

Visual Diagnosis in Emergency Medicine



FRONTAL SINUS TASER DART INJURY

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CASE REPORT

A 41-year-old man arrived by police escort to the Emergency Department (ED) for evaluation and removal of a TASER dart (TASER International, Scottsdale, AZ). Prior to arrival, the patient was involved in an altercation with police and was inadvertently shot by a TASER (Figure 1) at close range. As the TASER was fired, the patient turned, resulting in one dart striking the patient in the face. The patient immediately became cooperative and was transported without further incident to the ED for evaluation and dart removal. The patient endorsed resisting arrest and alcohol consumption prior to the confrontation.

The patient complained of local facial pain at the TASER dart entrance site but was without other complaint. He denied loss of consciousness, headache, fever, chills, nausea, vomiting, epistaxis, blurred vision, or neck pain. All vital signs were within normal limits.

On physical examination, the patient was noted to have a TASER dart with attached wire embedded in the right side of his forehead with associated puncture wound (Figure 2). There was a small amount of dried blood surrounding the wound but no active bleeding. The remainder of the patient's head, eye, ear, nose, and mouth examination was unremarkable. He had no other injuries noted and no additional complaints.

A physician assistant attempted to remove the TASER dart with direct traction, perpendicular to the site and

angle of penetration, which was unsuccessful. The patient was then locally anesthetized with a more aggressive attempt, which was also unsuccessful. At this point the attending physician was notified and an attempt was made to maneuver the barb, also unsuccessful. After multiple failed attempts at dart removal, there was concern the dart was embedded in the skull. Curved hemostats were placed under the neck of the TASER dart and direct traction was applied. At this point the TASER dart body was separated from the metallic barb, with the barb remaining embedded in the patient's forehead. A noncontrast computed tomography scan (CT) of the head was ordered for further evaluation.

“WHAT IS YOUR DIAGNOSIS?”

Noncontrast CT of the head revealed a “metallic foreign body penetrating the right frontal sinus and possibly breaching the integrity of the bone between the sinus and the anterior cranial fossa. The tip does not appear to extend into the brain parenchyma. Blood is noted within the frontal sinus. No intracranial hematoma seen” (Figure 3).

Based on the CT report and physical examination, it appeared the TASER barb penetrated the anterior and possibly posterior table of the frontal sinus. The patient had his tetanus status updated and intravenous (i.v.) antibiotics were immediately begun (1 g of ceftriaxone i.v.).

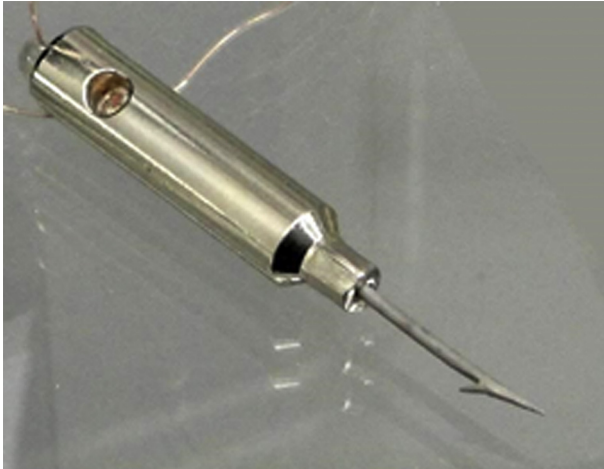


Figure 1. Metallic barbed TASER dart with attached barb. Retrieved from: <http://smg.photobucket.com/user/hamett65/media/Album11/pic1843a.jpg.html>.

Ear, Nose, and Throat (ENT) and Neurosurgery were consulted.

An ENT physician evaluated the patient in the ED and removed the barb at bedside by extending the wound with a #11 blade, rotating the barb, and applying pressure to remove the barb in its entirety. The wound area was irrigated copiously with sterile saline. A follow-up noncontrast CT of the sinuses was obtained post barb removal (Figure 4). CT confirmed complete removal of the barb with no remaining metallic foreign body and no definitive fracture of the posterior table of the frontal sinus. The patient was discharged with clindamycin 300 mg four times a day for 14 days and topical bacitracin. He did not follow up with ENT and was lost to follow-up.

DISCUSSION

The TASER (Thomas A. Swift's Electric Rifle) is an energy weapon used to temporarily stun an individual. TASERs are increasingly being used by law enforcement officers as a less lethal alternative to handguns. TASER mechanism of action is via compressed nitrogen propel-



Figure 2. Patient with TASER dart embedded in forehead.

