered to be the diffusion of graphite particles^[7]. Although graphite has less pro-inflammatory properties^[8], 30y of chronic inflammation caused by it and other chemical components still lead to the formation of inflammatory granulomas. In addition, blinking may aggravate this effect. The wound healed well and the vision was not affected postoperatively.

In term of pigmented conjunctival mass, its differential diagnose include conjunctival nevus, congenital or secondary melanosis, scleral staphyloma, prominent choroidal melanoma, and chloasma *etc*^[7,9]. Our patient's lesion presented as a growing vascularized black mass, so it is very easy to be misdiagnosed as melanoma. Based on the history of pencil injury, preoperative UBM examination, pencil core-like foreign bodies found during surgery, and post-operative histopathologic results, the foreign body granuloma caused by the pencil lead was finally confirmed. So, biomicroscopy is of paramount importance in diagnosis of the disease^[10]. In 1985, Guy and Rao^[7] reported a very similar case, a 24-year-old woman with a suspected conjunctival melanoma for 5y who had a history of pencil injury 17y before. Histopathologic examination also confirmed the mass as conjunctival granuloma caused by graphite pencil lead. Unfortunately, there had no picture was provided in the article. So the case we present here is the first similar one with complete pictures and a longer medical history.

In summary, this case suggests that for the dark ocular surface mass, the possibility of pencil lead induced foreign body granuloma should be considered in the differential diagnosis. Detailed medical history inquiry, UBM^[11] or B-mode ultrasound and other examinations are very helpful to rule out this possibility. Of course, the final diagnosis must rely on histopathological result.

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