Posterolateral Disc Herniation


Abstract

Object. Anterior cervical foraminotomy has been advocated as a procedure that preserves the motion segment while treating radiculopathy due to degenerative cervical disc disease. Because the medical literature contains no long-term follow up or randomized studies related to this procedure, the authors reviewed their results, specifically examining cases of failure to determine the efficacy of the approach.

Methods. The authors identified 23 patients in whom unilateral cervical radiculopathy due to degenerative cervical disc disease was refractory to conservative therapy and in whom anterior cervical foraminotomy was performed between 1998 and 2000. The procedure involves ipsilateral exposure, microsurgical removal of the uncovertebral joint to identify the nerve root, and partial removal of the lateral anulus and or disc fragments. Data in those patients who underwent reoperation(s) were reviewed specifically for the procedure type, interval between index procedure and reoperation, and whether multiple procedures were performed. Of the 23 patients, 30% required at least one additional procedure. A good or excellent outcome at last follow-up examination was achieved in only 12 patients.

Conclusions. In the current study the authors found a reoperation rate that is considerably higher than that in most series of anterior cervical surgery for radiculopathy. The presumed benefit of anterior cervical foraminotomy is preservation of the disc interspace; however, in this study, a significant number of patients failed to experience a satisfying outcome. Currently the authors do not recommend anterior cervical foraminotomy as a stand-alone procedure.

Mentioned also is arthritis of the joint; however, there is no such thing as an uncovertebral joint.

In 1858 Luschka described the uncinate process and named it the eminentia costaria, because it resembled the head of a rudimentary rib. He thought it was associated with a joint cavity lined with a synovial membrane that had papillary elements that secreted synovial fluid. This observation turned out to be as imaginative and erroneous as that of the astronomer who described canals on Mars. In 1893 to signify the joints of Luschka.

In 1834, Rathke found that joints of Luschka were merely fissures in the anulus fibrosus. Kroghdahl and Torgersen confirmed the existence of a cavity that was 2 to 4 mm in length. It was situated between the uncinate process and the corresponding facet of the vertebra above. They described the cavity caused by a separation of vertical fibers of connective tissue at the posterolateral aspect of the disc.

In 1942 Haglund concluded on the basis of cadaver studies that the joints of Luschka were in fact fissures in the anulus that were a manifestation of an early phase of disc degeneration. As disc degeneration progressed the fissures were noted to become continuous with more centrally placed annular fissures.

Frykholm in 1951 reviewed the literature concerning uncovertebral joints and conducted extensive studies of this region of the cervical spine. He stated, the true nature of the uncovertebral fissures is evident from the anatomic arrangement of the epiphyseal rings that completely cover the uncinate processes. All structures enclosed between the epiphyseal rings of apposed vertebræ must therefore be equivalent to the anulus of the discs. Consequently the ‘uncovertebral joints’ belong genetically to the annulus fibrosus.

He observed that the uncovertebral fissures were lined with fibrocartilage with the same histological structure as that of the anulus. Frykholm found that “a certain amount of gliding” of one vertebra on another with forward and backward flexion of the neck was most pronounced “opposite the uncinate processes.” He believed that the uncinate processes restricted sideward flexion of the neck and that the occurrence of fissures in the uncovertebral region was the result of the anulus being much thinner there than elsewhere. He concluded, “It is inadequate to speak of uncovertebral joints and of special uncovertebral joint arthrosis.” He also noted that the right and left uncovertebral clefts spread across the posterior aspect of a disc to form a single fissure.

Payne and Spillane studied 70 cadaveric cervical spines. They stated, we have found by careful study of thin sections that an uncovertebral fissure approximately 3 × 3 × 1 mm is indeed present in all adult spines. It is only absent in infant spines. Synovial membrane was never detected by histological study of the uncinate part of intervertebral discs. We consider the fissures to be a separation of annular fibers. With increasing age they can be identified more readily, and they frequently become ragged after middle life and join up with other fissures in the central disc material and the anulus. The explanation for the appearance of uncovertebral fissuring probably lies in the stress imposed on the lateral parts of the discs as the consequence of the mobility of the cervical spine. To some extent, the uncus, by restricting lateral flexion, is protective. The wide range of movements occurs at the expense of wear and tear in the uncinate part of the disc where the effects of gliding of one vertebra upon the other are most likely to be felt.

In 1967, Hirsch, et al., concluded that the controversy regarding uncovertebral joints arose as the result of inadequate methods of study. They used sagittal, horizontal, and oblique sections that they examined radiographically, angiographically, macroscopically, and histologically. They believed their studies proved that the uncovertebral area does not contain a joint. They found that uncovertebral fissures first appeared in a patient at the age of 7 years and at age 14 years and older they were consistently present at both upper and lower cervical disc levels. Other signs of degenerative change in the anulus were obvious after the age of 14 years.

In Jho’s editorial the posterior approach for cervical radiculopathy is described as being a posterior foramin-
omy, but a posterolateral cervical disc herniation (PLDH) typically is situated at the site of the nerve’s dural pouch. The removal of bone that is required to expose that portion of the nerve is approximately the diameter of a cranionomy burr hole. It spans from the lateral aspect of an interlaminar space to and including the medial one third of a facet joint. The location of a typical PLDH at the site of the nerve root sleeve is obvious on a cervical myelogram. The extension of the subarachnoid space around the nerve is obliterated. Usually the lateral aspect of the dural sac is indented at that site as well.

