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Observational Study

OXYGEN-OZONE THERAPY IN THE TREATMENT OF FACET SYNOVITIS. AN OBSERVATIONAL STUDY OF 36 PATIENTS

M. Bonetti[1†], A. Fontana[1], G. Bragaglio[2], I. Marchina[2], G. Guarino[2] and G. Pellicanò[3†]

[1]Department of Neuroradiology – Clinical Institute Città di Brescia, Brescia, Italy;
[2]Specialist Policlinic Oberan, Brescia, Italy;
[3]Department of Neuroradiology – University Hospital Careggi, Florence, Italy

†These authors contributed equally to this work.

Correspondence to:
Matteo Bonetti, MD
Neuroradiology Department,
Clinical Institute,
Città di Brescia,
Via Gualla 15,
25128 Brescia, Italy
e-mail: dottorbonetti@gmail.com

ABSTRACT

The aim of our observational study was to evaluate the therapeutic efficacy of the treatment with oxygen-ozone therapy in patients suffering from low back pain related to interarticular synovitis. From November 2014 - October 2015, we enrolled 36 patients with a neuroradiological diagnosis of facet synovitis with magnetic resonance imaging (MRI) and symptoms characterized by back pain. Follow-up visits for the evaluation of the clinical outcome of the treatment were conducted after 30 ± 4 days and 90 ± 7 days using a modified version of McNab's method. At the clinical check-up, carried out 30 days ± 4 from the end of the treatment, in 25 patients (69.4%), we obtained a complete remission of pain with a single treatment, while in the remaining 11 (30.6 %) we carried out a second treatment ten days later, obtaining an excellent clinical benefit in 4, while in the remaining 7 (19.4%) it was decided to suspend this therapeutic option. At 90 ± 7 days of the 29 patients with positive outcomes, 27 (93.1%) reported complete resolution of painful symptoms, while 2 (6.9%) reported partial recovery of painful symptoms. Based on the excellent therapeutic results obtained in our series, we believe oxygen-ozone therapy performed with a guided CT technique is a valid therapeutic alternative for treating facet synovitis.

KEYWORDS: *oxygen ozone, facet synovitis, low back pain*

INTRODUCTION

Oxygen-ozone therapy for treating herniated discs was introduced in 1985 (1). Over the years, numerous case histories

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have been presented in the literature that reports positive results ranging from 75% up to almost 90% in the treatment of low back pain complicated or not by sciatica from disc-radicular impingement for disc herniation (1-23).

Low back pain and lumbosciatica are highly disabling pathologies, more and more widespread in every social category and at an increasingly precocious age. They arise acutely following unusual efforts or movements or slowly, often with progressive aggravation. Moreover, they can have numerous etiologies related to vertebral pathology: disc diseases, facet joint diseases, spondylolysis- listhesis, spinal canal stenosis, radicular cysts, meningiomas, and primary or metastatic tumor pathology (23). A precise diagnosis made after a careful, objective examination and supported by suitable instrumental examinations is therefore essential, in addition to standard radiograms of the spine, Computed Axial Tomography (CT), and/or Nuclear Magnetic Resonance (MRI) (5, 10, 15, 17).

We have been performing oxygen-ozone therapy at our clinic centers since 1993 to treat back pain and lumbosciatica due to disc-radicular conflict.

In this article, we report the results of the selected treatment of patients with low back pain not due to hernias and/or disc protrusions. In fact, we focused our attention on cases of synovitis.

Intra- and/or inter-apophyseal synovitis is an inflammatory disease of the synovial membrane; at the origin of this pathology, there is usually a micro or macro traumatic event; sometimes, it can also arise in young adults as a result of excessive stress of the spine, a typical finding in athletes who practice extreme sports with considerable stresses of the spine (24-28). Although the onset, in most cases, is acute with low back pain, the symptoms can be unilateral if only one joint is involved or "bar" in case of involvement of both joint masses (21).

Our study excluded synovitis of an infectious nature and any cases of SAPHO syndrome (Synovitis, Acne, Pustulosis, Hyperostosis, Osteitis) (27, 28), including exclusively those with certain post-traumatic genesis. No patient had any signs of active infection. Diagnosis is often not easy, and it is essential to perform MRI with a contrast medium to have a diagnosis of certainty (5, 10, 15, 17, 24-28).

MATERIALS AND METHODS

In this study, we propose the treatment of facet synovitis with injections of a gaseous mixture of oxygen and ozone carried out through targeted infiltrations. From November 2014 to October 2015, we selected 36 patients (22 male, 14 female) aged between 18 and 52 years (mean 34) with inter-apophyseal synovitis, of which 11 were also complicated by intra-apophyseal synovitis; 22 patients with unilateral symptoms (61.1%) and 14 patients with bilateral involvement of the facet joints (38.9%).

In all patients, the diagnosis of the pathology of the posterior compartment to be treated was confirmed with Magnetic Resonance (MRI) investigation. All MRI investigations were carried out with Siemens Magnetom AERA 1.5 T software SYNGO MR D13 using standard sequences and then completed m the examination with the use of Fat / Sat sequences without and with the administration of a contrast medium (Table I).

