The Role of Provocative Discography In Endoscopic Disc Surgery

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Introduction

Lindblom first described discography as a useful tool to identify intervertebral disc ruptures in 1948.(1) Hirsch then correlated the disc injection with pain reproduction.(2) Since then, with improved understanding of the pathophysiology of discogenic back pain, its usefulness in selecting patients for surgical treatment has been validated and widely accepted by physicians who use it for the clinical management of chronic low back pain.

For ten years discography was set back due to a poorly done study by Holt, who found a 37% false positive rate using highly irritative Hypaque transthecally in a prison population, prompting him to conclude that discography has no value as a diagnostic test.(3) Holt's study was repudiated 20 years later by Simmons,(4) then Walsh,who found discography to be 100% specific, although its sensitivity could not be determined.(5) Walsh concluded that discography was a valid method to determine that the disc was a pain generator. Colhoun correlated a positive discogram with good surgical outcome (89%) in patients treated by anterior/posterior fusion(6). Moneta found strong correlation of outer annular tear disruption with pain provocation during discography.(7)

With the advent of minimally invasive techniques, both Saal(8) and Yeung(9) began to use electro-thermal and radio-frequency techniques to treat the painful annular tears. Saal utilizes a thermal resistive catheter threaded adjacent to the inner annulus while Yeung prefers a visualized technique that incorporates removing the degenerative interpositional disc tissue from the annular fibers.

In spite of numerous studies validating discography as a useful patient selection tool for various treatment protocols, controversy continues, primarily from physicians who do not perform their own discograms but rely on others to help with patient selection, and attention given to articles that point out the variability in defining discogenic pain and the ability to determine concordancy in pain reproduction.

The Role of Discography in Selective Endoscopic Discectomy

Since 1991, the author has performed his own discograms and has utilized provocative discography to help identify the pathologic lesion in thousands of lumbar discs. The endoscopic technique is used for a broad spectrum of disc herniations as well as discogenic back pain from internal disc disruption. The discogram was not only used for pain provocation in patient selection, but also to stain the degenerated disc material, annulus and epidural tissue that would come in contact with the non-ionic water soluble discographic material (isovue M 200). A vital dye, (indigocarmine) was added to the radiographic agent (1-2cc mixed with 9cc isovue). The indigocarmine would selectively stain the acidic degenerative disc tissue and would outline the annular tears in the disc and annulus. An endoscope with distal irrigation was then utilized to visualize the disc tissue and annular tissue surrounding the annular tear.

It was soon recognized that discographic findings were more sensitive than MRI in identifying the presence of a painful abnormal disc, and degenerative disc tissue could be selectively removed, preserving normal disc tissue, which had a different endoscopic look and consistency. The discogram was able to identify the type, location, and extent of the radial and circumferential tear

as well as help in identifying the type of disc tissue involved in the herniation. A large collagenized fragment or an endplate fragment would be seen as a void in the discogram, whereas a soft disc herniation would be stained through out. Lateral tears connecting with the exiting nerve root could be visualized with discography, but invariably missed by the MRI

Pain Provocation

With the surgical technique relying on a discogram to label the targeted disc material in every endoscopic discectomy, the author had the opportunity to compare a patient's reaction to the discogram provocation with his response with and without sedation. Pre-operative discography performed for the purpose of identifying the painful disc amenable to techniques of selective endoscopic discectomy and thermal annuloplasty required two concomitant findings. The discogram pattern had to be abnormal in identifying the disc structure causing the pain, and pain provocation must be severe. enough to warrant the risks of endoscopic disc surgery. For the purposes of pain reproduction, the patient was asked to describe the pain using analog scale of 1-10 separately for back and for leg pain. Only pain scale numbers 5 or more were considered clinically sufficient for surgical intervention. The patient was also asked to describe his pain as concordant , similar, or discordant. The procedure was always done without sedation and with only the skin anesthetized. If the patient had pain reproduction, but the disc morphology was considered normal, this was insufficient to be considered a positive discogram for surgical purposes. If a patient had an abnormal discogram pattern, but did not have pain reproduction level 5 or higher, this was considered insufficient for surgical intervention. The discogram pattern was described in accordance to the degenerative stages as calssified by Adams(10) and the extent of the radial tear by the Dallas Discogram Description(11). The circumferential component was divided into quadrants of involvement in the absence of a post discogram CT scan. This method of discogram classification was utilized as an integral part of the YESS technique for selective endoscopic discectomy.(12). Other unusual patterns were described separately as endplate separation, intranuclear herniation into the end plate, radial tear communicating with the thecal sac, or simply unclassificable due to complete uptake of the dye through venous channels.

Concordancy Versus Non-Concordancy

It was soon recognized that the requirement of concordancy versus non concordancy was an exercise in futility, as the unanesthetized patient was usually too traumatized by the severity of pain reproduction that he could not tell immediately whether the pain was concordant or not. The usual response was the reproduced pain was much worse than his usual pain, yet the results of surgery eliminated his usual pain post operatively. Therefore, much of the controversy centers on defining what is discogenic pain and the requirement of concordancy to validate the test.

Patients with a low pain threshold ,with drug dependency, or suspected psychologic factors requiring complementary treatment or who would be poor candidates for any surgical treatment could be easily identified by the way they responded to the discogram process itself. Patients who could not tolerate the needle puncture into the skin or could not tolerate the pain of needle insertion into the annulus would be considered poor candidates for any surgical intervention. These patients would also be unable to relay information about pain concordancy.

If a patient was sedated for surgery, He would usually report less pain on the analog scale while sedated than when he underwent his provocative discogram pro-operatively. The pain reproduction would usually be cut in half while sedated.

Clinical Use of Provocative Discography

The author has treated over 1700 discs in over 1000 patients using discography as an integral part of the endoscopic procedure. Discography has helped with patient selection, and as a guide to intradiscal pathology. Visualized pathology could be probed and studied in a conscious patient, and herniations could be targeted by following the stain.

The role of provocative discography extends beyond patient for fusion. With emerging new minimally invasive techniques for treating discogenic pain, the ability to identify the pain generators in the lumbar disc will enhance development of techniques for annular healing and augmentation, nucleus replacement, and endoscopic stabilization of the disc.

To do so, discography will become an integral part of the process, and it is imperative the the literature of the future be by surgeons who are capable and interested in performing their own discography in order to avoid the inter-observer variability that confuses the reader of scientific articles that raises doubts about the role of discography simply because there is no real definition of discogenic pain.(13) For the time being, until we can standardize the definition and perform discography in a standardized manner, the best option to improve patient selection is to encourage rather than discourage physicians who use discography for patient selection to do their own discography. That way, there can never be a false positive discogram, only a false interpretation of a painful discogram.

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Identify Pain of Discogenic Origin The Back Letter 15: number 6 June, 2000

Rev. 7/30/2000