

Original Research Article

Intracorneal pencil graphite particles following penetrating ocular injuryYusuke Arai¹, Hiroto Obata², Meri Watanabe¹, Mari Miyakoshi³, Satoru Inoda¹, Shinji Makino¹¹Department of Ophthalmology, Jichi Medical University, Tochigi, Japan²Department of Ophthalmology, Saitama Medical Center, Saitama, Japan³Department of Ophthalmology, Graduate School of Medicine and Pharmaceutical Sciences, University of Toyama, Toyama, Japan***Corresponding author**

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Abstract: We present three cases of intracorneal pencil graphite particles following penetrating ocular injury. Slit lamp examination revealed pencil graphite particles in the corneal stroma in all cases. Although we did not remove the particles, no complications occurred during the follow-up period. We assumed that removal of the pencil graphite particles was unnecessary, and it was avoided to prevent the occurrence of irregular astigmatism.**Keywords:** pencil graphite particles, penetrating ocular injury

INTRODUCTION

Ocular trauma is not a rare condition, and is mostly observed in children [1]. Foreign bodies can be seen in the anterior chamber, lens, iris, vitreous, and retina after trauma. They are most frequently seen in the anterior chamber [2]. Pencils are very rare etiologic agents [1]. Graphite pencils are composed of graphite and clay mixed with animal oils and fats, with a wooden casing [3]. The primary component of the pencil lead is fine graphite powder bound together by clay [3]. Few cases of graphite foreign bodies in eyes owing to pencil injuries have been reported [1, 2, 4-7]. To the best of our knowledge, graphite particles embedded in the cornea are extremely rare [1, 6, 7]. Here, we present three cases of intracorneal pencil graphite particles following penetrating ocular injury.

CASE SERIES**Case 1**

An 8-year-old boy was admitted to our hospital with a complaint of decreased vision in the left eye after ocular trauma with a pencil. The patient was accidentally struck in his left eye with a pencil by his friend. Visual acuity (VA) was 0.2 with C -8.00D A90° in the left eye. Slit lamp examination revealed a corneal laceration (Figure 1A, B) and numerous silver-gray pencil graphite particles embedded in the corneal stroma (Figure 1C). Although Seidel test was positive (Figure 1D), corneal suture was not necessary.

We decided not to remove the graphite particles and placed a medical use soft contact lens (MUSCL). The wound was closed, and his VA improved to 1.2 with S +0.25D. No complication occurred during a one-year follow-up period (Figure 2A). Anterior segment optical coherence tomography (OCT) clearly revealed the location and extent of the intracorneal pencil graphite particles (Figure 2B).

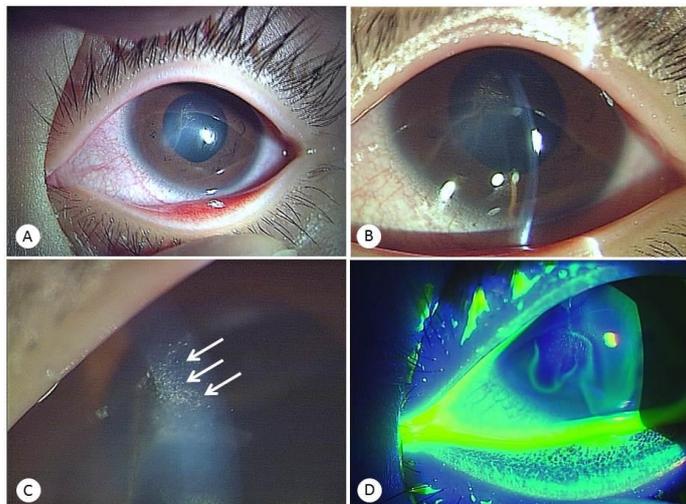


Fig 1: Slit lamp photographs of the left eye at the initial visit. Graphite particles are seen as silver-gray opacities in the corneal stroma (arrows in figure 1C).

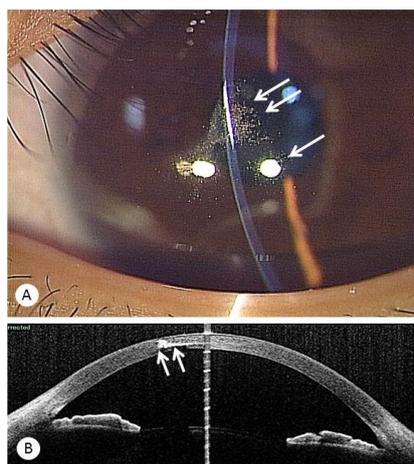


Fig 2: Slit lamp photograph (A) and anterior segment optical coherence tomographic (OCT) image (B) at the final visit showing graphite particles in the corneal stroma (arrows).

Case 2

A 6-year-old boy was admitted to our hospital with a complaint of decreased vision in the left eye after ocular trauma with a pencil. The patient's brother threw a pencil at him, and it hit his left eye. VA was 0.4 with C -8.00D A145° in the left eye. Slit lamp

examination revealed a corneal laceration (Figure 3A-C) and numerous silver-gray pencil graphite particles embedded in the corneal stroma. Seidel test was negative (Figure 3D) and corneal suture was not necessary.

