Artículo Original

Minimally Invasive Treatment for Lumbar Discs Herniation
Targeted by Anterior Epidural Endoscopy Epiduroscopy

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ABSTRACT

Epidural endoscopy is an efficient option among conservative modalities in the management of refractory low back pain. The purpose of this paper is to evaluate retrospectively the effectiveness of the treatment of this condition with targeted O2/O3 and steroid therapy. The procedures were performed in 75 consecutive patients who failed to show significant response to at least 6 weeks or longer from treatments that included anti-inflammatory and analgesic drugs, physiotherapy and posterior epidural steroids and/or facet joint injections. These procedures were performed during the year of 2006 to 2011 and all the patients have been followed up for at least 2 years. Patients evaluated by Visual Analogical Scale (VAS) pre and immediately post procedure informed an improvement of mean 80% of their previous pain status. Follow up revisions with one, three, six, twelve and twenty four months showed persistent improvement percentage at mean 60%. The Oswestry Disability Index (ODI) showed significant changing in status pre and post procedure related to the pain control condition. No serious complications were related to the procedure. Targeted Epidural endoscopy associated with injection of O2/O3 and steroids is a safe and efficient minimal invasive procedure to be used in patients with refractory low back pain. The association with ozone (O2/O3) and steroids seems to result in a long lasting pain relieve, giving to the physician and to the patient a wider window to work on the treatment of others frequent associated causes (emotional, socio economic and environmental) of refractory back pain.

Keyword - Epidural Endoscopy, Low Back Pain, Ozone-Oxygen Therapy, Steroid Therapy.

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INTRODUCTION

Chronic low back pain (CLP) is a very common symptom and important sign of a clinical and social problem that affects every human being (2). Approximately 70% of adults will suffer from back pain to varying degrees and at some moment in their lives. About 1.6% to 43% of these patients will have associated sciatica (3). Around 5% to 15% of cases, the origins of low back pain are generally related to facet joint degeneration and disc disease (4).

As ten percent of the patients suffering low back pain will have no improvement after 6 to 8 weeks of conservative treatment (5), others options should be include in the treatment to relief the patient’s pain. In some cases, also the clinical picture, the image diagnoses, the patient decision and treating physician’s experience will define the next treatment choice. It is not an easy decision. Clinical and image picture can be dazzling. Sometimes there is no clear explanation for patient’s symptoms or they are contradictories mainly in elder patients and patients that had submitted to a previous surgical procedure of the spine (6).

Anterior epidural endoscopy is an option among minimal invasive modalities in the management of the lumbar pain and disc herniation. It can be used for it’s diagnose and treatment and was included in the armamentarium in 1966 by Saberski and Kitahama (7, 8). This technique allows you to navigate, diagnose and treat the exact place of lesion without any additional (other tissues) lesions.

To the physician should be the presence of inflammatory mediators in the genesis of the low back and radicular pain (9,10,11) and the many modulators used in the treatment considering, anesthetics, corticosteroids, Clonidine, and O2/O3 mixture and its direct application in the place of pain origin (12,13). The purpose of this chapter is to evaluate retrospectively the effectiveness of the treatment of this condition targeted by anterior epidural endoscopy.

MATERIAL AND METHODS

This retrospective study evaluated the results of procedures performed in 75 consecutive patients with lumbar disc herniation in MRI or CT and Electroneuromyography of lower extremities. The patients are those who failed to show significant response to at least 6 weeks or longer from treatments that included anti inflammatory and analgesic drugs and physiotherapy. These procedures were performed during 6 years period (2006-2011). Patients with facet joint pain or sacroiliac joint pain associated as major causative factors of disability were exclude. Age, gender, time of onset, cause, duration of pain, history of previous surgical interventions was collected. All patients had image study analysis with plain x rays in anterior posterior and lateral/oblique positions, Magnetic Resonance and/or Computerized Tomography (or both) of...
the lumbar spine. Pain in pre and post procedure evaluation was made using a Visual Analogical Scale (VAS) and the patients graded in percentage for his or her improvement immediately, at 1, 3, 6, 12 and 24 months post procedure so that all the patients had the minimum follow up of 2 years. For the work ability the evaluation used was the Oswestry Disability Scale before and after 3 month of the procedure. The Microsoft Excel Statistical Pack was used to analyze the data. The charts of all patients were reviewed by a third person who was not evolved in their treatment, contacted them for result evaluation and confirmation.

