Ozone Injection Therapy for Lumbar Facet Joint Syndrome

A Prospective Study

M. BONETTI, A. FONTANA, F. MARTINELLI*, G. PELLICANÒ*

Neuroradiology Service, City of Brescia Clinical Institute; Brescia, Italy
** Chair of Radiology, University of Florence; Florence, Italy*

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SUMMARY - *Lumbar facet joint syndrome is a common condition affecting around 80% of patients with low back pain. This study aimed to assess the therapeutic efficacy of CT-guided oxygen-ozone infiltration of the lumbar facet joints. We selected 58 patients presenting pain caused by the facet joint syndrome resistant to physical and pharmacological treatment. After O_2-O_3 injection 38 (65.5%) patients had a complete remission of pain immediately after treatment. At clinical follow-up using a modified McNab method the percentage success rate had dropped to 55.1% (32/58) one month after therapy, 46.5% (27/58) after three months and 36.2% (21/58) after six months. Our results show that CT facet joint infiltration with ozone is a good method for treatment of lumbar facet joint syndrome. The injections can be repeated and the treatment has no side effects. The best results were seen in patients with only spondyloarthrosis of the facet joints. Facet joint ozone injection therapy using a standardized protocol is safe, effective and easy to perform. However, the clinical effect is limited (65.5% decreasing to 36.2% after six months), and we recommend repeating the injections after one to three months.*

Introduction

Facet degeneration known as lumbar facet joint syndrome is a common condition, affecting about 80% of patients with low back pain [12,14,16]. Commonly encountered in the elderly, facet joint syndrome can be the primary cause of deterioration of the motor segment and a secondary cause in the course of progressive disc degeneration subsequent to other diseases [10]. The facet joints are related to the same elements at the spinal levels above and below them constituting synovial joints that allow the spine to carry out flexion, extension and rotation movements. Many conditions can give rise to facet joint symptoms, osteoarthritis being the most common [24]. Osteoarthritis causes a reduction or disappearance of the joint cartilage, erosion of the adjacent bone margin, abnormal bone growth of the facets and articular processes, and lastly joint instability which may lead to vertebral subluxation [6-7] (figure 1). The sensory nerve endings of the facet joints and surrounding tissues are subjected to irritation which gives rise to back pain.

Patients are selected for interventional treatment on the basis of clinical examination, history-taking and diagnostic imaging [13,17,18]. Radiological study of facet joint syndrome includes conventional x-ray examination and computed tomography scan to disclose the joint relations, abnormal growth of the joint bone component, and shrinkage of the joint spaces which is an indirect sign of cartilage rearrangement (figure 2). However, the main diagnostic imaging technique is magnetic resonance, namely T2-weighted fast spin echo sequences with fat signal suppression and T1-weighted fast spin echo sequences with fat signal suppression and administration of paramagnetic contrast medium to reveal the inflammatory process active within and around the facet joint (figure 3). The contraindications to this mini-invasive intervention include local infections at the presumed site of entry (osteomyelitis and spondylodiscitis), impossible access to the inside of the joint due to extensive solid lateral and posterolateral fusions, and neurological complications. This study assessed the therapeutic efficacy of ozone infiltration into the facet joints in patients with lumbar facet joint syndrome [1-5, 8,9,11].

Materials and Methods

From November 2004 to December 2007, we treated 58 patients aged between 49 and 82 years (average 68.7), 42 men and 16 women present-

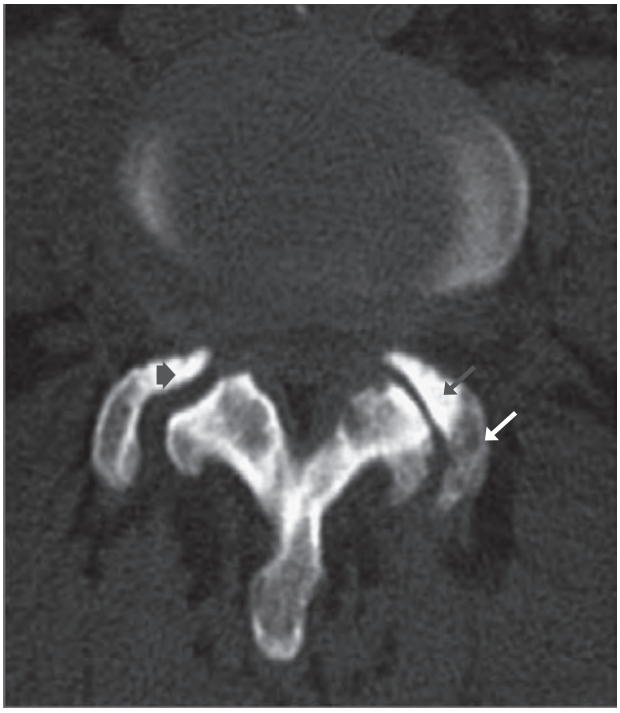

Figure 1 Axial CT scan with bone reconstruction algorithm: note the reduced joint interspacing with arthrotic degeneration of the facet joints (arrows). Secondary diastasis of the facet joints with a tendency to joint subluxation is evident on the right (arrowheads).

