CASE REPORT

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An Unusual Penetrating Neck Wound by a Golf Club: Precise Forensic Imaging

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ABSTRACT: An unusual case of a penetrating neck injury by a golf club with the weapon retained in situ is presented. The contemporary imaging technology that delineated the clinical and forensic aspects is demonstrated as another tool to assist in criminal investigation.

KEYWORDS: forensic science, forensic pathology, penetrating wound, computerized tomography

The problem of evaluating the victim with a penetrating neck injury from a weapon of assault presents a number of challenges to both the surgeon and the forensic pathologist. When the weapon is retained in the victim, many of the diagnostic issues are simplified, though the exact anatomic location within the body may require further clarification. The following case report documents the major assistance of contemporary imaging technology that the forensic pathologist may use for in situ visualization of an assault weapon.

Case Report

A 35-year-old man with a history of alcoholism and schizophrenia became involved in an argument with his roommate. Soon an altercation ensued, with the roommate assailant striking the victim multiple times with a golf club and then stabbing him completely through the neck with the shaft of the club.

The patient was able to call for an ambulance and was taken to the hospital with the club lodged in his neck. Initial evaluation in the emergency department revealed multiple lip and scalp lacerations and the obvious assaulting instrument. The club shaft entered the neck below the right ear and exited posterior to the left mandibular ramus. To enable completion of cervical computerized tomography (CT), the ends of the club had to be cut with a hacksaw so that the patient could be placed in the scanning machine. The images with facial, frontal and basilar skull reconstructions delineated the exact course of the club through the neck. (Figs. 1, 2, 3). After the CT, cervical angiography was performed, which revealed no evidence of vascular injury (Fig. 4). The club was then removed in the operating room. The only abnormal finding was a small perforation of the posterior pharynx. After a seven-day course in the hospital, transfer was effected to a rehabilitation hospital to complete recovery of speech and swallowing ability.

FIG. 1—*3-dimensional reconstruction of face in frontal plane.*

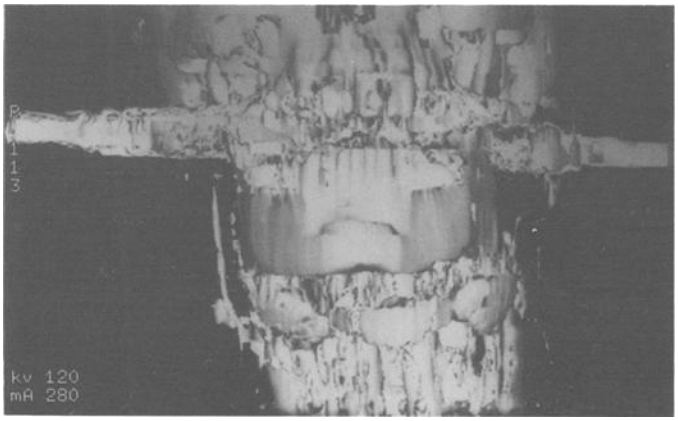

FIG. 2—*3-dimensional reconstruction of skull in frontal plane.*

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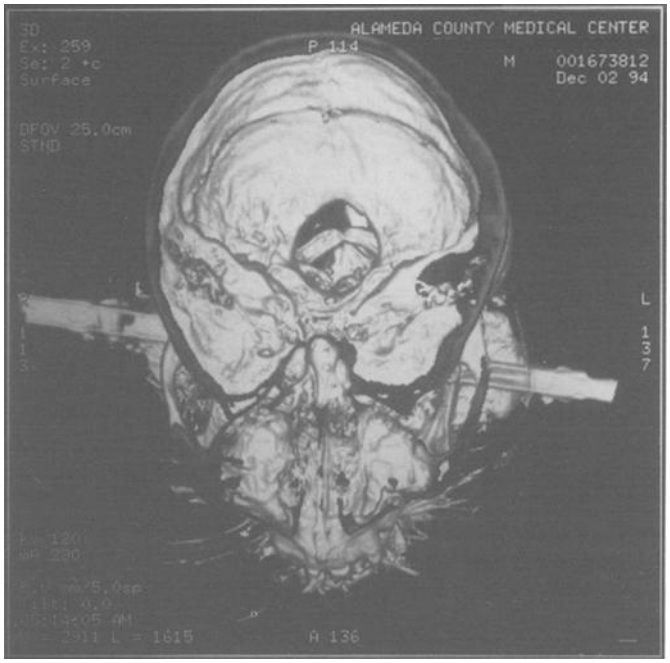