PROCEDURE TECHNIQUE

All procedures were performed under light sedation by an anesthesiologist and in a conventional surgical theater and sterile operating room with monitoring systems. The patients were positioned in prone and the lumbosacral area prepared and draped as a sterile field. The epidural space was entered through the sacral hiatus using a Spinal Endoscopy Access Kit (Myelotec). A Touhy18-gauge-90-mm needle is inserted after local anesthesia with 5 cc of Lidocaine 2% without vasoconstrictors. A 0.9 mm wire was inserted through the needle and advanced with fluoroscopic control to L5/S1 level. The needle was taken out and followed by a 3-mm incision around the wire with the advancement of a 3.8-mm x 17.8-cm dilator over the guide wire. The internal part of the dilatators was then taken out and the two working channels video guided catheter with 3.0-mm x 30 cm (Myelotec) was introduced with video endoscopic (0.8-mm fiberoptic spinal endoscopy) and fluoroscopic guidance to the level of suspected pathology. The catheter with the fiberoptic were manipulated and rotated in multiple directions with visualization of the nerve roots at various levels. The widening of the epidural space was carried out by slowly injections of normal saline (maximum of 120 ml) (hydro dissection) and manipulation of the catheter under the endoscope and fluoroscopic visualization (mechanical dissection). We avoided the injection of contrast materials for correct positioning the catheter. Upon confirmation, the procedure was accomplished with the application of Clonidine (0.5 micrograms/kg); Marcaine 0,5% 4 ml; Solumedrol (steroid) 2 ml (80mg); Fentanila 0,5 ml(25 micrograms per ml). Ozone (O2/O3 mixture) 10ml with a concentration of 10 micrograms per ml is injected at the end. The catheter was taken out and an absorbable suture applied to the wound.

The patients were evaluated, oriented by the physiotherapist and discharged at the end of the same day. They were maintained in anti inflammatory/analgesics for 10 days, antidepressant drugs for 2 months or as long as necessary and submitted to hydrotherapy from 10 to 20 sessions.
Procedure technique

Figure 1. – The steering video guided catheter is introduced through the sacral hiatus using the spinal endoscopy access kit.

Figure 2. – Illustration of the trajectory of the steering video guided catheter anteriorly to the dural sac.

Figure 3. – With the steering guided catheter in the anterior epidural space you can access the disc herniation.
Minimally invasive treatment for lumbar disc... Masini

Figure 4.- Image A and B corresponds to extruded lumbar disc identified by an anterior epidural endoscopy. In Image C there a small disc herniation identified in an anatomic section at the cervical spine. It is a finding without any clinical symptom very similar to those found in lumbar region.

RESULTS

The 74 patients with 75 procedures (one was repeated due to technical difficulties) which included 44 females and 30 males and the age concentration in the third, fourth and fifth decades of life (Figure 5 and 6). All these patients failed to show any significant response to at least 6 weeks or longer from treatments that included anti inflammatory and analgesic drugs, physiotherapy and posterior epidural steroids and/or facet joint injections. Clinically the patients had untreatable low back pain and sciatica without progressive neurological and no indication to open surgical procedure. Plain x rays, Magnetic Resonance and/or Computerized Tomography of the spine demonstrated that 46 (61%) patients had previous surgical procedure with instrumentation of the spine. In these cases, the posterior approach to the epidural space was practically impossible due to the scar and instrumentation. The anterior epidural approach was a feasible solution.