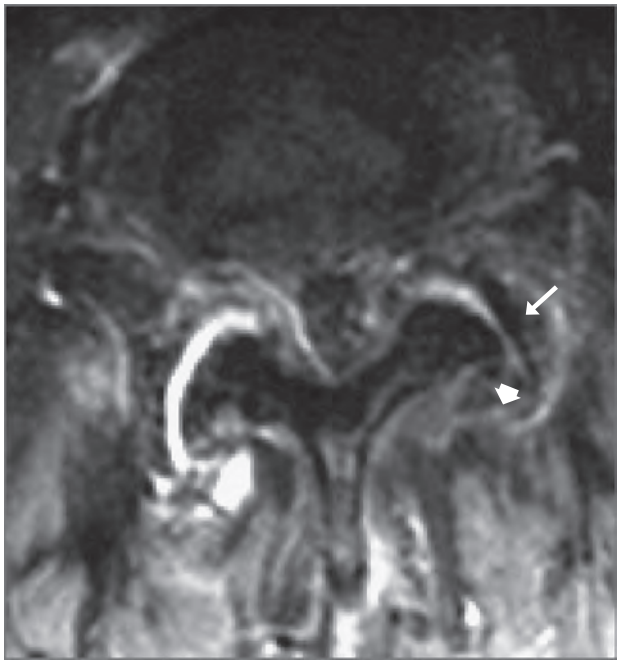

Figure 2 Axial MR scan after i.v. administration of contrast medium: lumbar facet joint syndrome causing shrinkage of the joint cartilage and erosion of the adjacent bone margin (arrows) and abnormal growth of the facet joints (arrowheads).

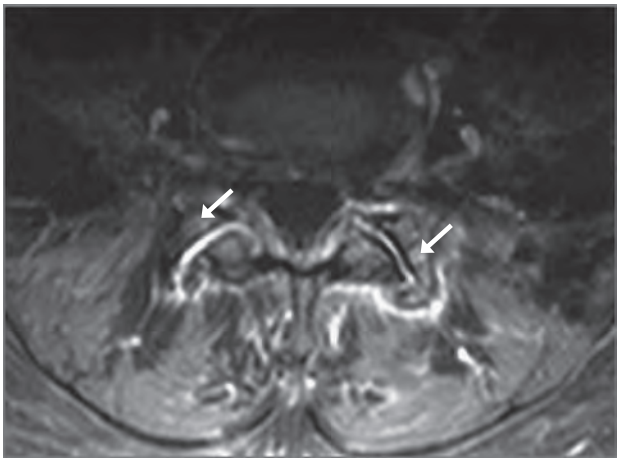

Figure 3 Axial MR scan after i.v. administration of contrast medium showing inter and intra-apophyseal arthritis with local inflammation (arrows).

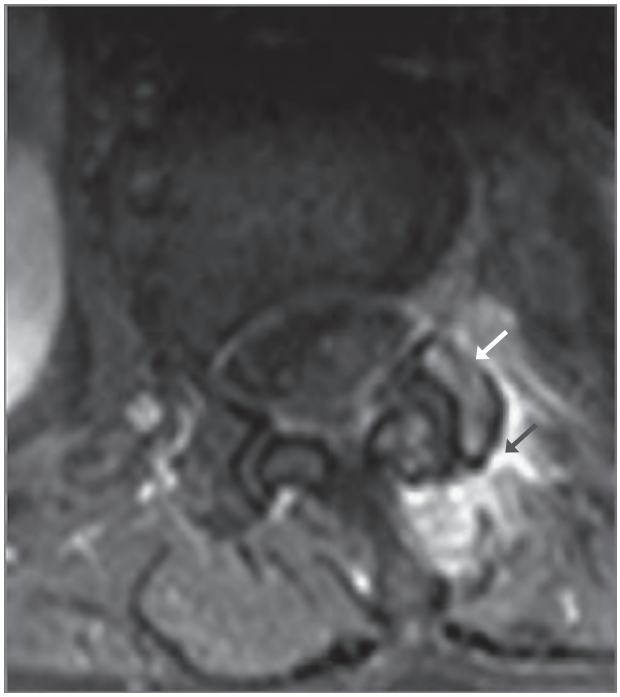

Figure 4 A 53-year-old man with chronic low back pain mainly extending to the left side. MR scan after i.v. administration of paramagnetic contrast medium establishes a diagnosis of facet joint syndrome of the left facet joint (arrows).