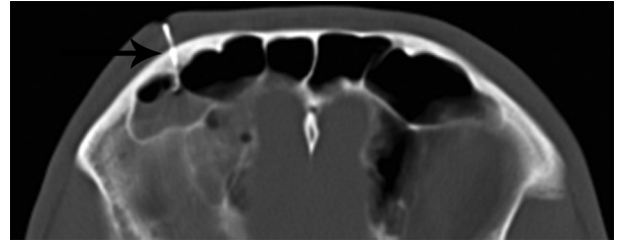


Figure 3. Noncontrast computed tomography scan of the head bone window shows the fractured portion of the TASER dart embedded in the right frontal sinus (arrow). Blood is also seen layering in the right frontal sinus.

ling two barbed probes attached to conductive wires up to 15 feet (1). Transmission of up to 50,000 volts (peak voltage though the body is actually around 1200 volts, and average voltage during the 100-ms duration of the pulse is about 400 volts) between the two probes causes the individual to lose complete neural control (2). The barbs are 9.5 mm long and 0.8 mm in diameter (3). More frequently used by law enforcement officials, they have been regarded as “relatively safe when compared to shooting with more conventional weapons” (4). TASER injury patterns generally can be grouped into primary barb strike injuries, electrical injury, and secondary trauma from falling (3). These patients should be evaluated for all three types of injuries. The areas most commonly affected by barb strikes are the trunk or back (5,6).

The goal of TASER dart removal is to remove the dart in its entirety in an expedient fashion. This diminishes pain, risk of infection, and prevents complications. Dart embedment in the face occurs in only about 1% of cases (4). Rarely, darts can result in intracranial injury. There are three previous cases of intracranial injuries due to TASER dart penetration (2,7). In all three cases of skull penetration, device removal at the bedside was unsuccessful due to penetration of both the inner and outer tables of the skull. Two of these cases required small surgical craniectomies, which were successful in completely removing the embedded TASER barb, without permanent neurological sequelae (7). In one case, a small fragment remained in the skull; however, the patient had no known long-term

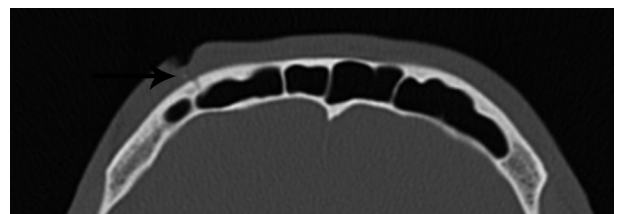


Figure 4. Noncontrast computed tomography scan of the sinuses shows complete removal of the TASER dart.

complications (2). It has been proposed that if no fracture of the inner table of the skull is present, the wound may be closed, leaving behind a small barb fragment (1). If a barb is embedded in a patient's eye, Ophthalmology should be consulted, and the barb removal should not be attempted in the ED (3).

Our case was unusual in that the initial CT was inconclusive in determination of barb penetration through the inner table of the skull. Both ENT and Neurosurgery consultants had no previous experience or exposure to TASER dart injuries to the skull. After direct exploration, the barb was removed in its entirety under local anesthesia, and subsequent CT confirmed no penetration through the inner table of the skull or intracranial complication. This unusual case report should be added to the growing body of evidence that TASER dart injuries, though potentially concerning at first glance, can usually be handled in an outpatient setting.

Take home points:

1. In all documented cases of skull penetration from TASER darts, none had intracranial bleeding or permanent neurological compromise.
2. Dart removal in all four cases at the bedside initially caused separation of the barb from the dart, leaving a foreign body embedded in the skull.
3. Local exploration and rotation of the barb with direct traction was successful for extraction of the intact barb with our patient, who had penetration of only the outer table of the skull.
4. If both inner and outer tables of the skull are penetrated, Neurosurgery evaluation is recommended.
5. A summary of these cases might be a pertinent education point for our ENT-, Neurosurgical-, Radiology-, and Trauma-trained colleagues.

REFERENCES

1. Kaloostian P, Tran H. Intracranial taser dart penetration: literature review and surgical management. *J Surg Case Rep* 2012;6:10.
2. Mangus BE, Shen LY, Helmer SD, Maher J, Smith RS. Taser and Taser associated injuries: a case series. *Am Surg* 2008;74:862–5.
3. Robb M, Close B, Furyk J, Aitken P. Review article: Emergency Department implications of the TASER. *Emerg Med Australas* 2009;21:250–8.
4. Ordog GJ, Wasserberger J. Electronic gun (Taser*) injuries. *Ann Emerg Med* 1987;16:73–8.
5. Strote J, Walsh M, Angelidis M, Basta A, Hutson HR. Conducted electrical weapon use by law enforcement: an evaluation of safety and injury. *J Trauma* 2010;68:1239–46.
6. Bozeman WP, Hauda WE 2nd, Heck JJ, et al. Safety and injury profile of conducted electrical weapons used by law enforcement officers against criminal suspects. *Ann Emerg Med* 2009;53:480–9.
7. Rehman T, Yonas H, Marinaro J. Intracranial penetration of a TASER dart. *Am J Emerg Med* 2007;25:733.e3–4.