When exposed by a posterior approach, the caudal margin of the herniation may be visible in the axilla of the nerve, or its cephalic edge may barely be seen at the “shoulder” of the nerve. At times the herniation is entirely concealed beneath the nerve. In each case the herniation obliterates the nerve root sleeve. It is not within the intervertebral foramen.

There are several anatomical facts that are important to an understanding of posterolateral cervical disc herniations and their relation to uncovertebral pathology. The anulus fibrosus of a cervical disc does not form a complete rim around the entire circumference of the disc as it does in the case of lumbar discs. Instead, the anulus has a crescent shape so that it is attenuated at the posterolateral extent of the disc. The posterior longitudinal ligament meets the attenuated anulus at that site. It forms the posterior rim of the disc. The junction of these two elements is the weakest part of the disc; consequently, this is the usual site for a cervical disc herniation. It is also the site of the uncovertebral portion of the disc, the site of an uncovertebral osteophyte, and corresponds to the location of the dural pouch of a cervical nerve.

Occasionally an uncovertebral osteophyte contains a small amount of disc tissue that extrudes from a narrow fissure between the “lips” of the osteophyte. A small bit of disc material within an uncovertebral osteophyte would probably not be recognized during an anterior approach. The resulting acute clinical presentation is entirely comparable to that seen in a classic instance of a PLDH. At operation the involved nerve is noted to be elevated over an underlying uncovertebral osteophyte that contains a small amount of disc tissue. The herniated disc tissue may go up the suction tube with an audible slurp before its true nature is fully appreciated. It is not necessary to remove the osteophyte.

This lesion is of interest because it supports the concept that a painful radiculopathy requires compression and inflammation. This could be an explanation for relief of radicular pain by an anterior discectomy, even though disc fragments that have been extruded through a rent in the posterior longitudinal ligament may not always be seen and removed. Henderson et al. reported relief of radicular pain via a posterior approach when the nerve was simply decompressed and the herniation was not disturbed. In fact, they stated that the herniation was seldom even visualized! Finally, it is well known that the relief obtained with removal of a herniated disc is often immediate, whereas the inflammatory change in the nerve may be evident on magnetic resonance imaging for weeks thereafter.

The debate concerning the respective merits of anterior and posterior surgical approaches to cervical discs has gone on ad nauseam, but if only the treatment of acute postero-lateral disc herniations is considered some sharp lines can and should be drawn. The statements made by Jho in his editorial offer a starting point for such an appraisal.

Jho admitted that the posterior approach “has been associated with excellent outcomes in the literature. In addition it does not require sacrifice of a functioning motor unit.” Nonetheless he states, “It has, however, been less favored than anterior procedures because the pathological process is often located anterior to the nerve root, surgical positioning is difficult, epidural bleeding is burdensome, and postoperative incision-related pain is significant.” Let us consider his objections one at a time.

Indeed, a PLDH is located anterior to the nerve root, but it is at a very precise site that makes it possible to limit the removal of bone to an area approximately the size of a dime. This precise location of the herniation immediately under the nerve at the level of the nerve root sleeve is an asset to the posterior approach, however, and not a problem as Jho asserts.

Jho goes on to state, “Surgical positioning is difficult.” He does not elaborate on that assertion, but I assume he is referring to the sitting position because the prone position adds considerable difficulty to the operation, and the sitting position has been the position used by most surgeons who utilize the posterior approach. If that is the case, I fail to understand his objection. The sitting position has been used without “difficulty” since the Cushing era. With the advent of excellent monitoring methods, venous air embolism has become a minor problem. The sitting position allows excellent visualization of the operative site, it affords a comfortable posture for the surgeon, congestion of epidural veins is minimized, and there is no pooling of blood in the depths of the wound at the site of the disc herniation such as that which occurs in the prone position. The sitting position is a most advantageous position for cervical disc surgery. It does not constitute a valid objection to the posterior approach. It is, however, useful to support the elbow in such a manner as to elevate the shoulder and relax the nerve.

Furthermore Jho complains, “Epidural bleeding is burdensome.” Cloward said the same thing. In my experience this is not a major problem with the patient in the sitting position, although it may well be if the prone position is used. The epidural veins and extradural fat are wiped off the nerve with a small cotton patty. Cotton patties packed within the extradural space around the nerve provide essentially a bloodless field as the herniation is exposed and removed. On occasion, an epidural vein has to be coagulated and divided to gain access to the herniation.

In case the herniation is retained by the posterior longitudinal ligament, the plane of dissection between the nerve and the posterior longitudinal ligament is somewhat obscured by an inflammatory response that causes a rather dense adherence of the nerve to superficial fibers of the ligament, which form a capsule to the herniation. It is not, however, necessary to dissect the nerve completely free of the capsule or to expose its entire extent. If only approximately one third of the capsule is exposed it can be incised. Either a spontaneous extrusion of a disc fragment(s) occurs, or a blunt nerve hook inserted through the capsular incision allows a bloodless intracapsular dissection. The free edge of a disc fragment is exposed and grasped with a small forceps. In the case of free disc fragments