Infiltration Technique

The treatments were carried out under CT guidance, using the deep paravertebral infiltration technique. Then, based on the neuroradiological documentation and the patient's clinical symptoms, it was decided to treat the patient. At this point, the patient signs the informed consent after being informed about the procedure and possible complications.

Table I. *Siemens Magnetom AERA 1.5 T software SYNGO MR D13.*

T2 SAG	(Thickness 3 mm, Gap 20%, TR 3500, TE 100, Fov 300 mm, Matrix 384 Pd HF)
T1 SAG	(Thickness 3 mm, Gap 20%, TR 550, TE 9.7, Fov 300 mm, Matrix 384 Pd HF)
T2 AX	(Thickness 3 mm, Gap 10%, TR 4280, TE 100, Fov 220 mm, Matrix 384 Pd AP)
T2 SAG pair	(Thickness 3 mm, Gap 20%, TR 3900, TE 100, Fov 300 mm, Matrix 384 Pd HF)
T1 COR	(Thickness 3 mm, Gap 15%, TR 420, TE 9.1, Fov 300 mm, Matrix 384 Pd RL)
T1 FS SAG	(Thickness 3 mm, Gap 20%, TR 2500, TE 39, Fov 300 mm, Matrix 384 Pd HF, Fat/Sat)
T1 FS AX	(Thickness 3 mm, Gap 20%, TR 3500, TE 39, Fov 220 mm, Matrix 384 Pd AP, Fat/Sat)

Preliminary CT scans are performed with the patient prone to confirm the pathology and the level to be treated. The skin is then disinfected using special preparations for general skin antisepsis (CITRO JOD 100 registration No. 1805 of the Ministry of Health based on iodine polyvinylpyrrolidone). Finally, a preliminary CT scan is performed to identify the skin approach point.

Local anesthesia is performed with ethyl chloride spray, and subsequently, again using the CT guide, a spinal needle is positioned as per norm. Again, 22 G gauge needles are used. The perfect positioning of the needle at the joint level in cases of synovitis is checked with a CT scan.

A 10 ml syringe in polyethylene is filled with the gaseous mixture at a 25 µg / ml concentration. The gaseous mixture is then injected, generally injecting a variable volume from 3 cc to 5 ccs of O_2-O_3 gaseous mixture according to the pathology to be treated. After the infiltration, other CT scans are performed to document the correct distribution of the gaseous mixture. All material used needed to be sterile and single-use (Fig. 1-5).

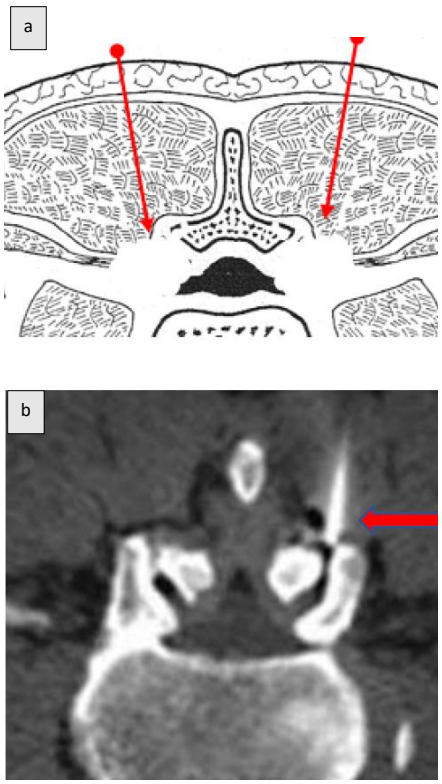

Fig 1. *A-B: The treatment is carried out under CT guidance, by injecting the gaseous mixture at the level of the articular facets. It is thus possible to check the perfect positioning of the needle (arrow).*

RESULTS

In the 36 cases selected, an almost complete resolution of the painful symptoms already with infiltration in 25 patients (69.4%) was obtained, which was then confirmed at the clinical check-up carried out 30 days ± 4 after the infiltration, so much so that no further treatments were carried out in this group of patients, while on the remaining 11 cases (30.6%) a second infiltration was carried out after 10 days and on these patients, further treatments were not conducted. These eleven patients were also re-evaluated 30 days later; 4 reported an excellent clinical benefit with the second treatment for which they were deemed clinically cured, while the remaining 7 (19,4%) considered the therapeutic result practically nil. In these 7 patients, the consensus decided to change the therapeutic strategy by relying on the orthopedic colleague for the appropriate decisions. At 90 ± 7 days of the 29 patients with a positive outcome, 27 (93.1%) reported complete resolution of painful symptoms, while 2 (6.9%) reported partial recovery of painful symptoms.

The approach to all patients has always been multidisciplinary, also making use of the collaboration of a physiatrist colleague who at the same time prepared a targeted physiotherapy program of postural re-education and in 19 cases (52.7%) also associated a therapeutic completion with tecar therapy.