Patients were evaluated by VAS scale pre and immediately post procedure informed a mean improvement of 84% of their previous pain status. Follow up revisions with one, three, six, twelve and twenty four months showed persistent improvement at mean of 68%. At Figure 7 you can see that there is a fall of 15% between the moment of the procedure and after one month evaluation which is regained during the next 3 and 6 months. Patients that have improvement detected in the first month will not lose it during the next months allowing a wide window to complete the treatment utilizing other modalities options. Data also sugest a better improvemente in females than in males probably related to the way they assume the complementation of the treatment and to differences in life style. During the follow up of 6 years, 3 patients (4.1%) had a surgical procedure in the intention to reduce pain. Most of the cases with persistent pain were diagnosed as having a neuropathic pain.

The Oswestry Disability Index applied after 3 month showed improvement of
the status pre and post procedure with XX (70%) of the patients with better work capacity. This index follows the pain reduction analysis. All patients were classified as group 5 initially due to the excruciating pain, meaning that they were unable to work or assume responsibilities. After 3 months analysis, 70% were classified as group 1 showing good capacity to work. The lower index was 3 which mean patients that they are still in rehabilitation program with expectation of improvement. Worthy to mention that in other treatments the time between the procedure and the recover takes longer than 3 months. No serious complications were related to the procedure. No adverse effect of drugs. No infections. No motor deficit or sphincter disturbance.

Figure 5. – Gender

Figure 6. - Age in decades.
Minimally invasive treatment for lumbar disc... Masini

Figure 7. - Results - Evaluation of the patients along 2 years.

Figure 8. - Graph showing the improvement in Oswesty Disability Index after 3 months of the treatment. All patients were out of work before the treatment.

DISCUSSION

Saberski (7) in 1995 mentioned that epidural endoscopy is not limited to injections but also it can be used as an instrument to diagnose in many situations as hematomas, abscesses, tumors, inflammations and adhesions. It can help in the treatment to drain cists, to make biopsies and remove scars. It is known that adhesions develop after extrusion of nucleus pulposus causing a chronic chemical radiculites (9, 14) which explains the persistence of pain in many patients. The mechanical movements of the disc associated to a fissure of the annulus releases proteoglycans, which causes an autoimmune reaction next to the root maintaining the inflammatory process. The inflammatory reaction is evoked consecutively through histamine, bradykinins or prostaglandins which sensitize the
Minimally invasive treatment for lumbar disc... Masini

nerve root and the ganglion stimulating the biochemical pain (15, 16). Distortions caused by the disc fragment or the scar process do not allow adequate blood supply to the root and the ganglion stimulating de biomechanical pain. Drugs given orally or by venous injection will not reach the place to stop or reverse the inflammation process. Catabolites will not easily leave the region due to scar isolation and impaired vascular drainage. Kayama (17) suggested that the intraneural vascular compromise is probably the cause of nerve conduction distortion and pain generation which can be alleviated by reducing radicular edema and the local inflammatory process.

Sakai et al (13) related that after contrast injection in the epidural space in patients with previous surgical procedure that all of them presented some kind of block in the diffusion around the roots which did not happen in places not submitted to procedure. They also confirmed that patients submitted to epidural endoscopy, application of steroids and anesthetics had reduction in their pain and dysfunction of fibers Aβ and Aδ associated to chronic sciatica.

Geurts (18) described their experience using clonidine with analgesic and antineuropathic properties at the dorsal ganglion and anti-nociceptive property at the posterior horn of the spinal cord. They describe a good clinical response with the use of clonidine associated to hialuronidase in epidural endoscopy for incapacitating low back and sciatica pain. They confirmed that among 20 patients with normal magnetic resonance 8 patients had some epidural scars and adhesions due to very tiny discs rupture that are not clearly visible at Ct or MRI. The intra-discal effect of ozone is based on its direct effect on proteoglycans under the release of water molecules, which is followed by cell degeneration and shrinkage of tissue. The activation of fibroblasts causes additional scarring and a subsequent reduction in the herniated disc tissue under strain. Around the root ganglion space, ozone improves the tissue oxygenation and through the immunomodulation effect, reduces the release and activation of cytokines, bradykinins and prostaglandins and other pain stimulators (2, 3 and 20). After localizing the pain source, epiduroscopy allows direct injection in the targeted place, mainly in the cases where the imaging test is not evident. The 3D capability of the Myeloscope allows improved targeting. Some inflammatory mediators of pain are theorized to be "washed away" or diluted within the saline solution perfusion (7, 8,13)

