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CASE REPORT

Cervical spinal cord injury by unusual foreign body penetration

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Introduction

Non-missile penetrating spinal cord injury has become relatively uncommon in developed countries due to the availability of more sophisticated weapons. More rare still is spinal cord injury caused by a chopstick, which has been used for centuries in Asia. Chopsticks have been reported to cause penetrating intracranial injuries through the nostrils,[17,18] temporal[6,13] or orbital fossa,[3,9,11,12] and high cervical spinal cord injury through the oral cavity.[7] We herewith report the case of a 12-year-old boy who sustained cervical spinal cord injury due to accidental chopstick penetration by an anterior route through the neck. In many aspects, this case represents a unique situation including the unusual mechanism of the injury and the impressive functional recovery. To our knowledge, such a case has not been previously reported.

Case report

A previously healthy 12-year-old boy was presented to the emergency department with a chopstick penetrating the anteriolateral aspect of his left side neck. The boy was chasing his friend in the classroom with a stainless steel chopstick held in his left hand. While running out of the classroom, his friend slammed the door and the boy ran into it at full force, driving the chopstick into his neck. He immediately noticed that he could neither move nor feel his four limbs.

Upon the patient's arrival in the emergency room on 27 November 2001, he was fully conscious and hemodynamically stable. A chopstick penetrated his neck, lateral to the left sternocleidomastoid muscle (Fig. 1). The initial neurological examination results were significant with grade 3/5 motor strength in the bilateral deltoid and biceps brachii, and 0/5 strength in the remaining upper- and lower-extremity muscles; while motor strength in the bilateral trapezius and sternocelidomastoid muscles revealed normal with grade 5/5. During initial assessment, a C5 myotome level was obtained. He had symmetrically vague sensation to light touch, pinprick, and proprioception below C5 dermatome and sacral

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Figure 1 As the boy was presented to the emergency department at the community facility, a chopstick penetrated his neck, lateral to the left sternocleidomastoid muscle.

area, with absence of deep tendon reflexes and voluntary anal contraction.

The radiograph and the computerized tomography scanning of cervical spine revealed that the hyperdense metallic tubular structure penetrated in the neck through left side C6 neural foramen into the spinal canal, and bent upwards and rightwards to C5 level (Figs. 2 and 3).

The boy received emergent exploration of left side neck with supine position. The carotid artery, esophagus and internal jugular vein remained intact. Anterior decompression and C5/6 diskectomy with removal of the chopstick were performed.

Eight weeks after the injury, antigravity movements over bilateral hip flexors and knee extensors with normal grasping function developed. He achieved trunk stability and sitting balance without support 3 months postoperatively and supervised independent ambulation for 25 m after 10 months. As for the upper limbs, the muscle power of bilateral shoulder and elbow flexion recovered to grade 3/5 and improved hand grasping function with some degree of clumsiness left. His activities of daily living became nearly totally independent. Follow up MRI of C-spine 18 months after the injury showed in Fig. 4.

Discussion

Traumatic spinal cord injury usually results from fracture-dislocation or missile injures. The incidence of non-missile penetrating spinal cord injury has been reported to be quite rare. In the United States, only 1% of spinal cord injuries are attributed to stab wounds.[2] In previous studies, only one large review has been published from South Africa, where

