

Tips On Selective Endoscopic Discectomy: The YESS Technique

Anthony T. Yeung, M.D.

Since 1991, as I gained experience with arthroscopic micro-discectomy, a procedure first described by Parviz Kambin, M.D., I have gradually treated an ever increasing spectrum of disc herniations previously thought to be beyond the scope of AMD. I would like to share a few tips on the techniques I now use which allow me to routinely perform a targeted posterior fragmentectomy, remove very large herniations, and extract far lateral extruded extra foraminal herniations. I have chosen to call my technique selective endoscopic discectomy. Utilizing the new **Yeung Endoscopic Spine Scope System (YESS)**, it is now also possible to perform foraminoplasty with trephines, rasps, burrs, and micro osteotomes. Many of these tips are only for advanced arthroscopists who have become comfortable and successful with central nucleotomies and broadbased disc protrusions.

The continued evolution of arthroscopic microdiscectomy depends on the visualization and documentation of pathology contributing to discogenic pain. That includes identification of extruded fragments and annular tears as well as extraction of the collagenized portions of the herniated nucleus pulposus contributing to the herniation. Painful structures can be visualized and evaluated. If the bony anatomy will not allow the surgeon to reach the area of the spinal canal, knowledge of the anatomy will allow the surgeon to simply trephine or drill through bone to get to the disc fragment or bone spur. Some patients may have unique findings such as conjoined nerve roots not seen on MRI, or synovial cysts, fractured endplate fragments adherent to the disc fragment.

I have incorporated into the posterolateral technique the inclusion of an intraoperative discogram using Isovue 200 mixed 4:1 with indigocarmine. Indigocarmine is a common dye used intravenously by urologists to locate the ureteral opening in the bladder. The intraoperative discogram allows me to correlate the patient's response to the provocative discogram with findings on the video screen and arthroscope. The discogram is helpful in determining whether the herniation is of soft, degenerated nucleus pulposus or may involve collagenized fragments that show up as a void that may or may not be outlined by the stain and contrast agent. At times the contrast agent will extravasate and outline the nerve root or an extruded fragment not visible on the MRI. I now use the discogram to grade annular tears and correlate the tear pattern with the likely hood of the tear to heal with new and novel use of thermal energy to shrink and reduce the size of these tears, whether caused by a disc herniation or simply from a painful degenerative process.

Perhaps the most critical part of AMD is the targeted placement of the cannula in the best position possible for visualizing and removing the pathology. This is generally as far posterior and proximal as safely possible to allow for visualization of the traversing nerve root, epidural fat and herniated disc. In order to accomplish this, the needle must be placed at the medial border of the pedicle rather than in the middle of the pedicle. When the instruments are also as proximal as possible, the exiting nerve root forming Kambin's working triangle may also be seen. Rather than arbitrarily selecting the distance for the needle entry point, a postero central placement can be estimated by measuring the distance from the center of the disc to the skin as identified on a lateral intraoperative C-arm view, parallel to the disc, then moving 1 or 2 cm further lateral from the midline spinous process to get a more posterior angle. This is more accurate than arbitrarily

selecting a point 8 - 12 cm from the midline or depending on the size of the patient.

At L5S1 it may not be possible to get a posterocentral placement because of a wide S1 facet or a high pelvis. Getting a preoperative Ferguson view is helpful. In order to get the most posterior position, it is usually best to enter the disc slightly superior, just skimming over the inferior end plate of the superior vertebra, but parallel to the superior end plate of S1. This position allows the surgeon the best chance to visualize both the traversing as well as the exiting nerve root since the cannula is closest to the axilla. Of course, when the surgeon is attempting to place the cannula as close to the nerve root and dura as possible, it is necessary to use precautionary techniques to prevent injury to the nerve or dura by removing the needle or stylette before advancing the blunt obturator the last cm to dock on the annulus. The best needle position varies slightly at each disc level. If it is not possible to enter the disc because of severe narrowing, the surgeon can safely dock on the superior facet of the inferior vertebra. He may then use a trephine inserted in a special slotted cannula to cut his way into the disc. L4-5 or L3-4 generally has the most room for cannula placement. As the surgeon places the cannula at each higher disc level, the size of the triangular working zone decreases. In general, the most space is available at the most medial and distal part of Kambin's working triangle.