Machikanti et al (19) used steroids and anesthetics through epidural endoscopy with 50% of initial pain reduction but no significant lasting result after 6 months. The association with ozone injection is probably the explanation for our long lasting results after 2 years follow up.
Oder at al (12) studied the nucleolysis with ozone combination with steroids and analgesics in 620 patients with lumbar pain. They also confirm the sustainable results with significant pain relieve mainly in patients with bulging discs. Muto at al (20), in 2008 reported their experience with 2.900 cases of patients treated by discolyses with O2/O3 intradiscal, perianglionic and periradicular injection. They relate an initial success of 80% for substantial pain relieves in disc protrusions and no major complications related to this method. This is the conclusion we have also sustained (21, 22)

Igarashi et al (23) relates the effect of epidural endoscopy and injection in the treatment of 58 patients with lumbar stenosis relating the improvement of the patients to sympathetic block and better blood supply in the compressed roots. Heavner et al (24) relates two cases of intravenous injections of contrast during epidural endoscopic procedures and relates to vein lesions and absence of wall collapse associate to fibrotic adhesions. Gill et al (25), in 2005, reviewed 12 cases of retinal venous hemorrhagic complication associated to epidural endoscopic injection and concluded the it could be associated to the speed of volume injection. He stated that the injection speed should not exceed 1 ml per second.

Boric (26) reports that after intra discal injection, ozone can accelerate the degradation of proteoglicans in the herniated degenerated nucleus pulpous leading to re absorption and dehydration with the consequent reduction of herniated material responsible for nerve root compression (27). The natural history of the evolution of an herniated disc points in the same direction in clinical treated patients with a progressive reduction of its volume shown by image follow up with the reduction of the bumping mechanism with associated to internal fibrosis of the disc and consequent reduction of the root compression. After 10 or more years, the clinical history is similar for those operated and those clinically treated for their lumbar disc herniation. The report of Alexander (28) points out that the progressive physiological reduction that occurs to the disc material is speed up by ozone therapy.

CONCLUSIONS

As more endoscopic approaches of the anterior lumbar epidural space we do, more surprisingly we see large amounts of small disc ruptures not identified in image examinations. It seems that we normally have every day ruptures that heal without perceptive major symptoms (29). Lumbar disc herniation is associated with chemical lesion of the roots and the scar caused by this chemical lesion will certainly limit the washing out mechanism of the pain stimulating factors (30). By applying the Anterior Epiduroscopic Approach you will be able to localize and release the scars and start and / or accelerate the
chemical washing out mechanism of the pain chemical substances and restructure the region to be more accessible for systemic medical treatment (31). It is also highly recommended for treating lumbar disc recurrence. We know that a very small amount of disc is the cause of the pain in these cases. The immunological reaction in recurrences cases is even worse. The root is fixed by the previous scar so the reduction of its mobility will result in more pain. Image examination will not be clear enough in identifying the compression due to the associated scar.

So the anterior epidural approach will allow you to release the scar and to initiate the medical treatment. In some cases it will anticipate the slowly anticipated recovery. That is the reason why we think this is a very good procedure for those cases with scars due to operation or with long time duration of the pain. But surely, it is still a very good procedure to accelerate the recovery of most patients with back and sciatica pain due to lumbar disc herniation. With the development and association of the mechanical and washing dissector allowed by the steering guide needle associated with laser, radio frequency and or other kinds of chemical substances, among them the ozone will increase the power of this technique. I do believe this technique will be widely used in future as a first option to treat the most of the patients with lumbar disc herniation (33, 34). Targeted Epidural Anterior Endoscopy associated with injection of ozone and steroids is a safe and efficient minimal invasive procedure to be used in patients with refractory low back pain and sciatica related to lumbar disc herniation. Targeted Epidural Anterior Endoscopy associated with injection of ozone and steroids seems to result in a long lasting pain relief, giving the patient a wider window for treatment of other frequent associated causes of refractory pain like emotional, socioeconomic and environmental.

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