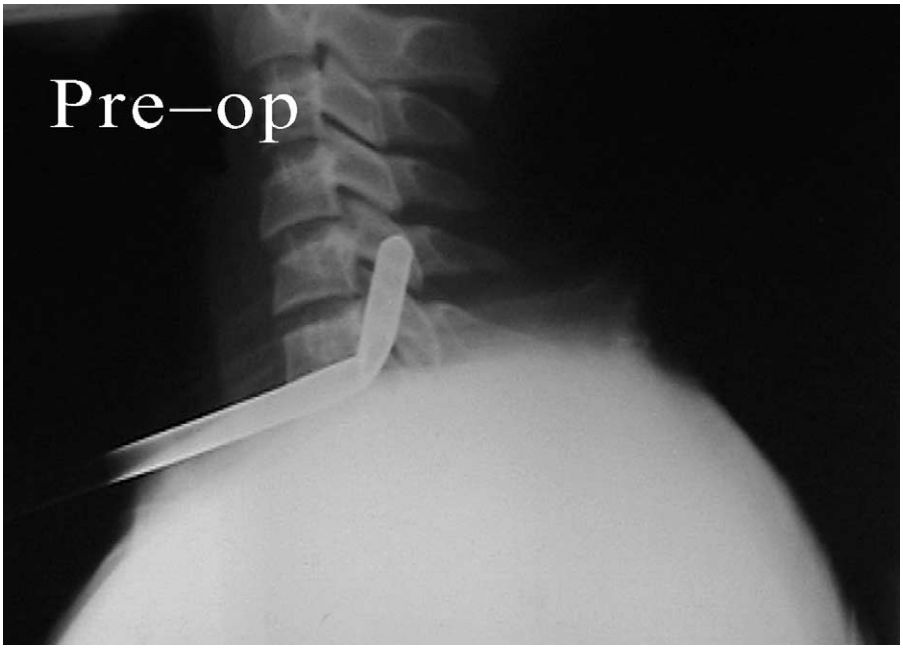

Figure 2 The radiograph of cervical spine revealed that the tubular structure penetrated in the neck into the spinal canal, and bent upwards and rightwards to C5 level.

