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Paradigm change: "The Ozone a therapeutic mediator in MODIC processes".

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ABSTRACT

Key words: vertebral endplate, ozone, MODIC, discography, chronic low lumbar pain.

MODIC changes of signal in lumbar MRI offeres a new vision to the spine degenerations process. Several theories try to explain this phenomenom, after a critical apraisal and based on our own experience, we propose ozone intradiscal injection as an effective and safe treatment for disc degeneration disease.

Introduction

The MODIC changes [1] are the result of a degenerative process of the vertebral endplates [2,3], which combines an evolutionary triad: low back pain, radiological changes in the MRI and histological modifications ruled by biomechanics and biochemistry (table 1). We have developed our therapeutic strategy based on our clinical experience, besides the bibliographic support.

Table 1
Modic changes [1] in MRI and histological correlation [2]. Millier et al. [4] reclassifies in 4 grades giving the 0 grade as normal.

	MRI T1 STUDY	MRI T2 STUDY	CLINICAL CORRELATION
MODIC I	hypotense	hyperintense	edema of the vertebral body and hypervascularization: inflammation.
MODIC II	hyperintense	hyperintense	fat replacement of the bone marrow.
MODIC III	hypointense	hypointense	under cartilage bone sclerosis.

The MRI signal change of the vertebral endplates and the sub cartilage bone gave to the MODIC changes the capability of summarize and combine in its classification the morphological changes and the causative mechanisms. Even today some questions are not clear enough and we should understand and use therapeutic models that change the paradigm of spine degeneration.
Based on the definition of "scientific paradigm" a situation is law until a new one takes its place. It is a set of scientific facts universally known that during

certain period of time proportions a model of problems and solutions to a critical community.

My pose is based on:
1: Efficacy of intradiscal ozone injection with ozone discography (diagnostic and therapeutic) for lumbar disc herniation [5].
2: The natural history of the evolution of MODIC changes [1].
3: Avoid invasive surgery in elderly people.
4: Side effects and short term relief after the intradiscal corticosteroid treatment [2].
5: Consider that thermal annuloplasty by radiofrequency does not stop the evolution of disc degeneration [6].

The biomechanical changes [3] occur on the vertebral endplates during the disc degeneration due to micro fractures and subsequent bone spurring. Those changes determine an unequal distribution of the loads throw the disc being the cause of the endplate fissure. The endplate and the bone are weak links where the disc biological structure changes and the reveal of this micro fractures are an important source of MODIC changes. Therefore, this is reflected by edema and increased vascularization after an accumulative trauma and an inflammatory response [5] after these lesions.

The biochemical changes in the nucleus pulposus produced an inflammatory environment with pain and raise of the proinflammatory mediators as IL 6 and IL 8 and PGE2 [7]. The gen product of protein (PGP) and nervous fibers immunoreactive and the tumorous necrosis factor (TNF) this was observed in the immunoreactive cells of in the endplate in patients with MODIC I changes [8]. The C reactive protein normally is higher in patients with MODIC I changes [9].
The ozone is a biomodulator gas inducing [10] a modulation in chronic oxidative stress situation, produces inhibition of C amyelinic fibers, activates the antinoniciceptive system, and raises the endorphins by increasing the muscular relaxation with consequent analgesia. It raises the superoxide dismutase, catalase and glutathione peroxidase levels and decreases the pro-inflammatory cytokines.

The radiofrequency and nucleoplasty [6] decreases the intradiscal pressure with heat changing the collagen fiber in the annulus fibrosus. It modifies the tertiary structure of the triple spiral, producing their contraction making them more stable and getting them closer decreasing the space in disc ruptures. They also reduce pain by noniciceptive fiber heat ablation.

Materials and methods
We use the follow up of 168 patients from SPINE MEDICINE SERVICE with chronic low back pain for more than 6 months, between 2004 and 2014 with intradiscal rupture and bone edema. All of them were treated with intradiscal ozone injection (5 mL at 25 µgr/mL concentration) as only treatment. The objective was clinical improvement in the evolution we used the McNab criteria[11] and Oswestry scale [12] and their follow up was made at the first, third, sixth month and the first year after the intradiscal procedure.
Changes in MODIC scale were also checked by MRI after six and twelve months.

Results.
During this period, we find an improvement of their disability and we reach in almost all of our patients the disappearance of pain.
In 45 % of the patients, we had excellent results, in 31%, good results and moderate in 24% of the patients.
We observed the regression of MODIC changes in all patients.
At one year follow up we found an average of total symptoms remission in aproximately 100 days in the excellent result group.

Discussion and Conclusions.
Compared to other surgical approaches, the minimum procedural risk and the lower costs can be regarded as a clear advantage[13,14,15].
We know that degenerative lumbar disease with MODIC changes is a clinical, radiological and progressive situation, that has two hypotheses of its origin, the biochemical changes and the biomechanical imbalance.
Ozone therapy plays an important role in the paradigm change of spine degeneration treatment, improving the healing time, giving a permanent solution and decreasing the complications[16], we hope that new investigation models and image studies makes stand longer the law.
We conclude, based on our results, that minimal invasive non-surgical treatment with ozone therapy intradiscal injection can be considered an effective treatment for low back pain due to spine degeneration.

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