Changes in the thoracolumbar spine are a major cause of impaired performance in athletic horses and a high incidence of these disorders has been found in exhibition and competition jumping horses, dressage and trotting horses. The many pathologic changes affecting the thoracolumbar spine fall into three main categories: 1) congenital spinal deformities, 2) soft tissue lesions, 3) vertebral bone disorders.

Congenital deformities of the thoracolumbar spine include abnormal curvature (scoliosis or lordosis) and union of the vertebrae (synostosis).

Soft tissue lesions include muscle sprains, ligament tears, disc disease and skin injury caused by sores or parasite lesions.

Bone changes include ossifying spondylosis, deforming spondylosis, overriding of the dorsal spinous processes and fracture of the spinous processes, intervertebral joints, neural arch and vertebral bodies.

This study focuses on soft tissue spinal lesions (longissimus dorsi muscles, psoas muscles, gluteal muscles etc.). Following intense muscular stress, e.g. a race or other activity requiring a swift start, or other causes, these muscles may suffer varying degrees of inflammation.

Conservative management of thoracolumbar disorders includes anti-inflammatory treatments, acupuncture, physiotherapy techniques like short wave diathermy, thermography, ultrasound, and pulsating magnetic fields, and lastly manipulating techniques like chiropractic and osteopathy. These traditional treatments have recently been flanked by oxygen-ozone therapy now well established in human medicine.

In view of the scant literature on the administration of oxygen-ozone to treat spine disorders in the horse, this study summarizes the case reports of four trotting horses treated by oxygen-ozone infiltration.
**Etiology**

Soft tissue spinal lesions are caused by muscle fatigue/sprain. The muscles running along the spine to the dock of the tail are very important in maintaining balance and harmonious movement of the spine with the rest of the body. Together with the pelvic muscles, spinal muscles are involved in the thrust of the posterior muscle train and subject to varying degrees of injury when the horse is treated wrongly: incorrect training, prolonged excessive stress, falls, poor nutrition, inappropriate shoeing, cold, lesions to other joints resulting in irregular gait with negative effects on the spine, etc.

**Symptoms and Diagnosis**

Palpating one or more muscles involved, the back of the horse feels tense, hard and contracted: the inflamed area may be confined to a single region of the spine (thoracic, lumbar, sacral) or involve several segments and different muscles. Spinal pain must be assessed by examination with the hand open and fingers outstretched. The hands should run delicately over the dorsal muscles from the withers to the dock of the tail increasing pressure as the movement is repeated. A positive sign of pain is evoked when the horse draws back and a muscle contraction (spasm) is noted over the lesion. The horse’s muscular response is protection against moving the injured area: in some dramatic cases, this response is accompanied by whining, arching of the back to escape palpation/pressure, kicking, rearing, etc.
On moving the horse, its walking gait is stiff, insecure in the early stages of trotting and the animal is unable to lengthen its stride with short close-set movements of the anterior and posterior limbs producing trotting gait alternating with pacing, loss of flexion of hock and patella (differential diagnosis) and a tendency to drag its hooves. On warming up the horse’s gait improves but as trotting speed increases the animal cannot perform normal propulsion movements with its posterior limbs and acceleration and speed are affected so that the horse’s fatigue threshold is reached more quickly thereby diminishing its athletic performance both during training and in competition.

In the long-term, the horse shows a progressive loss of convexity of the pelvic muscles and mono or bilateral atrophy of the rump muscles caused by limited use of the posterior train. Diagnosis can be confirmed in hyperacute forms by a two to fivefold increase in serum levels of the muscle enzymes AST and CK.

**Materials and Methods**

We studied four trotting horses (three mares aged three and five years and a three-year-old stallion) in full competitive activity and all belonging to the same stables located in a training centre in the Bologna area, Northern Italy.
The four horses all presented the symptoms described above: pain on finger palpation/pressure over the affected muscles, arching of the back and rigid gait of the posterior muscle chain (gait is rigid as trotting starts then gradually disappears as the horse warms up before the race or in training to then return during or after physical stress, negatively affecting performance), confirmed by the trainer and stable staff.

We used a portable ISIS 2000 OZONLINE generator producing an ozone concentration of 75 mg/ml with an oxygen cylinder of 1 and/or 5 kg, 60 ml disposable syringes to collect the ozone and 25 G mesotherapy needles for infiltration of the gas mixture into the inflamed muscles.

Treatment consisted of weekly O2-O3 infiltration for three to four weeks depending on symptoms. A 25 G needle was inserted subcutaneously in an oblique direction followed by injection of 20-25cc ozone at a concentration of 30 mg/ml into each point. The treatment area depended on the extent of inflammation varying from one part of the back (thoracic, lumbar or sacral regions) to the whole stretch of the spine from the withers running along the thoracolumbar spine to the sacral dock of the tail. Treatment of the whole spine involved ten injection sites located at 7-8 cm intervals 4-5 cm away from the sides of the spine along the muscle fascia, see figures 1, 2, 3, 4, 5, 6, 7). During infiltration the ozone expands subcutaneously leading to swelling which gradually subsides within 24 hours (corresponding to the time necessary for ozone absorption). Soon after injection the ozone has an analgesic effect in the infiltration site confirmed by lacking of arching of the spine on pressure/palpation of the injured part.

Before infiltration the injection site was disinfected with betadine then rubbed with ethyl alcohol followed by walking the horse for 15-20 minutes to accelerate the process of absorption. During the rest of the week the horse underwent regular trotting training, avoiding intense or prolonged stress. Throughout the treatment cycle the animals’ diet was supplemented daily with 30-40 g vitamin C in powder form to balance the oxidants/antioxidants ratio changed by ozone injection.

**Results**

The four horses had a positive response to treatment after the first and second injections of O2-O3 showing an improvement in both walking and trotting gait. The animals’ movements were less stiff as trotting started and posterior muscle chain thrust was more vigorous as trotting speed increased. These improvements continued until full recovery at the end of treatment which was discontinued after the third infiltration in two of the horses.

In addition, rigidity and tension on palpating the muscles involved had disappeared and there was no response to pain on applying pressure to the treated area or the resulting contraction and arching of the spine. Lastly, there was a progressive filling and rounding of the back muscles.
The improvement was confirmed by the trainer and by the animals’ training performance and during races. No allergic reactions were encountered either at the site of injection or generally.

**Discussion**

We administered subcutaneous infiltration of an O2-O3 mixture but the gas can also given at the same doses and concentration by vertical injection into the deep muscles using 21 G needles or intravertebral infiltration with spinal needles. During and just after injection the ozone produces a tingling/itchy sensation gradually replaced by an analgesic effect as subsequent palpation of the treated area failed to elicit pain or arching of the spine.

It is not possible to determine the duration of the beneficial effect of treatment or claim that the disorders will not recur since the ongoing muscle stress in trotting horses engaged in competitions throughout the year combined with one of the causes of spinal disorders could lead to further acute muscle inflammation.

I have had occasion to administer different treatment cycles to the same horse and have always noted a positive response without short or long-term side effects.

In conclusion, this study and the daily administration of O2-O3 to treat a variety of disorders show that the therapy is a reliable, safe and effective alternative to the many treatments currently administered in equine veterinary practice.

**References**

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