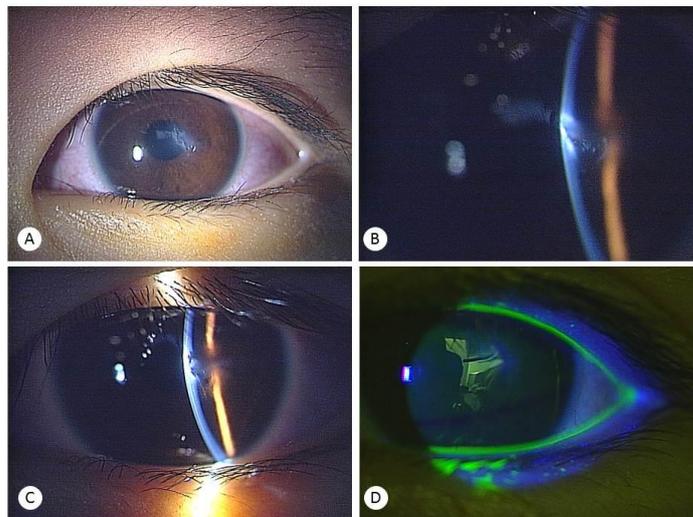


Fig 3: Slit lamp photographs of the left eye of the patient at the initial visit.

We did not remove the pencil graphite particles. The wound was closed, and his VA improved

to 1.0. No complications occurred during a one-year follow-up period (Figure 4).



Fig 4: Slit lamp photograph of the left eye of the patient at the final visit shows graphite particles in the corneal stroma (arrows).

Case 3

An 8-year-old boy was admitted to our hospital with a complaint of decreased vision in the left eye after ocular trauma with a pencil. The patient was struck with a pencil in his left eye by his friend. VA was 0.01 in the left eye. Slit lamp examination revealed a

corneal laceration (Figure 5A), traumatic cataract (Figure 5B), and numerous silver-gray pencil graphite particles in the corneal stroma (Figure 5C). A grade 3+ anterior chamber reaction was present (Figure 5B). Seidel test was positive (Figure 5D).

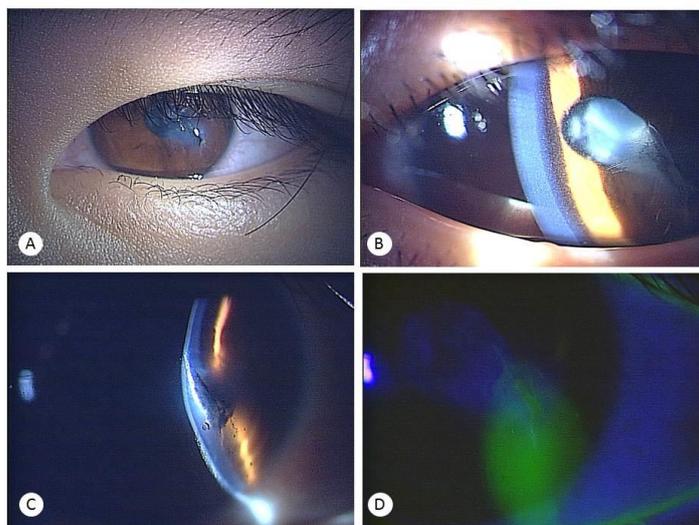


Fig 5: Slit lamp photographs of the left eye of the patient at the initial visit.

We performed lensectomy and intraocular lens implantation. However, we did not remove the pencil graphite particles. The wound was closed, and his VA improved to 1.2 with C -2.50D A155°. No

complications occurred during a two-year follow-up period (Figure 6A). Anterior segment OCT clearly revealed the intracorneal pencil graphite particles (Figure 6B).

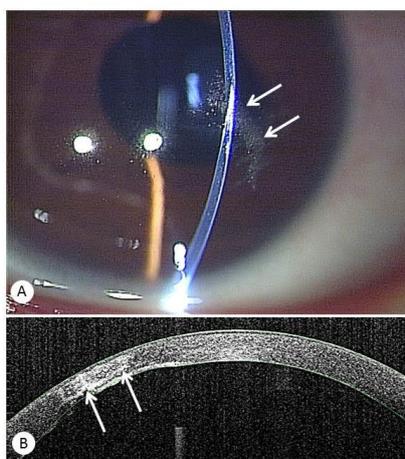


Fig 6: Slit lamp photograph (A) and anterior segment optical coherence tomographic (OCT) image (B) at the final visit showing graphite particles in the corneal stroma (arrows).

DISCUSSION

Graphite is generally known to remain inert in the eye [4]. Few cases of ocular graphite foreign bodies owing to pencil injuries have been reported [1, 2, 4-7]. Retained graphite in the vitreous has also been reported, with one case demonstrating no inflammatory reaction during 6 years of follow-up [4]. Another case report suggested that elemental aluminum released by the retained graphite might have caused sterile endophthalmitis in the immediate posttraumatic period

[5]. Han *et al.*; [2] reported a case of a retained graphite foreign body in the anterior chamber that was masquerading as stromal keratitis. To the best of our knowledge, graphite particles embedded in the cornea are extremely rare [1, 6, 7]. Gül *et al.*; [1] reported the first case of graphite particles on the corneal endothelial surface in a 14-year-old boy. Jeng *et al.*; [6] reported the first case of graphite particles embedded in the cornea in an 18-year-old man. They stated that the graphite particles in the cornea appeared to be

asymptomatic. Philip *et al.*; [7] reported a case of intracorneal graphite foreign bodies in a 12-year old girl, which remained inert in her eye for three years. This present series of cases is the first to visualize the retained graphite particles in the cornea using anterior OCT.

CONCLUSION

Based on the findings of previous reports [1, 6, 7] and the present report, graphite particles in the cornea appear to be asymptomatic. We decided that removal of the pencil graphite particles was unnecessary in order to avoid the development of irregular astigmatism after removal.

Disclosure

The author declares that he has no conflicts of interest.

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