Anterior Cervical Fusion by the Smith-Robinson Approach*

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We are presenting our personal experiences in treating cervical disc disease and spondylosis by the Smith-Robinson technique of discectomy and anterior cervical fusion. Based upon careful analysis of the results, it is our feeling that this operative method is superior to those commonly used for these conditions in the past.

Modifications of the posterior approach have usually been used to treat various conditions of the cervical spine, depending upon the condition expected. One might treat a nerve root compressed by osteophytes by a foraminotomy; a soft posterolateral disc protrusion by partial excision through an interlaminar approach; spinal cord impingement from a ventral ridge by total laminectomy, perhaps combined with dentoate ligament section; and midline disc herniation by laminectomy and transdural resection.

We believe that all of these conditions can be effectively treated by a single operation, without variation, consisting of total disc excision from an anterior approach followed by interbody bone grafting. We have utilized it in a series of 86 patients with disc protrusion and/or spondylosis of various kinds. Our results indicate that this operation has been successful for all of these conditions.

Preoperative Analysis and Preparation
We have rarely resorted to operative intervention without first giving the patient a fair trial of conservative treatment consisting of traction, immobilization by collar or brace, and physiotherapy. Except in acute conditions with intractable pain, we can often foretell the probable success of the proposed surgery by whether or not the patient responds to adequate preoperative rigid immobilization in a two-poster brace.

The level or levels to be approached surgically are determined by the clinical picture, the plain x-ray films, the myelogram, and open discography or discometry. We have avoided percutaneous discography or discometry because we are convinced that false results may occur when the tip of the needle is inadvertently placed in the end-plate of the vertebral body rather than into the nucleus pulposus, thus preventing free flow of the injected material.

We feel that anterior cervical fusion should always be a combined neurosurgical-orthopedic endeavor, the neurosurgeon and orthopedist working as a team in evaluating and treating the patients preoperatively, combining their efforts in the performance of the operation and cooperating in the postoperative care.

Operative Technique
The operative technique is essentially that described by Smith and Robinson, with a few modifications of our own.

The patient is anesthetized, intubated, and placed in the supine position on the operating table with an inflatable thyroid bag under the scapulae. The arms are placed at the sides and the shoulders pulled down with adhesive tape, depressing them as much as possible to obtain an acceptable lateral x-ray film later in the procedure. Head halter traction is applied with 5 lbs of weight being used initially. The right anterior iliac region is usually designated as the donor site, since it is on the opposite side of the operating table from where the surgeon stands who performs the initial work on the neck. In this manner, the neurosurgeon can approach the disc from the left side of the neck, while the orthopedist obtains the bone graft from the right iliac crest. The right hip should be elevated with a sandbag or a folded sheet to fa-
cilitate exposure of the iliac crest. The site of the neck incision is best draped with a thyroid sheet, applied with the long end towards the head and suspended from intravenous poles; in this manner the surgeon can work much more comfortably than when the drapes are supported on a standard ether screen.

A transverse supraclavicular incision is made, the left side of the neck being chosen to avoid injury to the recurrent laryngeal nerve. The level of this incision is determined by the relationship of the clavicle to the involved space or spaces as seen on the standard anteroposterior x-ray film of the cervical spine.

The platysma is cut transversely, and a cleavage plane developed by blunt dissection between the sternomastoid muscle and carotid sheath laterally and the esophagus and trachea medially which are elevated from the anterior surface of the vertebral column by blunt finger-dissection. It is helpful to use a small Richardson retractor to displace the esophagus and trachea medially, and a thyroid retractor to pull the sternomastoid muscle and carotid sheath laterally. Upon visualization of the anterior surface of the vertebral bodies, 20-gauge discogram needles are inserted into the center of the disc spaces chosen for testing. A lateral x-ray film is taken, using a portable cassette holder, to verify the level or levels (Fig. 1).

In our earlier cases, we resorted to discography with diatrizoate sodium, 50%. We have now abandoned discography, however, in favor of simple discometry, using physiological saline solution for that purpose. The normal disc will accept only 0.1 to 0.3 cc of normal saline under pressure, whereas a pathological disc will accept from 0.3 cc to an unlimited amount of solution, which flows in without resistance. Care must be taken that the bevel of the needle is not against the subchondral bone or a false-negative discometric reading may result. It is interesting to note that there usually is a clear positive correlation between myelography and discometry, which, however, does not always agree with the findings on the plain films. We have frequently observed that a soft disc protrusion, as evidenced by the myelogram, discometry, and operative findings, appears at a level which may look normal on the plain films. After the level or levels have been identified by the needles on the lateral x-ray, the traction is increased to 20 lbs before proceeding with disc excision.

Once the level or levels to be attacked have been decided upon, the diseased disc or discs are then completely excised down to the posterior longitudinal ligament, including careful removal of the cartilaginous end-plates of the vertebral bodies. This is accomplished with pituitary rongeurs and curettes. Where an intraspinal extension of the disc exists, a hiatus is frequently found in the posterior longitudinal ligament and may be gently probed with a blunt nerve hook. Extruded fragments can often be extracted from within the canal with a small curette and a pituitary rongeur.

A bed with parallel surfaces is prepared to receive the iliac graft at each interspace to be fused, after anterior vertebral spurs, if present, are removed to facilitate its entry. The diameter of the bed is measured in three dimensions: width, height, and depth. A malleable silver probe and a metric rule are utilized for this purpose.

Fig. 1. Polaroid film with identifying discogram needle (arrow) which has been placed into disc at C6–7.