Anterior cervical discectomy without bone graft

Report of 71 cases

DONALD H. WILSON, M.D., AND DWIGHT D. CAMPBELL, M.D.
Department of Neurosurgery, Dartmouth-Hitchcock Medical Center, Hanover, New Hampshire

Anterior cervical discectomy without bone grafting may become the procedure of choice for acute cervical disc protrusions. This operation was performed on 71 patients, all of whom were followed from 1 to 6 years. Complications were minor in nature. The results were excellent and sustained.

KEY WORDS • intervertebral disc • cervical disc • anterior discectomy

Anterior cervical discectomy without interbody fusion may become the procedure of choice for acute cervical disc protrusion. Our experience includes over 100 patients operated on in this manner at this institution between April, 1970, and June, 1976. We are reporting 71 patients who were operated on under the personal direction of one surgeon. All were followed for 1 to 5 years after surgery.

Clinical Material and Methods

Patient Selection

Anterior cervical discectomy was performed for acute cervical disc protrusion, defined as incapacitating brachialgia of sudden onset, of relatively short duration, and unresponsive to a reasonable trial of cervical traction. Most patients had objective evidence of radiculopathy on clinical examination and all underwent Pantopaque myelography. If the myelogram was abnormal at more than one level, discectomy was performed at the level suggested by the clinical features, and if these were confusing, further clarification was obtained by electromyography. If the myelogram was normal, surgery was not performed. Neck pain alone justified neither myelography nor surgery. As our experience grew, we paid little attention to spondylosis on plain films, and even less to “foraminal encroachment” on oblique views. These were usually unchanged on postoperative x-ray films, even though the patient was relieved of pain. We agree with Murphy and Gado that the soft component of the so-called “hard disc” accounts for the acute onset of brachialgia.

It was decided at the outset not to publish our results until every patient had been followed for at least 1 year and many for 5 years. Patients were scheduled for visits at 6 weeks, 6 months, and then yearly after surgery. However, as the years went by, fewer patients kept their appointments for the simple reason that they were well.
Operative Technique

Our operative technique, which has now been standardized for 3 years, represents a gradual evolution. Many of the earlier operations were performed under the operating microscope, eventually abandoned for the less cumbersome ×3 loupe and fiberoptic light. At first osteophytes were removed using curettes, small punches, or the air drill. Later they were left untouched when the postoperative plain films (especially the oblique views) showed little or no change, although the patients were relieved. In the beginning cartilaginous plates of the contiguous vertebrae were removed by curettage. But this too was abandoned when we found that the vertebrae showed progressive anatomical fusion when the plates were left intact, contradicting the opinion that fusion of bone occurs only when interposing cartilage is removed.

The patient receives a Betadine shower on the eve of surgery and is shaved an hour before the operation. He lies supine on the operating table, under endotracheal anesthesia, with the head turned 20° to the left side. For ease of retraction and for greater visibility of the posterior longitudinal ligament, the head is not extended. The skin is prepared with Betadine and alcohol.

The subcutaneous tissue is infiltrated with a solution of Xylocaine (1%) and adrenaline (1:200,000) to separate the platysma muscle from the skin. An incision is made from the midline, extending laterally over the disc level to the middle of the sternomastoid muscle on the right side. The subcutaneous tissue is undermined above and below, and the platysma muscle is divided longitudinally in the direction of its fibers. The medial border of the sternomastoid muscle is identified. Connective tissue between this muscle and the thyroid strap muscles is divided by sharp dissection until the index finger can be inserted comfortably into this avascular space and the carotid artery can be felt. By blunt, slow dissection the connective tissue medial to the carotid sheath is separated until the finger palpates the cervical vertebrae. The tissue beneath the esophagus is divided the full length of the wound so it does not pouch into the field. Hand retractors are used to expose the prevertebral fascia. This is torn in the midline superiorly and inferiorly as far as possible, exposing usually three vertebrae and two discs. A spinal needle is inserted into the uppermost disc and a lateral x-ray film is made to determine the correct level. The needle is removed and Cloward self-retaining retractors maintain excellent exposure of the area. The prevertebral muscles are retracted and the anulus fibrosus is excised as widely as possible with a No. 11 scalpel blade. With narrow rongeurs and small curettes as much disc as can be seen is removed. The intervertebral spreader, inserted into the right side of the disc space, is spread to a minimal degree and usually does not have to be replaced to remove remaining disc. All disc is removed down to the posterior longitudinal ligament and laterally to the uncinate processes. These appear at the extremities of a gradual upward curve of the inferior vertebra. The operation is then concluded.