FIG. 3—*3-dimensional axial reconstruction of skull base demonstrating extracranial location of club.*

Discussion

Treatment of penetrating injuries to the neck demands a surgeon's closest attention because of the close proximity of vital structures in the small volume of the neck (1). In the majority of cases, the weapon or missile will no longer be present in the patient, and one must determine possible damage to the vascular, respiratory, digestive, or neural structures in the neck.

The diagnostic process is facilitated when the source of penetrating injury is still in place in the body. The forensic and medical literature reveal no other similar cases of penetrating cervical assault with a golf club though reports of neck impalements by a fence post, a screw driver, a spear gun, a knife jammed into the vertebral body after perforation of the trachea and esophagus, a needlefish "flying" into a swimmer's neck, and a section of picket fence are documented (2–7).

The most remarkable aspect of this case is the anatomic clarity provided by the CT and the three-dimensional reconstructions in the various planes illustrated in the figures. In his text, *The Pathology of Neck Injury*, Vanezis describes computed tomography as an adjunct for delineation of vertebral and laryngeal injuries (8). The potential value of this imaging application in forensic examinations is yet to be fully determined, but should certainly be considered in any victim with penetrating injuries, as illustrated by the present case (9,10). The complementary technology of digital subtraction angiography, coupled with computerized tomography has similar utility (11).

FIG. 4—*Angiography of right and left carotid arteries showing close proximity of club shaft (arrows) to arteries. 4A–Right lateral carotid angiogram, 4B–Left lateral carotid angiogram.*

Conclusion

A penetrating cervical injury with an uncommon weapon, a golf club, was evaluated and imaged with technology available for computed tomographic reconstruction imaging. This is but another example of the utility of computer tomographic imaging methods in forensics. It is anticipated that the forensic scientists will consider implementation of this imaging technology for supplemental display of assault or homicide investigations.

References

1. Miller RH, Duplechain KJ. Penetrating wounds of the neck. Otol Clin N Am 1991;24:15–29.
2. Bowsher WG, Smith WP. Severe facial injury by impalement. J Trauma 1984;24:999–1000.
3. Niamtu J, Lassiter J. A bizarre penetrating head wound with intraoral communication. Oral Surg 1979;47:410–2.
4. Tuncbay E, Ovul I, Zileli M. Unusual spinal cord injury by a speargun. Surg Neurol 1983;20:57–8.
5. Das PB. Simultaneous penetrating injury of the trachea and esophagus by a knife jammed into the vertebral body. Int Surg 1976;61:160–1.
6. Bendet E, Wolf M, Leventon C, et al. Penetrating cervical injury caused by a needlefish. Ann Otol Rhinol Laryngol 1955; 104:248–50.
7. Birt BD, Smitheringale A. A bizarre pharyngeal injury. J Otolaryngol 1980:9:364–6.
8. Vanezis P. Pathology of neck injury. London: Butterworth, 1989.
9. DiMaio DJ, DiMaio VJ. Forensic pathology. New York: Elsevier, 1989.
10. Gordon I, Shapiro HA, Berson SD. Forensic medicine. Edinburgh:Churchill Livingstone, 1988.
11. Pringle MB, Charig MJ. The use of digital subtraction angiography in penetrating neck injury—a very instructive case. J Laryngol Otol 1994;108:522–4.

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