

## Fracture of the hyoid bone

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### Abstract

A patient complaining of dysphagia was diagnosed as suffering from a fracture of the hyoid bone. The fracture was fixed using the modern technique of tension band wiring. There was subsequent relief of the symptoms. A review of the literature and our perspective is included.

### Introduction

Fracture of the hyoid bone has not been extensively reviewed in the literature and there is no widely accepted mode of treatment. We believe that, in preference to inactivity or to excision of the bone, especially in symptomatic patients, rewiring of the fragments may be effective and possibly even rehabilitative.

Our success with an unusual case prompted us to review the available literature and, we hope, to provide a new perspective.

As with any other fracture, fracture of the hyoid must be regarded in the light of the mechanism of the causative injury and the attendant complications and associated injuries. We have attempted to categorize the treatment of these fractures on the above basis.

### Case report

An 18-year-old male presented to our out-patient department complaining of dysphagia and a disturbing crepitus on neck flexion. In addition, he was forced to leave technical college due to his inability to acutely flex his neck when sitting at a draughtman's board. The patient had been treated for two years with no relief. Although he could not ascribe an initiating cause for his symptoms, on clinical suspicion we asked for a lateral X-ray of his cervical spine. This revealed a fracture of the hyoid bone.

Further X-rays delineated the fracture line situated at the junction of the body and the greater cornu on the left, causing an inward displacement of the lateral fragment.

Keeping open the option of excising the hyoid, we attempted a repair of the bone with tension band wiring using a miniature drill fashioned from a battery razor. Under general anaesthesia, with the neck extended on sand bags, an incision was placed over the palpable hyoid. The entire bone, with the fracture line, was exposed and two holes were drilled on either side of the fracture line from above and below. A wire was passed through these holes, such that it described a figure-of-eight across the fracture line. Dynamic compression, achieved by tightening the wire, returned the fragments to their anatomical position.

The absence of a precipitating cause suggested to us a possible cartilaginous defect at the junction of the body and the greater cornu, where a synchondrosis ossifies at puberty (Johnston and Whillis, 1954). Hence, to prevent a recurrence at a similar weak point on the other side, we prophylactically wired the opposite side, too.

The patient had an uneventful post-operative recovery and has been symptom free for 18 months.

### Discussion

Fracture of the hyoid is a rare entity. It may, however be commoner than is thought, since it may often be missed during the emergency treatment of patients, when other more dramatic injuries claim attention (Eliacher *et al.*, 1980). In the past strangulations and hangings were the commonest reported causes (Weintraub, 1961) but over the last twenty years road traffic accidents have topped the list (Maran and Stell, 1970; Eliacher *et al.*, 1980). The USA has a higher incidence of this type of injury, possibly due to the use of a lap type of seat belt (Maran and Stell, 1970), as opposed to the chest type used in the U.K. Other causes of this injury include gunshot and knife wounds (Browne, 1973) and sports, particularly contact sports where the neck remains extended, such as karate and basketball.

The biodynamics of injury to the larynx are thus relevant to fractures of the hyoid and Nahum and Siegel (1967) have studied it in great detail. The momentum-induced falling forward of the driver in an automobile accident does not always cause injury to the larynx. On impact, the body of the driver is thrown forward against the steering wheel. Simultaneously, the neck is

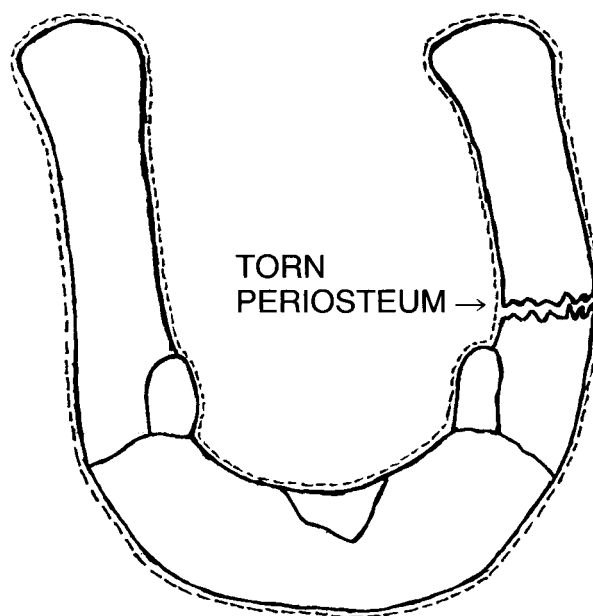


FIG. 1

Fracture due to inward compression with a periosteal tear on the outside.