The posterior longitudinal ligament is not excised, the nerve root is not seen, and no attempt is made to explore it or probe into the canal. In the past, excision of the ligament and probing the root canal did not reveal a "free" fragment, and often resulted in brisk and unnecessary bleeding. Although it is possible to miss a fragment by not excising the posterior longitudinal ligament, we believe that most protrusions have a tail leading back into the disc space and this, together with the posteriorly protruding disc, is removed along with the rest of the disc material. Even in cases where plain films showed marked spondylosis and a very narrow disc space, it was surprising how much soft disc material could be removed.

A closed silver clip is laid within the interspace. The platysma muscle is closed carefully with 4-0 interrupted silk sutures to prevent a depressed scar, and the skin is apposed with subcuticular Dexon sutures.

The patient is encouraged to be up and around on the same day. A collar is not used. If the patient has more than mild neck pain, heat, massage, and neck exercises are recommended for a few days. We found that the severity of posterior neck pain was directly proportional to the extent we spread the vertebrae during disc removal.

X-ray films are taken on the third day. These consist of a single anteroposterior film and lateral flexion-extension views. The patient is usually discharged after 3 to 7 days.

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Summary of Cases

Onset of Symptoms

There were 36 women and 35 men in our series, the majority of whom were in the fourth and fifth decades of life. Twenty associated the onset of their pain with some form of neck trauma, although only one (unrelieved) had experienced a "whiplash" injury. Many were awakened from sleep by the first onset of pain; 47 patients presented with symptoms of less than 6 months duration.

Diagnosis

Signs indicative of a single root involvement were found in 36 patients. Myelography confirmed the clinical localization in 34 cases. A further 29 patients had focal signs of single root involvement; the level could not be deduced clinically with complete confidence, but was diagnosed by myelography. In the remaining eight patients, brachialgia was typical but focal signs were absent. In three of these, the myelogram gave a false-positive diagnosis.

Myelography revealed an obvious single level of abnormality in 62 patients, indicating a slightly higher degree of accuracy than the clinical signs. It was found a necessary complement to physical examination.

Surgical Procedures

Sixty-nine patients underwent anterior cervical discectomy at one level. Only one patient (unrelieved) had two cervical discs removed at one time. Another patient had a disc removed at the wrong level. This was corrected a few days later. Thirty-six discectomies were performed at the C6-7 level, 30 at C5-6, five at C4-5, one at C3-4, and one at C7-T1.

Operative Results

Relief of pain was immediate and sustained in 24 patients. At the first follow-up examination 6 weeks after discharge, 56 patients in the series had recovered fully except for some who still had paresthesiae in their digits and loss of reflexes in their appropriate muscles. These latter features often took several months to clear. By the second follow-up examination at 6 months, 68 patients had recovered and had resumed their usual activities.

Three patients were not helped by surgery. The first had diffuse pain in the upper limb and no localizing signs. Plain films showed marked spondylosis at several levels. The myelogram showed root cutoffs more severe on the appropriate side at C4-5 and C5-6. These discs were removed at one operation. The patient was not relieved. Later, the C6-7 disc was removed and a Smith-Robinson fusion performed at this level without noticeable effect. Bone grafts were then placed at the original discectomy sites. This patient was unrelieved and remains so. The second patient had suffered a "whiplash" injury. Like the first patient, his pain was diffuse and there were no focal signs of root involvement. Myelography revealed the appearance of a disc protrusion at C5-6. Discectomy failed and so did a subsequent Smith-Robinson procedure. The third patient presented with clinical features similar to the first two. Symptoms were diffuse. Anterior cervical discectomy and later bone grafting at the same site gave him no relief.

