TREATMENT OF ACUTE FRACTURES AND FRACTURE-DISLOCATIONS OF THE CERVICAL SPINE BY VERTEBRAL-BODY FUSION

A REPORT OF ELEVEN CASES

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Acute injuries to the cervical spine with or without involvement of the spinal cord and/or cervical nerve roots continue to be a difficult therapeutic problem. Whether to use simple skeletal traction or open operation (laminectomy) has been a controversial topic in neurosurgery for many years. Regardless of the method of treatment used, the percentage of salvage in these patients is not great.

Since the contribution of skull tongs for skeletal traction by Crutchfield7,8 in 1933, very little has been added in the way of new technique or methods of treatment in these cases. In the past 2 years, however, several reports have appeared on the treatment of lesions of the cervical spine by an anterior surgical approach.1,9,10,12,18 An original operation was developed independently by the writer in 1956.2 The anterior surface of the cervical spine is exposed through a small transverse skin incision and blunt dissection through the line of cleavage between the carotid sheath and the thyroid. Using a 14 mm. drill, a hole is made through the intervertebral space to the spinal canal, through which acute disk ruptures, osteophytes, tumors, etc. can be removed. The adjacent vertebral bodies are fused by inserting a cylindrical dowel into the hole. In the past 3 years over 200 patients with lesions of the cervical spine have been operated upon by this method. Included in this series were 11 patients with acute fractures or fracture-dislocations of the cervical spine.†

This new method of early surgical treatment has resulted in a complete change in our therapeutic program for these patients. The end results are far superior indeed to those obtained by methods used previously. Space will not permit a detailed description of these cases, which will be reported elsewhere.3,6 A statistical review is presented to show the degree of injury to the spine and nervous system, the treatment employed and results obtained. The advantages of this new method of surgical treatment over standard methods are discussed.

STATISTICAL REVIEW

Method of Injury. The 11 patients with acute injuries of the cervical spine treated from 1956 through 1959 were all males ranging from 14 to 60 years in age. The injury was the result of automobile accidents in 4 patients, 3 by collision; 1 of these was thrown from his car, and 1 patient rolled his small car over at high speed. Four patients received their injuries by a fall, 3 of whom were intoxicated. Swimming and diving accidents accounted for 2 injuries and 1 patient was struck by a falling limb of a tree.

Injuries to Cervical Spine. The patients were classified into three groups depending upon the nature of the injury to the cervical spine as demonstrated radiologically: (1)
acute dislocation; (2) chronic (or delayed) dislocation; and (3) compression fracture. Anterior dislocation or subluxation occurred in 10 of the 11 patients. Five of these (50 per cent) occurred at the C5-C6 level, 3 at C4-C5 and 2 at C6-C7.

(1) Acute dislocations. The roentgenogram demonstrated an anterior dislocation at the time of injury in 8 patients. The dislocation was classified as marked (Fig. 2A) in 3 (75 to 100 per cent), moderate in 3 others (25 to 50 per cent) and slight in 2 patients (10 to 20 per cent). Additional fractures of either spinous processes, facets or vertebral bodies were present in 6 of the 8 patients.

(2) Chronic dislocations. At the time of injury the roentgenogram in 2 cases showed no evidence of dislocation, although 1 patient had a linear fracture through the body of C5. Films taken at a later date (3 weeks in 1 patient and 4 months in the other), demonstrated a moderate and marked anterior dislocation respectively.

(3) Compression fractures. In 1 patient, in a diving accident, there was a marked compression fracture of C4 with severe anterior angulation of the cervical spine but no dislocation (Fig. 1A).

Injury to Spinal Cord and/or Nerve Roots. In 10 of the 11 patients there was neurological evidence of motor or sensory impairment indicating involvement of the spinal cord and/or nerve roots. The spinal cord injuries with motor and sensory impairment involving all four extremities occurred in 7 patients. Three of these were quadriplegic on admission with complete motor and sensory loss below the lesion; 3 others were markedly quadriparetic and 1 patient was moderately so. Three of the 11 patients had motor impairment in the upper extremities only; and 1 patient had no motor involvement. All patients complained of pain in the neck and shoulders and in one or both upper extremities. The pain was recorded as severe in 8 cases and moderate in 3.

Therapeutic Program. All patients were treated the same, that is, with initial trac-

![Fig. 1. (A) A 19-year-old, 6'7" college basketball player thrown by a wave in heavy surf. Compression fracture of C4; laceration of posterior (intraspinous) ligaments (arrow). Quadriparetic on admission to hospital. (B) Vertebral-body fusion of C8-C4-C5, 1 year after operation. Marked anterior angulation, asymptomatic and not apparent clinically. Complete functional recovery. Patient played varsity basketball 4 months after operation.](image-url)