There was an irregular-shaped laceration on the left side of his neck, 2 inches lateral to the midline, with a shaft protruding from it (Figure 1). Bleeding was minimal. The EMT stabilized the arrow shaft with a gauze dressing. Once the ambulance crew arrived, the patient was transferred from the car to a backboard, and then to a gurney, while maintaining manual cervical immobilization. A cervical collar was not placed around the victim’s neck due to the protruding arrow shaft.

The victim was transported to the nearest hospital. Vital signs remained stable, and he remained unchanged neurologically. A detailed neurological examination was deferred to expedite diagnostic imaging. Cervical spine X-rays revealed that the tip of the arrow had crossed the midline. The bulk of the arrowhead was lodged between the spinous process of C1 and C2 with posterior splaying of the spinous processes and anterior wedging of the vertebral bodies (Figure 2). Loose fragments of the arrowhead blades were noted, along with obvious air in the ventricular system.

Anticipating that air transport would be necessary, the physician shortened the shaft of the arrow with the aid of medical imaging to avoid motion of the arrowhead. The magnitude of the injuries exceeded the local hospital’s resources, and the patient was transferred via air ambulance to a trauma center. Analgesics and sedation were not administered to preserve the ability to obtain an ongoing assessment of the patient. Assessment revealed leakage of blood mixed with cerebral spinal fluid, as shown by a light-colored ring radiating outward than the blood (positive Halo sign) on dry cotton gauze. Cranial nerves II-XII were grossly intact. Motor strength was full throughout all major muscle groups of the bilateral upper and lower extremities. Deep tendon reflexes were equally brisk without being hyperactive. Sensory examination was normal bilaterally in the upper and lower extremities. Babinski’s sign was negative. No foot clonus was present. Examination of the heart and lungs was unremarkable.

Initial diagnostic impression was impact injury to the cervical spine at C1/C2 with known dural lacerations.
Surgical intervention was planned to remove the arrow. Following consent, the patient underwent an awake fiberoptic intubation. The surgical approach was midline, similar to the approach for any typical C1/C2 posterior procedure. Once the skull base and C1/C2 were visualized at the midline, dissection toward the arrow shaft was taken following the spine laterally. Metal fragments were encountered and removed from the paraspinal musculature. Once the arrowhead was located, muscle was dissected from around it, and it was stabilized with a hemostatic forceps (Pean). The shaft of the arrow was unscrewed from the arrowhead allowing significantly more control over the arrowhead. Additional dissection directly around the arrowhead was carried out, and it was grasped firmly with a Pean and removed in 1 piece (Figure 3). Cerebral spinal fluid was found, confirming the suspected dural tear. Seven fragments of the arrowhead were retrieved from the surrounding musculature. A C1 laminectomy was performed, and the dural tear was located and repaired. The trajectory of the arrow was explored and debrided, and a NuGauze wick was placed in the wound. The midline incision was closed after approximating the musculature as well as subcutaneous and skin layers.

Post-surgery, the patient was alert and oriented with cranial nerves intact. He was able to move all extremities with full vigor. A sensory examination revealed grossly intact sensation. Hospitalization was prolonged due to a postoperative cerebral spinal fluid leak requiring re-

**Figure 1.** Patient with arrow shaft protruding from left postero-lateral neck.

**Figure 2.** Cervical X-rays revealing (a) posterior splaying of the spinous processes C1-C2 and (b) anterior wedging of the vertebral bodies along with air in the ventricular system.

**Figure 3.** Replica of an arrowhead.
operation and drain placement as well as an entrance wound infection treated with intravenous antibiotics. The patient participated in inpatient physical and occupational therapy and was ultimately discharged to his home. He continued physical and occupational therapy as an outpatient for approximately 10 months and returned to work approximately 12 months after the accident. Despite continued numbness and pain, he is employed full time as a highway worker.

Although a limited number of cases of accidental arrow injuries to the skull, brain, and body are reported in the literature, cervical spine injury due to accidental arrow shooting is extremely rare and has not been documented. Universally accepted and of paramount importance are the following tenets of care: best possible immobilization of patient and arrow before and during transfer, and arrow removal in a surgical setting only where hemorrhage can be controlled.\(^1\)\(^2\) The outcome of our patient was, in part, predetermined by the dedicated team of individuals who were instrumental in his pre-hospital care. During the continuum of our patient’s journey from the field to definitive care, various medical personnel upheld the ethos *Primum non nocere* of the Hippocratic Oath, translated as, “First do no harm.” Adherence to training and utilization of proven techniques involving transfers and positioning of cervically injured patients proved imperative to the patient’s ultimate recovery.

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REFERENCES
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