The average length of stay in hospital after discectomy was 5 days. Postoperative complications were minor and transient. Except for an elderly woman who had a pneumonitis which was immediately recognized and quickly cured, there were no infections. Nine patients experienced severe posterior neck pain for several days; a wound hematoma resolved without drainage; hoarseness and dysphagia occurred in two patients for a few days but neither had recurrent laryngeal palsy.

Standard anteroposterior and lateral flexion-extension x-ray films were taken before discharge, at 6 weeks, 6 months, and then yearly. Only seven patients showed slight motion at the operative site after surgery. The rest had no motion at all from the time of the first film. Thus, functional stability usually occurred immediately. Twenty patients showed anatomic fusion by 1½ years (Fig. 1). The rest showed subtotal obliteration of the disc spaces, with only thin lines to demarcate the contiguous vertebrae. The involved interspaces collapsed immediately after operation, much more so than occurs after lumbar discectomy. Some patients showed forward angulation of the cervical vertebrae above the surgical site, but this appearance on x-ray film had no clinical significance in our cases and eventually corrected itself.
FIG. 1. Plain films taken of a patient with anterior cervical discectomy. Upper Left: April, 1970. Preoperative film shows spondylosis most marked at C5-6, although clinical signs were typical of a C6-7 disc protrusion. Upper Right: April, 1970. Postoperative film shows silver clip at operated level with marked collapse of the interspace. Note marked spondylosis at C5-6 which remains unchanged in the subsequent films. Lower Left: November, 1970. Anatomic fusion is beginning. Functional stability was present since first postoperative film. Note remodeling of the spondylotic spur at C6-7. Lower Right: October, 1971. Complete fusion has occurred with absorption of the spurs at C6-7. Angulation above fusion is of no clinical significance, and the spurs at C5-6 have not enlarged.
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Thirty-six patients had obvious spondylosis associated with their disc protrusions. The areas of severe spondylosis were often at different levels than the protrusions. These patients were relieved by discectomy alone, whether or not the spurs were removed.

Observations

The following observations were derived from this group of patients:
1. Cervical disc protrusion usually occurs at one level.
2. The clinical features of cervical disc protrusion are typical. When these are combined with myelography, an accurate diagnosis can be made and relief by discectomy reasonably assured.
3. Spondylosis alone is a rare cause of incapacitating brachialgia. It may or may not be present in conjunction with disc protrusion, and in most cases can be ignored. Where present, it is the soft component of the "hard disc" that is usually responsible for the patient's trouble.
4. Neck pain alone, atypical symptoms without localizing signs, or a normal myelogram are contraindications to discectomy.
5. Anterior cervical discectomy without bone grafting is a further refinement of previous techniques for the removal of a cervical disc protrusion. The operation fulfills all the criteria for effective surgery: minimal dissection through normal tissue planes, little interference with normal anatomical structures, adequate visualization and complete removal of offending matter, quick recovery in relative comfort, few complications, and sustained relief.
6. After anterior cervical discectomy there is immediate functional stability of the contiguous vertebrae with collapse of the interspace. This is followed by more gradual anatomic fusion, not prevented by retained cartilaginous plates.
7. The so-called "whiplash" injury rarely causes cervical disc protrusion.

Discussion

In 1960, Hirsch first described the operation of anterior cervical discectomy without interbody fusion, and in 1964 he and his coworkers reported another series. It was surprising that these papers, which reported excellent results, received little attention in this country at the time. Boldrey in 1964, and Susen in 1966, presented their experience with this technique, but no results were published until several years later by Murphy and Gado, Robertson, and Hankinson and Wilson. When our series began in 1970, only Hirsch's results were known to us. It was gratifying to find that our optimism for anterior cervical discectomy was being confirmed by others and that their excellent results closely paralleled our own. Our fairly large series of patients followed for a long time merely adds conviction to the belief that anterior cervical discectomy without interbody fusion represents a refinement of other techniques for the removal of acute cervical disc protrusions. The operation can be recommended with little reservation to be simple, safe, and effective.

References


Address reprint requests to: Donald H. Wilson, M.D., Department of Neurosurgery, Hitchcock Clinic, Hanover, New Hampshire 03755.