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Invited Commentary

To Treat or Not to Treat; The Disc is the Question

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In 2001, Jarvik and Deyo stunned the neuroradiology community with their perspicacious analysis of vertebroplasty (1). Their landmark opinion paper published in the American Journal of Neuroradiology was not an analysis of the technique, the utility, or the results of a series. Rather, it was an incisive look at the need for a randomized, controlled, trial regarding the utility of percutaneous vertebroplasty.

Percutaneous discectomy is a procedure that has been performed via one method or another for over twenty years. Over that time, there have been many studies documenting the clinical outcome. Over that same period of time, other treatment options coupled with controversy has effected further development.

A brief historical overview of percutaneous discectomy is warranted. Chemonucleolysis has been the most widely used method for percutaneous discectomy, first performed by Lyman W. Smith in 1963(2). The goal of chemonucleolysis is chemical dissolution of the nucleus pulposis. Typically this is done via a percutaneous route. The most commonly used method is chymopapain; a proteolytic enzyme derived from the papaya plant. Chymopapain cleaves the proteoglycan into glycosaminoglycan and mucoprotein. The major issue relating to this procedure was the relatively significant morbidity associated with the use of chymopapain. Thus, despite the performance of over 400,000 procedures(3) and despite the presence of randomized and double blind studies(4), this procedure has lost its appeal in the United States. The FDA no longer allows its use.

Specific causes of the problems are varied. Many of the original users were performing the procedure on primitive or with absent, fluoroscopy. Without X-ray, one could not be confident of the placement of the needle. In addition, it is difficult to predict the amount of nucleus that will be digested, leading to cases of over-decompression, disc collapse and destruction. As a proteolytic enzyme the action is not limited to disc tissue but rather any tissue in its wake. As such, there were cases of transverse myelitis and paraplegia as neural tissues were damaged and destroyed. In addition, one can have an anaphylactic response to the enzyme and this led to a number of widely publicized deaths.

The resultant complications and unintended sequelae of the treatment with chymopapain led a variety of traditional spinal specialists to form very antagonistic opinions to the use of chymopapain. Having been in their view scarred by chymopapain, many of these same specialists then rejected all manner of percutaneous disc decompressions.

Hijikata first described manual percutaneous decompression of the nucleus in 1975 utilizing a fenestrated punch (5). In 1985, Onik and Maroon developed a blunt-tipped, reciprocating suction-cutting probe for automated percutaneous lumbar discectomy (APLD) (6). To date, it is thought that over 100,000 patients have been treated in this fashion.

Choy et al (7) introduced the YAG laser to vaporize nucleus pulposis in 1991. Dr. Choy has continued to perform these procedures through the years. Studies demonstrated a sharp drop in nuclear pressure after disc ablation of nuclear material(8). The relief of pressure became a core thought regarding treatment of herniated disc.

The Saal brothers pioneered intradiscal electrothermal annuloplasty (IDET) and started performing them in 1998. This was based on a new theory of "annuloplasty." The idea was that by heating the annulus one could seal tears and destroy the Type C afferent nerve fibers that innervate the outer one third of the annulus. The IDET requires threading a curved resistive heating wire around the posterolateral annulus under fluoroscopic guidance. Once properly positioned the wire is heated to 90 degrees centigrade which, in theory, allows annuloplasty (9). The historical relevance of this procedure is that it advanced an essentially new concept in therapy. There have been many success stories and this treatment has quite a few supporters. However, there are also many skeptics to this new theory of pain control via annuloplasty. Still others have pointed out that the temperature achieved in the annulus is not high enough to destroy the afferent nerve fibers (10).

Nucleoplasty utilizes the Perc D Spine Wand which is a 1mm bipolar instrument that utilizes Coblation technology. The process generates a unique low temperature plasma field, for controlled/cold ablation with minimal risk of thermal injury. The ablation mode generates a plasma field at the tip which then results in molecular dissociation of the disc material directly in front of the tip. The tip of the wand is S shaped and creates well delineated channels within the disc. By rotating the wand the S shape allows for the creation of multiple channels. Over 12,000 cases have been performed worldwide to date with low complication rates. Sharps reported on the effectiveness of this technique in a study published in this journal. He described an overall 79% success rate using a variety of objective pain criteria.

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Stryker launched the Dekompressor in October of 2002. The Dekompressor utilizes a patent pending Archimedes pump principle to efficiently remove nucleus pulposis tissue from bulging or contained herniated discs. This appears to work via a combination of pressure and volume reduction. This is a battery operated, disposable system and the company was successful in acquiring a Medicare Pass-Through Code. Unpublished reports suggest that significant pain relief and global satisfaction exists in the 80% range.

The varied history of percutaneous discectomies has in many ways hampered the natural explosion that should have occurred, and be occurring with these various types of therapies. Insurance companies are slow to embrace this technology in part because of the reluctance of their traditional surgical advisors.

Conversely, the traditional pain community has a somewhat conflicted vested interest as well. Many patients are currently treated with epidural steroid injection and selective nerve root blocks that form part of the mainstay of traditional pain practices.

The time has come for a rigorous evaluation of early therapy with percutaneous decompression. A critical mass of emerging technology and corporate strength is now available.

In 1997, the World Medical Association issued the declaration of Helsinki which contained recommendations for physicians using human subjects in medical research. This declaration states, "In any medical study, every patient-including those of a control group, if any, should be assured of the best proven diagnostic and therapeutic method (11)".

Sir William Osler said, "the philosophies of one age have become the absurdities of the next…" (12). Today, it would be considered inappropriate to suggest that early treatment of herniated disc with formal percutaneous discectomy is the desirable approach. After all, everybody knows that a combination of physical therapy, ESI and SNRB will work. However, beyond even a very cursory analysis one realizes that numerous complexities are intertwined including the patient's likelihood of improving on their own as well as the above mentioned physician incentives or disincentives.

Ambroise Pare changed medicine when in an assault on Turin in 1537 he ran out of the boiling oil that surgeons of the day used to treat gunshot wounds (13). He improvised an emulsion of eggs, rosewater and turpentine and discovered that these patients did much better than those treated in typical fashion.

In the 19th century, the medical profession adopted the scientific method to determine the values of medical practices. Improving awareness of bacteriology, immunology, and epidemiology led to better public health. By all accounts, utilizing the scientific method advanced medicine to heights that had previously been unimaginable.

The time has come for a study comparing different techniques for early treatment or discogenic disease. I call on the interventional pain community to take lead in this effort. I further call on the corporate world to help by sponsoring studies in this arena. If, as my bias leads me to suspect, that there is value added in rapidity of improvement associated with acute intervention via percutaneous decompression socioeconomic studies would necessarily follow. We should not fear these studies; rather, we should embrace them. Ultimately, by confronting the issue of early treatment the interventional pain community can take lead in new treatment paradigms, if the studies warrant them.

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