"Hangman's Fracture" of the Cervical Spine*

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Traffic accidents occasionally produce a distinctive variety of fracture (or fracture-dislocation) of the upper cervical spine, characterized by a bilateral avulsion-fracture through the neural arch of the axis without injury to the odontoid process and with or without fracture-dislocation of the 2nd cervical vertebral body upon the 3rd. The similarity of this lesion to that effected by the modern technique of judicial hanging justifies its description as "hangman's fracture" of the cervical spine.

Some years ago one of us (R.C.S.) published a radiograph of a lesion sustained in a traffic accident which revealed just such an avulsion-fracture of the laminar portion of the neural arch of the axis with accompanying marked dislocation of the axis upon the 3rd vertebra (Fig. 1). Though the detailed case history had been lost the author recalled the surprising survival of the patient without neurologic defect; the mechanics of the injury remained unknown. Subsequently two of us (R.C.S., K.E.L.) collected a series of 8 patients involved in traffic accidents in whom this same type of cervical lesion was manifest and for whom both clinical material and the evidence of follow-up examinations were available for consideration. This clinical information has been correlated with an assessment of the mechanics of modern judicial hanging and this anatomicopathological correlation has afforded a plausible concept of the mechanism involved in such fracture-dislocations. The victims of judicial hanging are naturally not available for study, but traffic victims with "hangman's fracture" may survive and thus permit the

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Fig. 1. Roentgenogram showing fracture-dislocation of C2 vertebral body anteriorly on C3 with complete avulsion of neural arch of the axis from the body. (Reprinted through the courtesy of Charles C Thomas and Kahn et al.5)
evaluation of clinical status, of the ultimate fate of traumatized spine, and of the possible means of prevention and treatment of such injuries.

Case Reports

Case 1. A.J., a 34-year-old mill worker, was admitted to Providence Hospital, Portland, Ore. on March 24, 1962, having been injured several hours previously when he was thrown from his car as it struck a pole. He sustained abrasions of the head and right side of the body.

Although comatose he responded to painful stimuli with slight movement of his left extremities. The pupils were equal and there was bilateral internal strabismus and a continuous rotatory nystagmus. He was areflexic. Roentgenograms of the cervical spine showed bilateral avulsion of the pedicles of the 2nd cervical vertebra with subluxation of the 2nd vertebral body on the 3rd. Slight compression fracture of the 3rd cervical vertebra was noted and there was marked retropharyngeal swelling (Fig. 2). Crutchfield skeletal traction was applied 24 hours later, replacing the halter traction. The patient became more alert but he had difficulty moving his tongue and swallowing so that his condition required a tracheostomy on March 26. Since the traction markedly increased the distraction of the spinal alignment at the site of the fracture-dislocation, the weight was decreased, skeletal traction was removed, and the fracture was treated by immobilization in slight cervical hyperextension in a Minerva jacket.

At the time of the patient’s discharge from the hospital on April 14, 1962 he was able to eat and swallow and no longer required a tracheostomy tube, but he still had a residual left hemiparesis. The Minerva jacket was replaced with a cervical brace, which the patient removed intermittently against advice. When last seen on May 24, 1962 he had regained strength in the left leg but still had a painful and paretic left arm.

Case 2. A.B., a 40-year-old registered nurse, was admitted to Providence Hospital on April 17, 1962, 48 hours after having been thrown from her car when it skidded from the road. The patient had not been unconscious. She complained only of tingling of the left arm and hand but these symptoms disappeared within a few days.

The neurologic findings were normal except for a bilateral diminution of the biceps reflex and a transient left extensor plantar reflex. Roentgenograms of the cervical spine demonstrated a bilateral avulsion of the pedicles from the body of the 2nd cervical vertebra (Fig. 3).