ing facet joint syndrome. On enrolment a clinical record was prepared for all patients recording: name, date of birth, date of enrolment, date of treatment and clinical information. Before treatment all patients enrolled in the study had under-

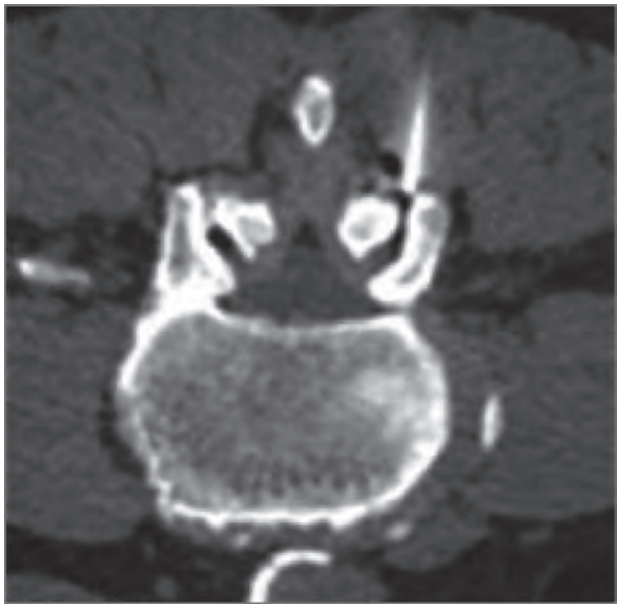

Figure 5 CT scan showing the correct placement of the needle within the joint capsule.

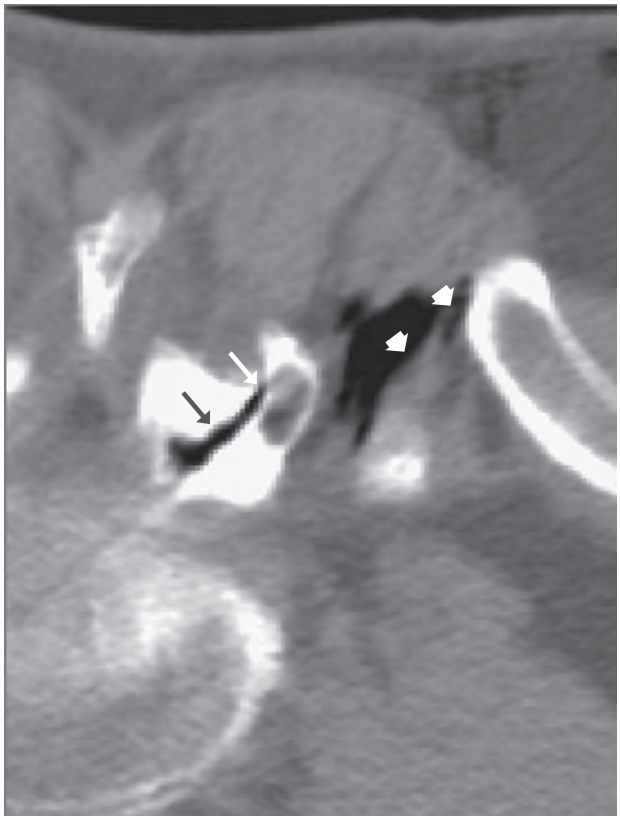

Figure 6 CT scan showing the distribution of the O2-O3 gas mixture within the joint (arrows). Once the joint has been infiltrated the ozone is also injected into the muscle to exploit the muscle relaxant action of ozone (arrowheads).

gone standard spine x-ray examination followed by CT scan of the lumbosacral spine and subsequent lumbosacral MR scan with and without paramagnetic contrast agent administration (figure 4).

All patients underwent CT-guided ozone infiltration into the facet joints [2,9,12,13] administered on a day hospital basis. Patients first had a preliminary CT scan to establish to point of needle insertion on the skin. Then the distance from this point to the facet joint was measured calculating the approach to the joint. Local anaesthesia was administered using ethyl chloride spray. A 22G X 9 spinal needle was used throughout. CT scans were done to ascertain the correct position of the needle within the joint capsule (figure 5). We injected 3/4 cc of oxygen-ozone gas mixture at 25µg/ml into the facet joints. Another CT scan was then done to check the correct distribution of the oxygen-ozone mixture (figure 6). Patients were kept supine and under observation for thirty minutes after the procedure and then discharged in the absence of complications. The clinical benefit of the treatment was almost immediate. Patients were then reassessed clinically using a modified McNab method at one, three and six months after treatment without further infiltration. No long-term CT scans were performed.