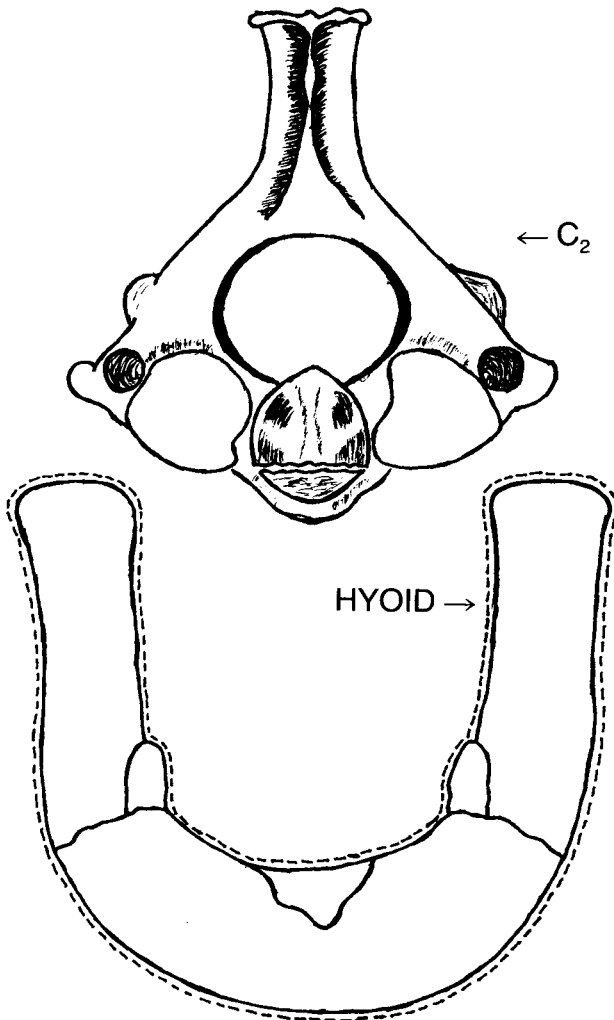


FIG. 2

Anatomical disposition of the hyoid in relation to the C2 Vertebra (after Weintraub).

flexed by the momentum of the head itself, causing the face and mandible to hit the upper arc of the wheel, rather than the larynx. However, if for some reason, such as the forehead hitting the windscreen first, the mandible is not brought down in time, the larynx suffers the injury. A similar mechanism of exposure of the larynx at the moment of impact operates in injuries during contact sports.

The hyoid bone, supported above by the stylohyoid and geniohyoid muscles, is normally held in its place by the strap muscles below and is thus unique in its mobility in all directions thus accounting for its rare involvement, even if injury to the larynx is present.

Weintraub, in 1961, studied fractures of the hyoid in post-mortem dissections and classified them as follows:

- a) Those due to inward compression.
- b) Those due to antero-posterior compression.
- c) Avulsion fractures.

Fractures of the hyoid in manual strangulations and similar injuries are due to squeezing forces pushing the two cornuae together. The fractured fragment thus dips inwards as shown in Fig. 1 and the tear in the periosteum lies on the outside.

In cases of hanging and in other antero-posterior compressions, the bone is forced against the vertebral body of C2, and the natural divergence of the greater horns is accentuated (Fig. 2). The fractured fragment is thus tilted outwards, with the torn periosteum on the inside (Fig. 3).

Sharp objects, however, are often deflected off the cartilages and bones, only to pierce the cricothyroid and thyrohyoid membranes.

Clinically, therefore, fractures of the hyoid can be of the following types:

- a) Fractures through the body which are often the result of direct trauma to the bone.
- b) Fractures of the lesser horn.
- c) Fractures of the greater horn.

They may be further classified as:

- Closed:
  - or displaced inwards.
  - or displaced outwards.
- Compound:
  - or externally
  - or into the pharynx.

The diagnosis of a fracture of the hyoid requires a high index of suspicion. Patients often complain of pain over the front of the neck which increases on deglutition and is associated with the muscle attachments of this bone. Pain is also aggravated by turning the neck, often to a particular position and by blowing the nose, a fact which helps in distinguishing this injury from that to the cervical spine. Some dysphonia is also possible.