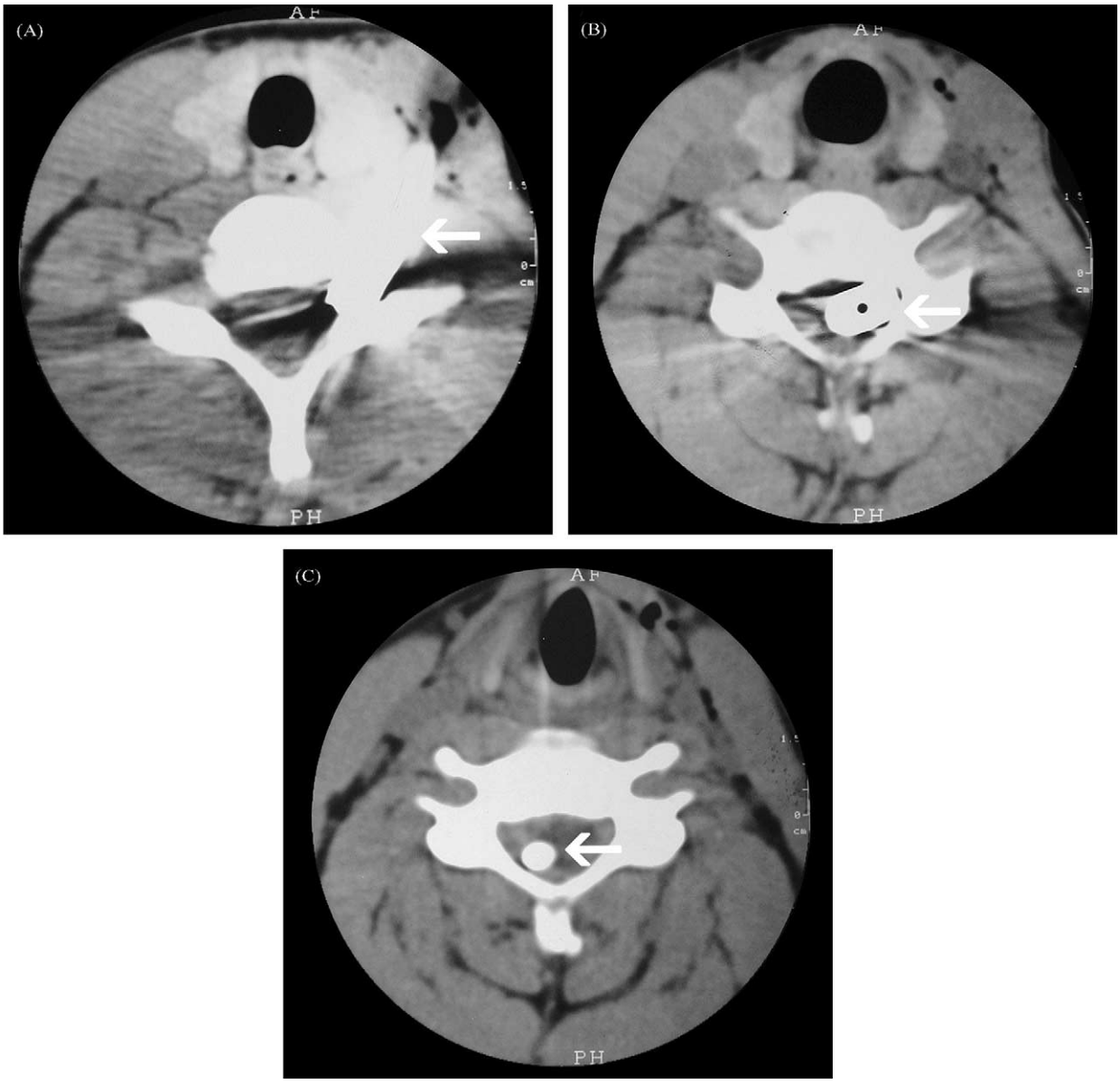

Figure 3 The computerized tomography scanning of cervical spine showed that the hyperdense metallic tubular structure penetrated in the neck through left side C6 neural foramen into the spinal canal, and bent upwards and rightwards to C5 level.

stab wounds of the spine are more common. Twenty-five percent of their patients with spinal cord injury were resulted from stab wounds.[14]

In the literature, penetrating spinal cord injury by chopsticks is also rarely reported. There are a total of 17 reports of penetrating injuries employing chopsticks, only one of which involved high cervical region with the penetration route via the oral cavity.[7] The one report appears in the Japanese language only, and has not been translated into English. Although the prognosis of spinal cord injury by chopstick penetration was not reported, metallic chopsticks, which become increasingly popular in Asian families, may cause more devastating injuries than wooden chopsticks, which have never been reported to penetrate the neural foramen.

The outcome of penetrating spinal cord injury was regarded much more favorable than other traumatic injury based on evidences that knives are the mostly used weapons, that insults usually take a posterior route, and that posterior penetration does not cross midline due to the natural protection of the bony structure of the vertebra. According the Peacock et al.,[14–16] two-third of victims presented with some type of Brown—Sequard syndrome, and remarkable motor recovery can usually be attained.

However, in this particular case, the metallic chopstick took an anterior, almost horizontal route

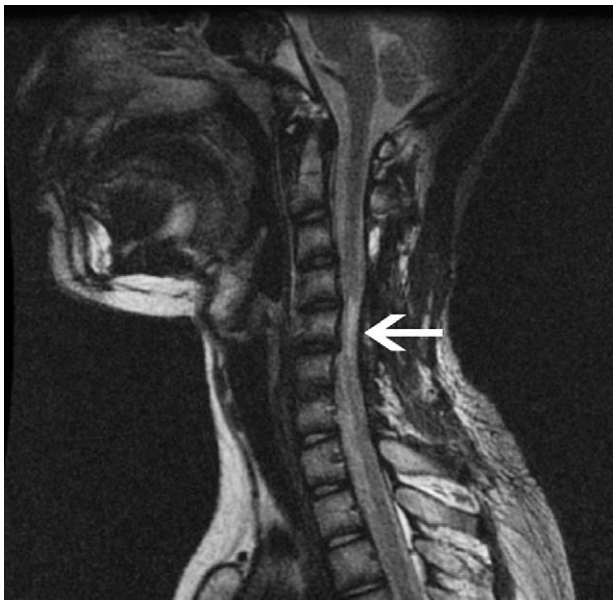

Figure 4 Follow up MRI of C-spine at 18 months after the injury showed linear T2 high signal change and mild tissue loss at C4—5 to C5—6 level.

lateral to the left sternocleidomastoid muscle and traversed the spinal canal through the left C6 neural foramen. The natural protection of the vertebra was negated due to the unusual direction of the insult. CT scan of C-spine revealed that the continuity of the spinal cord had been severely disrupted on account of the devastating penetration. The clinical presentation revealed bilateral complete flaccid quadriplegia and symmetrically impaired sensation below C5 dermatomes, consistent with the imaging findings.

It has been reported that patients with bullet trajectories that traverse the spinal canal had a higher percent of complete injuries (80%). Lipsechitz[10] also suggested that the neurological recovery is rare if the injury was neurologically complete over 24 h after injury. Furthermore, the presence of cord swelling consequent to trauma usually indicated a poor prognosis.[1,8] Taken together, a bleak prognosis could have then been expected in this boy. Contrary to these findings, this case demonstrated rapid return of motor function and dramatic motor recovery. According to previous studies, the outcome in pediatric patients surviving with spinal injury was in general better than adult patients.[5] Significant functional improvement occurs with pediatric spinal cord injury inpatient rehabilitation.[4]

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