Hyperextension injury of the cervical spine with esophageal perforation

Case report

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A case is presented of esophageal perforation following a hyperextension-flexion cervical injury. The patient recovered without complication. Hyperextension-flexion injuries of the cervical spine have proved to be a rare cause of esophageal perforation. The mechanism may be impingement of the esophagus against an exostosis or the edge of a vertebral body, or entrapment of the esophageal wall between the vertebral bodies as hyperextension changes to flexion. If not detected and treated early, the perforation may cause mediastinitis, retropharyngeal abscess, aspiration pneumonia, or death.

KEY WORDS • esophagus • esophageal perforation • hyperextension injury • cervical spine

HYPEREXTENSION of the cervical spine has been found to be the mechanism of serious cervical spine injury in approximately one-half of all such injuries (159 cases) reviewed by Whitley and Forsyth in 1960. The patterns of hyperextension injuries have since been classified by Burke as follows: 1) posterior vertebral body dislocation; 2) complete anteroposterior ligamentous rupture; 3) hyperextension injuries masquerading as flexion injuries (well illustrated by Forsyth); 4) extension-disruption of the spine affected by ankylosing spondylitis; and 5) extension-disruption without dislocation.

More hyperextension injuries fit in the fifth category than in any of the other four. Patients so afflicted are usually older than 50 years, and have some degree of degenerative change in the cervical spine and anterior longitudinal spinous ligament, kyphosis of the thoracic spine with compensatory cervical spine lordosis, and a spinal canal narrowed by hypertrophy of the ligamentum flavum and posteriorly protruding osteophytes and intervertebral discs. Many have a history of having fallen on or sustained a blow to the forehead or upper part of the face.1,2,7

Schneider, et al.,2 reported the sequelae of hyperextension cervical spine injuries to be central cervical cord syndrome, anterior and posterior cervical cord syndrome, central cervical hematomyelia, and complete transverse cord necrosis and transection. In 1960, Morrison4 described a patient in whom hyperextension of the cervical spine had ruptured the esophagus; the patient died of mediastinitis and bronchopneumonia 2 weeks after injury. In 1976, Spenler and Benfield5 reported a patient in whom delayed diagnosis and treatment contributed to the development of a retropharyngeal abscess that required surgical drainage. We report a case that was recognized early and treated with success.

Case Report

This 53-year-old woman fell down a stairway, striking her forehead. She complained of some neck pain and was taken to a local emergency room. Examina-
FIG. 1. Flexion and extension views showing separation of vertebral bodies of C-5 and C-6.

FIG. 2. Flexion and extension views 18 weeks after injury.
tion there revealed left-sided forehead and facial abrasions and contusions, and diminished strength in the right upper extremity. Cervical spine films taken with the neck extended showed marked separation of the anterior vertebral bodies of C-5 and C-6 (Fig. 1). The sagittal diameter of the cervical canal measured 10 mm at that level. The patient was transferred to the North Carolina Baptist Hospital where pneumomediastinum was detected on a chest film. After skeletal traction of 5 lb had been applied, repeat roentgenography showed normal vertebral alignment with a pocket of prevertebral air. Endoscopy showed anterior and posterior tears of the esophagus 1 to 2 cm above the sternal notch.

**Operation.** Through a vertical midline cervical incision, the esophageal tears were repaired with separate suture closure of the muscularis and mucosa layers. A nasogastric tube was inserted, multiple drains were placed in the wound area, and a regimen of broad-spectrum antibiotics was begun.

**Postoperative Course.** Barium swallow x-ray studies done 1 and 2 weeks postoperatively showed no leakage of contrast medium. After 6 weeks of skeletal traction and 12 weeks of cervical stabilization in a four-poster brace, flexion and extension films (Fig. 2) were repeated and showed no vertebral instability. The patient has had no further arm weakness and no difficulty in swallowing or eating.

**Discussion**

Esophageal perforation is a rare sequela of severe hyperextension of the cervical spine. The mechanism by which the esophagus is ruptured may be 1) a trapping and pinching of the posterior esophageal wall as the anteroposterior ligament ruptures and the vertebral bodies separate, then snap back as flexion occurs, or 2) an impingement on the sharp edge of one of the separated vertebral bodies, as suggested by Morrison, and Spenler and Benfield.

Regardless of the mechanism, esophageal perforation is a serious injury and can be fatal if not diagnosed and corrected early. It should be suspected and investigated in any patient with a severe hyperextension injury of the cervical spine.

**References**


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