I find it easier and faster to anesthetize the annulus with an 18 gauge 10" needle than with cottonoids. I inject 1-2 cc of 1% xylocaine with epinephrine in the disc space and the annulus. This will not anesthetize the nerve root if used judiciously. If the nerve is partially anesthetized, the short acting xylocaine will allow faster return of feeling and function than marcaine. The blunt obturator can also be used to direct the needle past the nerve root. After inspecting the annulus, if there are small veins in the way, I simply cauterize them with a radiofrequency electrode. To be more effective, the water or saline may be evacuated from the cannula. Touching the cannula wall with the electrode will not have any effect on the adjacent tissue. Cauterization should be accomplished by direct visualization using an operative scope. The annulus is then fenestrated bluntly or with the 3 mm trephine followed by the 5 mm trephine, if necessary. Sometimes I evacuate some nucleus pulposus through the 3 mm hole first if the patient experiences leg pain with the 5 mm trephine.

Once the annulus is fenestrated, I start with the upbiting pituitary forceps, then straight forceps, ramp forceps and the side cutting shaver blade without irrigation. However, the newer shaver systems that have an irrigation port are more aggressive and effective. Because of it's aggressiveness, you must also be more careful to not suction in the nerve root with the disc fragment. Sometimes the fragment is adherent to the nerve. Care must be taken to monitor the patient's sense of pain when removing the disc fragment. If pain is encountered, stop and use the operating scope to inspect the area and free up the nerve with endoscopic Penfield dissectors. Elimination of the fluid sealing adapter allows greater penetration of the disc and allows the surgeon to feel the blade cutting and extracting the nucleus pulposus. This step is important in the learning curve, as the surgeon will learn to "feel" whether the shaver is grabbing disc tissue. Likewise, it is just as important to learn to feel for collagenized fragments when using the uniportal technique. The cannula should be held against the annulus to prevent the nerve root from being suctioned into the operative site.

Depending on the patient and size of the herniation, a biportal or uniportal technique can be utilized. At the end of the procedure the disc is inspected. If there is any bleeding, it is controlled again by radio-frequency. I am testing various probes for this purpose, and have concluded that a

bipolar probe (Ellman) is the safest to use. Irrigation with the tip of the YESS scope with suction on the tip or working channel during the procedure also helps clear up any bleeding that obscures visualization. In each 3,000 cc bag of irrigation fluid, I add three ampules of epinephrine and 80 mg of gentamicin. I cool each bag overnight in a standard refrigerator. The cool saline and epinephrine help reduce capillary bleeding.

Since the working cannula is placed posteriorly, the epidural fat, posterior longitudinal ligament and traversing nerve root can be visualized before terminating the procedure. There are various cannula configurations. The most versatile is the cannula with the oblique opening. By now, the patient will already experience relief of his preoperative leg pain, and it is easy to probe the epidural space to confirm that the nerve root is thoroughly decompressed.

Whenever there are large posterior herniations present, it is usually a good idea to prepare for a biportal approach. This affords the surgeon the ability to evaluate the instruments and learn to use the new deflecting forceps (Endius). I anticipate gradual modification of current instruments and development of new instruments to make the learning curve easier and shorter. I hope these few hints on technique will help you make your next AMD easier.

A formal course and preceptorship is recommended for any surgeon wishing to perform AMD as described. Because of the demand, I have initiated a formal preceptorship that concludes with lectures and a cadaver hands on session. Surgeons who are serious about learning the YESS technique of selective endoscopic discectomy and thermal annuloplasty can register with Richard Wolf Instrument company at 1-800-323-9653.