DISCUSSION

The main symptom of intra and interarticular synovitis is low back pain, which is the « classic » back pain, defined as positional that is exacerbated with the movements of the torso (24). It is extremely rare that there is irradiation to the lower limb unless there is a concomitant compressive pathology on the nerve roots. It can be unilateral or bilateral back pain depending on whether the facet joints of one or both sides are involved. In our series, we treated 22 patients with unilateral symptoms (61.1%) and 14 patients with bilateral involvement of the joint masses (38.9%); this symptomatology enters into differential diagnosis with numerous other pathologies affecting the spine, such as spondylolisthesis, lumbar stenosis or herniated discs, which have often more complex symptomatological processes and are also more frequent.

In recent years, the introduction of MR sequences with Fat Saturation and gadolinium helped develop clinical treatments

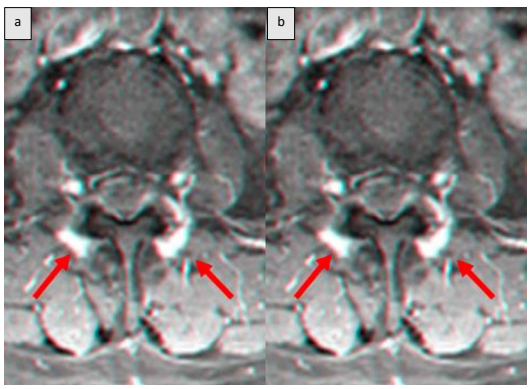

Fig 2. (A-B): *Axial Lumbosacral MRI after gadolinium administration: Bilateral post-traumatic interapophyseal synovitis (arrows).*

suited for the patient's needs, providing helpful information for patients with degenerative disease of the lumbar spine and low back pain and determining the best therapeutic strategy to be adopted (5, 10, 15, 17, 26).

In particular, in patients with non-radicular low back pain, this syndrome may arise from changes in the posterior elements of the lumbar spine (the "posterior vertebral compartment"). Although conservative treatment is usually the first approach to this pathology, it can be performed through individual postural re-education, analgesic therapies, and swimming to reduce muscle tension, reduce the load on the facet joints, and improve mobility. In case of failure with conservative therapy, radiofrequency treatment can be performed. Based on our experience treating back pain with oxygen-ozone therapy, we have included this therapeutic option in treating facet synovitis.

The excellent therapeutic results reported in our case series in treating patients afflicted by apophyseal synovitis are undoubtedly attributable to the known mechanisms of action of the oxygen-ozone mixture at the site of the disease (1-23).

The oxygen-ozone gas mixture injected at this level exerts an important anti-inflammatory and analgesic action and is thought to normalize the level of cytokines and prostaglandins, increase superoxide dismutase (SOD), minimize reactive oxidant species (ROS), and improve local periganglionic circulation with a eutrophic effect (1 - 23). In cases of intra and/or inter-apophyseal synovitis, the therapeutic effect is practically immediate, and sometimes a single infiltration may be sufficient to resolve the pathological picture (69.4% in our series). While, in cases where the therapeutic result (19.4% in our series) was poor or unsatisfactory, we sent patients to physiatrists or orthopedic colleagues for a re-evaluation of the picture to decide which therapeutic strategy to use.

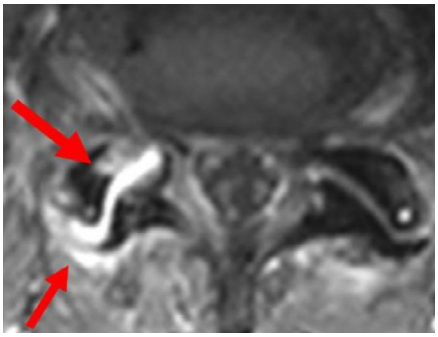

Fig. 3. *Axial MRI: right inter-intrapophyseal synovitis (arrows).*

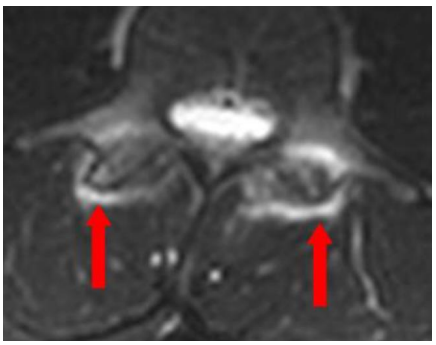

Fig 4. *Axial MRI T2 Fat Sat: interapophyseal synovitis with spongy edema of isthmuses and peduncles.*

Fig 5. *Axial MRI with contrast medium: post-traumatic interapophyseal synovitis.*

CONCLUSION

The rapid resolution of pain, with no complications, the ease of performing the method, and the complete control of infiltration under CT scan allow today to propose the CT-guided oxygen-ozone therapy as a viable alternative to the various treatments currently proposed for facet synovitis, so much that it can be proposed as a method of choice between conservative therapies. However, it is important to underline that this therapy does not contraindicate other infiltrative or surgical therapies.

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Conflict of Interest

The authors declare no conflict of interest.

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