Patients suffering from a fractured hyoid with pharyngeal lacerations have subcutaneous emphysema and even respiratory distress. The cause of these may often sought elsewhere in vain (Browne, 1973).

Tenderness to palpation is exquisite and aggravated by swallowing. The floor of the mouth may be oedematous, and in early cases there may be ecchymotic spots. In addition, be external marks suggesting injury to the laryngeal area maybe present. Associated fractures of the thyroid cartilage cause more obvious changes in the contour of the neck and should lead to suspicion of a concomitant hyoid injury (Maran and Stell, 1970).

Suspicion of a fracture should be followed by the request for lateral cervical X-rays. Fractures in the ossified hyoid and cricoid and associated injuries to the mandible and cervical spine should be sought and excluded, as well as lacerations of the pharynx, which present with subcutaneous gas in the tissue planes and even air shadows in the retro-pharyngeal space. Pharyngo-laryngoscopy is strongly advocated by most authors and doubtful cases certainly merit this procedure.

The treatment of fractures of the hyoid has not been standardized in the literature. Each case has been treated on its individual merit by techniques ranging from masterly inactivity to excision of the hyoid bone. We have attempted to put the recorded experience in perspective:

- 1) Fractures of the hyoid with pharyngeal lacerations and massive subcutaneous emphysema require exposure and drain-

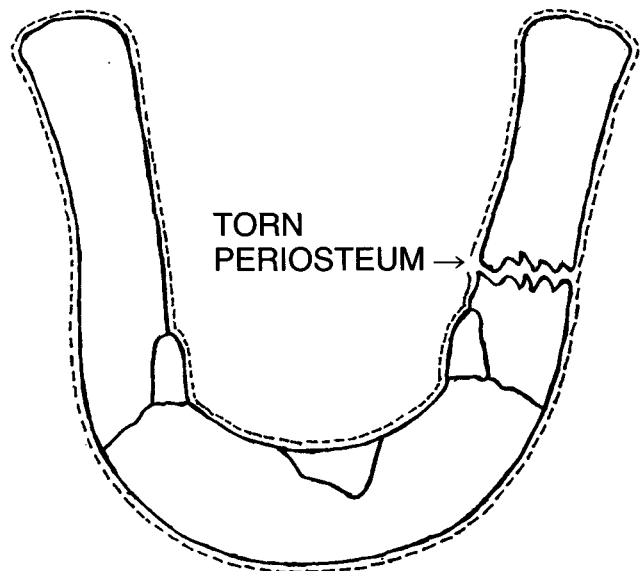


FIG. 3

Fracture of the hyoid due to antero-posterior compression with the periosteal tear on the inside.

age of the retro-pharyngeal space. No suturing of the pharynx and no manipulations of the hyoid are attempted. Within 10 days, pharyngeal mucosal continuity is restored and further treatment may be planned according to the patient's symptoms.

- 2) In lacerations of the hypopharynx, however, an attempt at primary closure in layers, following neck dissection, is justified since little can be lost and much gained by this method (Krekorian, 1964). These injuries are essentially similar to ruptures of the oesophagus.
- 3) External compound fractures of the hyoid may require cleaning and debridement of the wound, with primary wound care depending upon the type of injury. Hyoid manipulations may be deferred till later, though excision has been suggested (Krekorian, 1964).
- 4) Asymptomatic closed fractures of the hyoid require no treatment. This is also the case with those patients treated conservatively for compound fractures of the bone, who subsequently remain asymptomatic.
- 5) Patients with associated injuries of the thyroid and cricoid cartilages require additional measures, as outlined by Maran (1970).
- 6) Symptomatic patients pose a challenge. The options are:
  - a) Analgesics and restriction of the movements that cause pain.
  - b) Excision of the rough edges of the fracture line thus reducing friction, crepitus and pain (Maran and Stell, 1970).
  - c) Fixation of the fractured fragments by various wiring methods as is recommended, for instance, in fractures of the thyroid cartilage. Fixation is a particularly useful method for fracture lines running through the curved greater cornua, at their junction with the body. In these cases fractures caused by compression can be well apposed by tension band wiring, with the 'cross' of a figure-of-eight lying on the outside; the intact periosteum on the inside thus providing good counter-traction.

**Key words: Hyoid bone**

An assessment of the fixation can be made per-operatively, by compressing the greater horns together, in an attempt to appose them in much the same fashion as the forces causing the initial injury.

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