ANTERIOR OPERATIVE APPROACH IN CASES OF SPINAL-CORD COMPRESSION BY OLD IRREDUCIBLE DISPLACEMENT OR FRESH FRACTURE OF CERVICAL SPINE

CONTRIBUTION TO OPERATIVE REPAIR OF DEFORMED VERTEBRAL BODIES

H. VERBIEST, M.D.

Department of Neurosurgery, State University of Utrecht, Utrecht, Holland

(Received for publication November 24, 1961)

The anterior or anterolateral approach to the lower five cervical vertebral bodies is one of the newest techniques in spinal surgery. Its usefulness has been demonstrated in recent years in the treatment of tuberculosis or tumors of the vertebral bodies, the removal of cervical-disk protrusions and the performance of interbody or anterior fusion of the cervical spine.

Anterior fusion for stabilization of fracture-dislocations of the cervical spine was advocated by Bailey and Badgley. They found this method to be of real value: 1) after laminectomy, especially when extensive or when the dura mater was left open; 2) when the spinal injury was associated with severe maxillofacial injuries; 3) in the presence of osteoarthritic lipping, which later may require laminectomy or foraminotomy; and 4) in case of disruption of an intervertebral disk, which may lead to early or late displacement of the vertebral body. These authors were convinced that anterior fusion will find more extensive application but, on the other hand, they stated that anterior fusion is not indicated if reduction has not been attained by traction of the skull.

While this paper was being written, Cloward’s report appeared, describing his experiences with vertebral-interbody fusion by the anterior approach in 11 patients with compression fractures or fracture-dislocations of the cervical spine. Initial traction was followed by reduction of the dislocation, removal of intraspinal diskal protrusion, and interbody fusion. Two of the patients were operated on within 48 hours and 5 within 10 days. In 3 cases operation was delayed 3½ weeks, 8 weeks and 4 months after injury respectively. Cloward himself called this new form of treatment revolutionary. Ten patients survived. Complete recovery of nerve-root and spinal-cord injuries was noted in 5 patients and almost complete recovery in 4. As a side effect Cloward described the occurrence of anterior angulation of the cervical spine after interbody fusion in 50 per cent of the patients with traumatic lesions, while this deformity was noted in only 10 per cent of cases of cervical diskal disease. Braces, collars or casts did not prevent anterior angulation. Cloward was of the opinion that traumatic disruption of posterior ligaments as well as possible injury to the vertebral body may explain the fact that under the influence of compression forces applied to the anterior half of the vertebral bodies the hard cortex of the bone graft drifts into the weakened bone of the vertebral body resulting in anterior angulation of the cervical spine.

Promoting factors may have been the sitting position in which all his patients were placed after operation and the practice of early ambulation. In Cloward’s opinion however it does not make much difference from a functional standpoint whether the spine heals in a normal or markedly angulated position.

On the basis of personal experiences with anterior operations in the treatment of some tumors of the cervical vertebral bodies dur-
ing the past 7 years, a new technique was developed for treatment of old traumatic irreducible displacement of bone with development of spinal-cord compression. Encouraged by the results, the procedure then was used in some cases of fresh fractures and fracture-dislocations because of the presumed presence of a posterior diskal protrusion.

A. Late Cases of Irreducible Displacement of Bone with Development of Spinal-Cord Compression. This series consisted of 3 chronic cases in which it was not possible to obtain reduction of dislocation and good alignment of the portion of the cervical spine involved by skull traction alone. One patient had a flexion dislocation and the other 2 presented the tear-drop type of flexion fracture-dislocation. The patients entered our department 8 months, 15 and 12 weeks after injury respectively. The displacement had become irreducible because of inadequate treatment in 2 patients, while in the third it had been discovered too late. The current treatment in such cases consists in decompressive laminectomy and section of the dentate ligaments (Kahn’s operation). Schneider and Kahn stressed the fact that subsequent fusion of the spine frequently is indicated. The disadvantage of laminectomy is that it may promote instability of the spine. Moreover, the performance of effective posterior spinal fusion after laminectomy, especially in the presence of anterior angulation of the cervical spine, may present great difficulties. The techniques used in our anterior operations were developed in accordance with Rogers’ rule: protection of the spinal cord, complete reduction, adequate fixation. Reduction was obtained by anterior columnotomy combined with skull traction while fixation was effected by repairing the traumatic vertebral-body deformity and performing anterior spinal fusion.

Special attention was paid to the prevention of secondary spinal angulation. Cloward’s standpoint that secondary anterior angulation is not important as regards functional recovery, is not beyond question. Abnormal anterior angulation is compensated by reflexes maintaining the erect position of the body, and enabling the patient to look straight ahead (the so-called primary position of the eyes). In marked cervical anterior angulation the patient assumes a well-known posture with forward, hyper-extended head and increased extension of the trunk. Although this mechanism may provide a sufficient functional adaptation, it may give rise to complaints, which were clearly defined by Brocher. He stated that each increased or pathological curvature of the spine may lead to disturbances, often localized at distance from the site of the original deformity, implying an increased risk of disablement for those whose employment consists in strenuous work.

Case 1. W.W., male, 19 years old, when diving into shallow water on July 19, 1959, had sustained a flexion injury with forward dislocation of the 4th cervical vertebra, without locking of the articular processes. On admission in a local hospital he experienced paresthesias in the whole body but neurological findings were normal. He was treated with skull traction and subsequently with a Minerva jacket. When the Minerva jacket was removed on Sept. 24, 1959 the dislocation appeared to have increased and the height of the corresponding intervertebral diskal space had decreased considerably. The tips of the articular processes were in nearly “riding” position. The patient complained of paresthesias in the whole body on anteflexion of the head. These complaints did not disappear. He was admitted to our department on March 29, 1960.

Examination. Roentgenograms revealed wedging of the anterior portion of the C5 body, increased dislocation of the 4th cervical vertebra and anterior angulation of the cervical spine (Fig. 1A). Tendon reflexes of the arms were exaggerated, more on the right than on the left. Skull traction with weights up to 20 kg. did not result in any reduction.

Operation, April 8, 1960. With the patient in skull traction, right anterolateral retrosigmoidal approach was made. A flap of the prevertebral fascia made by a curved incision in the area of C4–C5 was reflected to the left.

Anterior columnotomy was done at the inferior surface of the 4th cervical vertebral body. Following this procedure complete reduction of the dislocation was achieved with skull traction of 15 kg. Residual fragments of disk between C4–C5 were removed. A wedge-shaped cortical graft was prepared from the tibia. This corrected the wedge-