Results

The 58 patients we selected presented low back pain caused by facet joint syndrome resistant to all physical and pharmacological forms of management who underwent CT-guided O_2-O_3 infiltration into the facet joints. Thirty-eight (65.5%) patients obtained a complete resolution of pain immediately after treatment. Therapeutic outcome was assessed by a modified McNab method according to which excellent outcome corresponded to a complete disappearance of pain, mediocre with a partial resolution of pain and poor with no response to treatment. At subsequent clinical follow-up assessment with the McNab method the therapeutic success rate dropped to 55.1% at one month as 32 out of the 58 patients continued to have an excellent outcome, while it dropped again to 46.5% (27/58 patients) after three months and 36.2% (21/58 patients) after six months.

Discussion

The indication for O_2-O_3 infiltration into the facet joints is facet joint syndrome, irritation (arthopathy) of both joint surfaces or segmental instability due to disc degeneration [19,20,25]. Pain is

caused by entrapment of the synovial villi between the facet joints. Diagnosis is based on: primary pain in the lumbar region approximately above the zygopophyseal joints; pain referred to the groin and proximal thigh, less frequently the buttock or iliac crest, due to the fact that nociception from the zygopophyseal joints is carried along the posterior primary branch of the same central neurons receiving the afferences of the anterior primary branch; hyperalgaesia in the paravertebral region evoked by pressure on the facet joints; pain triggered by extension and rotation movements of the trunk towards the affected side and improvement with flexion; exacerbation of pain after prolonged standing and sitting and improvement with bed rest; rigidity of the lumbar spine, i.e. reduced ability to flex the spine and maintain lordosis during flexion; absence of neurological deficits [21,24]. Clinical findings must then be supported by neuroradiological diagnosis following the algorithm requiring standard x-ray followed by CT scan and MR imaging with and without administration of a paramagnetic contrast agent. In particular, CT scan is essential to establish the clinical diagnosis as it will depict any osteophytosis, a narrowed joint space due to deformation of the joint rim or dilated by abnormal capsule laxity and stenosis of the central canal and root canal caused by facet joint hypertrophy. It should be noted that radiological abnormalities of the zygopophyseal joints are commonly encountered in patients with and without symptoms. At this point in the protocol an MR scan with and without contrast medium is always done to disclose the active inflammatory process within or surrounding the facet joint. Having correctly classified patients on the basis of clinical and neuroradiological examination the therapeutic outcome in our series was highly significant (65.5%). In our opinion the reason some patients (35.5%) failed to obtain a satisfactory therapeutic response immediately after treatment was due to the complexity of their clinical status. Fourteen patients had concomitant disease (facet joint syndrome, severe spondylodiscarthrosis, multiple disc disease) and six presented severe segmental stenosis hampering access to the facet joint to be treated. In addition, we noted that the therapeutic efficacy of O_2-O_3 infiltration declines with time, reaching 36.2% six months after treatment, a value only slightly better that those reported after treatment of facet joint syndrome with steroids plus anaesthetic or hyaluronic acid [15,18,21,23,27].

We emphasize that all patients enrolled in the study were subsequently advised to consult a physiatrist to undergo a post-treatment rehabilitation programme both to maintain the therapeutic outcome obtained and to prevent disease recurrence. We intentionally did not repeat the O_2-O_3 treatments in the six months of the study, but we think that this could be entertained give the ease of administration, safety and lack of side effects of O_2-O_3 infiltration.

Conclusions

CT guided facet joint infiltration of O_2-O_3 is a good method to treat lumbar facet joint syndrome. The treatment can be repeated and has no side effects. The best results were seen in patients with spondyloarthritis of the facet joints. The prompt resolution of pain, lack of complications, relative ease of execution and the advantage of monitoring O_2-O_3 infiltration under CT guidance make O_2-O_3 therapy a valid alternative to traditional facet joint infiltration with steroids or anaesthetic.

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Dr Matteo Bonetti
Servizio di Neuroradiologia
Istituto Clinico Città di Brescia
Via Gualla, 15
I - 25123 Brescia
Tel.: 030.3197173
Fax: 030.3197171
E-mail: matbon@numerica.it
www.matteobonetti.com