Case Report

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Surgical Extraction of Traumatic Orbital Mercury

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Key Words

Orbital foreign body
Blood mercury
Thermometer

Abstract

Initial clinical observation of a 2-year-old boy whose right eyelid had been pierced by a glass thermometer 3 days earlier showed a scab-covered cicatrix and slight swelling in the eyelid. X-ray examination showed the broken thermometer tip, fine glass fragments, and mercury droplets beneath the eyelid and extending along the superior orbital margin. On surgical incision, glass fragments and the thermometer tip were found and extracted from the eyelid and orbital fatty tissue with forceps, and 70.3 mg of mercury droplets were readily removed from the same regions by suction via an elastic needle connected to an injection syringe. Blood mercury gradually rose from the normal range to a peak of 28.4 µg/dl 3 months after surgery, then declined during the following 7 months to a level of 15.1 µg/dl. No abnormality has been found in liver or renal function to present.

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Introduction

We report here the case of a 2-year-old boy whose eyelid had been pierced by a glass thermometer resulting in the embedding of the thermometer tip, mercury droplets, and glass fragments beneath the eyelid and extending along the superior orbital margin. Early surgical removal of the mercury, via an elastic needle attached to an injection syringe, was undertaken to prevent the occurrence of toxic effects by the mercury.

Case Report

Onset and Course. A 2-year-old boy, with the chief complaint of swelling of the right eyelid, was brought to our hospital on October 20, 1995 by his mother, who stated that he had tripped and fallen on October 17 while holding a glass thermometer which as a result had pierced his right upper eyelid and broken, and that swelling had gradually increased during the succeeding 3 days. **Examination and Findings.** The boy's visual acuity was 6/36 in the right eye and 6/24 in the left, as determined by optokinetic nystagmus. A puncture cicatrix was identified on the right upper eyelid in the anterior segment, with a scab covering and slight swelling. There was no abnormality in either anterior chamber or the ocular fundus. Although slight swelling was observed, the punctured region was already covered with granulomatous tissue, formed during the 3 days since the initial trauma. Skull X-ray examination revealed shadows suggesting the presence of glass fragments and many drop-shaped shadows apparently due to mercury, around

the upper orbit region. The frontal skull and orbital images showed several grain-shaped shadows beneath the eyelid and around the orbit (fig. 1). The lateral image showed droplet-shaped shadows apparently consisting of mercury along the upper orbital rim (fig. 2). The tip of the thermometer was clearly visible in both the frontal and lateral orbital images. The mercury droplets appeared to be distributed mainly under the skin, but the glass thermometer tip clearly extended into the upper margin of the orbit. Surgical extraction of the foreign bodies was indicated. Systemic examination showed no abnormal results in either peripheral blood or biochemical tests. The blood mercury concentration before and just after surgery was determined by the gold amalgamation method [1], and found to be 1.7 µg/dl at both times, and thus well below the normal upper limit of 5 µg/dl.

Surgery. Surgery was performed on October 21. An incision 2 cm in length was made along the upper orbital rim in the injured region, to permit location of the subcutaneous glass fragments. At a depth of about 5 mm, glass fragments reflecting on an optical microscope were identified and extracted with forceps. Further exploration showed several small shining mercury droplets at a depth of about 1 cm, which were readily aspirated with an 18-gauge elastic instillation needle con-

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Fig. 1. Glass fragments and droplet-shaped shadows due to mercury. An arrow indicates the section of the thermometer.

connected to a syringe via a surgical extension tube. The tip of the thermometer was not yet observable, and an incision was therefore made in the orbital septum to explore the orbit, where two large mercury droplets (approximately 1.5 mm in diameter) were found encapsulated in yellow-white exudate and similarly extracted via the needle. The needle and syringe were chosen for this purpose because of the high specific gravity and strong surface tension of mercury, and proved effective for ready removal of the mercury by suction. The thermometer tip (fig. 3) was discovered embedded in the orbital fatty tissue and extracted together with its remaining mercury content and additional mercury droplets. The total amount of removed mercury was 70.3 mg. **Postoperative Recovery.** The patient has been periodically examined as an outpatient at our hospital throughout the following year. His blood mercury concentration was in the normal range until his discharge from the hospital in early November, but then rose gradually to a peak of about 24.8 µg/dl in early February and has since then gradually declined, with the most recently

measured value of 15.1 $\mu\text{g/dl}$ on May 24, 1996. Visual acuity has remained within the normal range throughout this period. Liver and renal functions have been tested periodically, with no observation of abnormality.

Discussion

Accidents with mercury thermometers most commonly involve mis-ingestion [2]. In such cases, the mercury is expelled from the body by excretion, since no gastrointestinal absorption occurs [3]. In the resulting absence of a pathway for its absorption into the blood, the patients are generally free from any systemic effect by the ingested mercury.

In accidents with thermometers which result in the subcutaneous entry and accumulation of mercury in tissues or cavities due to trauma, however, the metal mercury can be converted to an organic mercury complex in the tissue and

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Fig. 2. Droplet-shaped shadows due to mercury along the superior orbital margin in lateral view. An arrow indicates the tip of the thermometer.

Fig. 3. Thermometer tip following removal.

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thus be absorbed into the blood, thereby leading to the appearance of toxic symptoms in the liver and kidneys [4, 5]. Accordingly, the optimum course of action is to remove as much of the mercury and glass fragments as possible. Since mercury has a high specific gravity and strong surface ten-

sion, suction can facilitate its removal and measurement of the extracted volume [6]. The present case clearly demonstrates the desirability and need for the use of plastic (digital) thermometers, as a safe alternative to conventional glass thermometers.

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