Isolated vocal cord paralysis with vagal palsy following trauma: a case report

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Abstract

We report a rare case of isolated right vagal nerve palsy in a 50-year-old man who presented with hoarseness of voice following trauma.

Key words: vagal nerve palsy, trauma, base of skull fracture

Introduction

Base of skull fracture, although common, is a rare cause of isolated lower cranial nerve palsy (IX, X, XI XII). The lower cranial nerves are at risk of injury following shearing and stretching forces in a downward direction within the skull. There have only been sporadic case reports of this particular complication in the English literature.

We report a case of an adult male who developed post-traumatic vagal palsy secondary to base of skull fracture following a motor vehicle accident.

Case Report

A 50-year-old male motorcyclist presented to the Accident and Emergency Department following a road traffic accident. On admission, he had history of loss of consciousness of unknown duration, and bleeding from his right nostril and right ear. He also sustained multiple right-sided facial, shoulder, arm and lower limb lacerations. There were also right-sided facial bruising and right periorbital swelling. He was disorientated and restless with a Glasgow Coma Scale of 12. Blood pressure on admission was 200/100 mmHg and pulse rate was 110 beats per minute. There was subcutaneous emphysema over the neck and upper chest wall. Early chest radiograph revealed no pneumothorax. The patient responded to resuscitation and remained haemodynamically stable with normal arterial blood gas levels.

Further radiological investigations revealed fracture of the right clavicle, right glenoid, right scapula neck and right third to fifth rib. Chest radiograph taken on the second day of admission revealed pleural effusion suggestive of haemothorax. Contrast enhanced axial CT scan of the neck and thorax showed paraspinal haematoma in the cervical and upper thorax region, minimal right pleural effusion in the lower hemithorax with surgical emphysema in the neck. There was no local haematoma at the laryngeal area. CT scan of the head showed no evidence of intracranial bleed but there was blood within the sphenoid and ethmoid sinuses with features suggestive of a basal skull fracture to the petrous part of the right temporal bone.

The minimal right-sided pneumohemothorax with associated rib fracture was conservatively treated. The patient's condition progressively improved with the surgical emphysema subsiding slowly over the next few days.

Hoarseness of voice was noted six days later as he began to speak. Otolaryngological evaluation revealed right vocal cord palsy and impaired right palatal movement. The patient was however able to swallow and his gag reflex was present. Clinical examination of the ear showed left haemotympanum and an intact right tympanum membrane with blood clots in the external ear canal. Clinical assessment of hearing with Rinne's Test and Weber's Test confirmed conductive hearing loss in the left ear and sensori-neural hearing loss in the right ear. Conversation voice test demonstrated bilateral hearing impairment of approximately 50 db, as he was only able to receive conversation voice at 2 feet bilaterally.

At follow up, nine months after discharge, he still has hoarseness with minimal improvement of the right vocal cord palsy. The left vocal cord was compensating well and the patient has no aspiration.

Discussion

The vagus nerve (X) is the longest of the all cranial nerves and has the widest distribution. It exits from the jugular foramen at the base of skull along with glossopharyngeal and spinal accessory nerve as well as the jugular vein.

Base of skull fracture can be produced by compression of the sphere and extension of fissures radiating from the vault. The fracture can pass through the temporal bones, sphenoid bone, floor of middle cranial fossa or region of cavernous sinus, causing cerebrospinal fluid leak and injuries to vessels and nerves. Laceration of nerves in the fracture lines or axonetmesis produces an immediate paralysis, which will not recover. High vagal neuropraxia may be multifactorial which may be due to stretching and or compressive forces. Compression of nerves by blood clot produces temporary paralysis. Delay in recovery may be compounded by contraction of scar tissue or callus.

and paralysis of nerves may be permanent (Rains & Ritchie, 1984).

The vocal cord paralysis in this case is likely to be caused by this type of injury to the vagus nerve within jugular foramen, affecting the uvula and the vocal cord presenting itself as hoarseness. However, it is rare for the tenth nerve to be singularly affected while sparing the ninth and eleven nerves since both are in close proximity. On reviewing the English literature, only one case of isolated bilateral vagal nerve paralysis bas been reported following base of skull fracture at the occipital condyle area. (Spencer, 1984). Isolated paralysis of the hypoglossal nerve has also been reported (Orbay *et al.*, 1989). The vagal nerve is frequently involved with other lower cranial nerves in the base of skull fracture, producing the clinical picture of jugular foramen syndrome or Vernet syndrome. Fracture at the occipital condyle frequently involves the lower cranial nerve due to the close proximity of the occipital condyle to the jugular foramen as have been confirmed by Urculo *et al.* (1996). However, this type of fracture is rare as only 18 cases were reported in a review of the literature from 1925 (Legros *et al.*, 2000).

Transverse fracture of temporal bone accounts for 20 to 30 % of temporal bone fractures. This type of fracture usually occurs as a result of an intense blow and begins at the jugular foramen extending across the petrous bone. The inner ear is often in the line of this anteroposterior fracture causing sensori neural hearing loss and bleeding in the middle ear. Facial nerve (VII) paralysis, which occurs in up to 50 % of patients with transverse fracture of the temporal, was not seen in our patient. In contrast, the longitudinal fracture of the temporal bone, which accounts for 70 % of temporal bone fractures, has a fracture line in the axis of the external meatus. Thus, the seventh and eighth cranial nerves are frequently spared (Kinney, 1996). High resolution CT scan that was not performed in our patient would have been helpful in delineating the full extend of this fracture. Accurate imaging of base of skull fracture requires high resolution, thin section CT scan in both axial and coronal planes (Johnson *et al.*, 1984).

The consequences of unilateral vagal nerve palsy presenting as recurrent laryngeal nerve palsy includes immediate flaccidity of ipsilateral vocal fold, loss of adduction, dysphonia and frequently aspiration of food and drink. Hence, high index of suspicion and appropriate nursing care are required to prevent further complications. Initial management should be aimed at prevention of pulmonary aspiration by enteral feeding with a nasogastric tube and the patient in the upright position. Prompt symptom management and consistent psychosocial support from clinicians are required to decrease feelings of stress and isolation in patients and caregivers (Crumley, 1994).

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