

## Ozonucleolysis in Cervical Radiculopathy

Umair Rashid<sup>1\*</sup>, Fareeha Rauf<sup>1</sup>, Hameedullah A, Atif M<sup>1</sup>, and Marco Leonardi<sup>2</sup><sup>1</sup>Department Interventional neuroradiology, Punjab Institute of Neurosciences, Lahore, Pakistan.<sup>2</sup>IRCCS, Neurological Research Hospital, University of Bologna, Italy.**\*Correspondence:**

Umair Rashid, Department Interventional neuroradiology, PunjaInstituteof Neurosciences, Lahore, Pakistan, E-mail: dr\_umairch@yahoo.com.

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**Background and Purpose:** Direct injection of Oxygen-Ozone in the cervical discs has proved to be the effective alternative to surgery in patients with cervical disc herniation in many countries around the world. We report our experience with ozonucleolysis with patients effected by pain in cervical region (brachialgia) due to disc herniation including post-operative recurrence or disc prolapse.

**Methods:** 3871 patients were treated with single session of Oxygen-Ozone therapy from 2005-2015. All the patients had CT or MRI evidence of cervical disc prolapse with clinical signs of cervical nerve root compression. The procedure was performed under angiofluoroscopy using 22/23 G spinal needle without anesthesia. All the patients received intradiscal injection n of Oxygen-Ozone mixture at Ozone concentration of 30 µgm/ml. Among these patients 2920 were males and 951 were females between the ages of 20-70 years. Therapeutic outcome was assessed 6 months after treatment by using modified MacNab method.

**Results:** A satisfactory therapeutic outcome was obtained. 60% of the patients showed complete recovery with resolution of symptoms. 20% of the patients complained of occasional episodic neck pain and arms pain with no limitation of occupational activity. 5% of cases showed some improvement. 5% of cases had insufficient or no improvement and went for surgery. 10% of cases never turned up after the first visit.

**Conclusion:** Intradiscal and periganglionic injection of Ozone for herniated cervical disc has revolutionized percutaneous approach to nerve root diseases making it safer, cheaper and easier to repeat than treatments currently in use.

**Keywords**

Oxygen-Ozone, Pregnancy, Disease.

**Introduction**

Choice of treatment available for herniated cervical disc is non-invasive conservative management, minimally invasive percutaneous injection and spinal surgery [1]. Non-invasive conservative management is the treatment of choice, but when the patients fail to respond, then well tolerated minimally invasive procedures with good clinical results and low cost are the treatment of choice [2].

These treatments are increasing by a growing number of spinal surgery failures with failed back syndrome, significant soft tissue

injury, extensive hospital stay and recovery time of 6 Weeks or more [3]. Oxygen-Ozone therapy is one of the minimally invasive treatment currently available. It is used mostly in different medical conditions due to its effect, oxidation, bactericide, fungicide, immunomodulating action, analgesic and inflammatory effects [4,5].

A reduction in the volume of the herniated disc is one of the therapeutic aims of intra discal injection of the medical ozone, as disc shrinkage may reduce the nerve root compression [6]. Another reason of ozone treatment for disc herniation is due to its analgesic and anti inflammatory effects [4].

In this study, results of 3871 patients treated with Oxygen-Ozone therapy under fluoroscopic guidance, puncture route, ozone

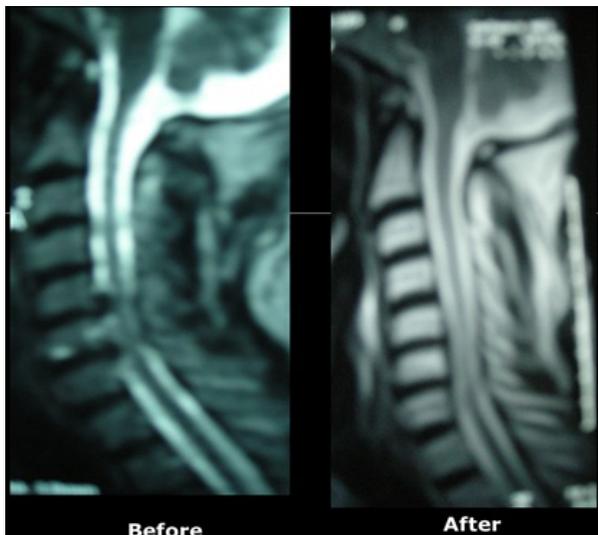
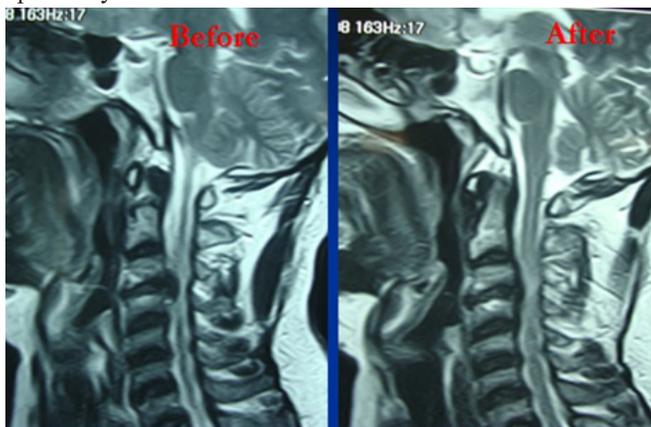
concentration and dose and therapeutic effectiveness were assessed by imaging changes and clinical improvement.

### Material and Methods

From June 2005 to December 2015, 3871 patients (2920 males, 951 females) aged 20-70 yrs received fluoroscopic guided Ozone injection. The levels of involvement were 118 (3.05%) at C3-C4, 309 (7.98%) at C4-C5, 2825 (72.98%) at C5-C6 and 619 (15.99%) at C6-C7 levels. The indications were pain cervical region (brachialgia) due to cervical disc herniation, symptoms and signs of sensory loss, tingling, numbness, muscle weakness and decreased tendon reflexes, and no improvement after 12 weeks of conservative therapy. Exclusion criteria were neuroradiological evidence of calcified disc, marked disc osteophytosis, major neurological deficit correlated with disc disease or pregnancy.

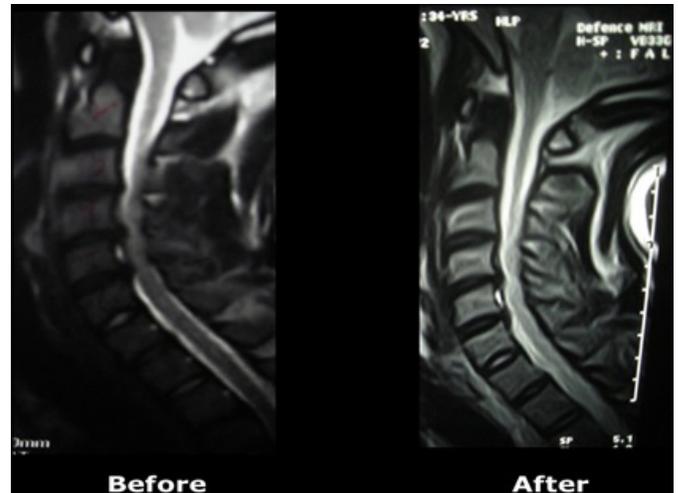
### Procedure

Informed consent was taken before procedure. The procedure was done under guidance with full aseptic technique. The ozone generator, the essential component, placed closed to the patient. Spinal needles 22/23G (Quincke type point) were used to inject ozone under angiofluoroscopic guidance in the paravertebral or intradiscal locations. No premedication or anesthesia was given and the procedure was performed as an outpatient with short hospital stay.



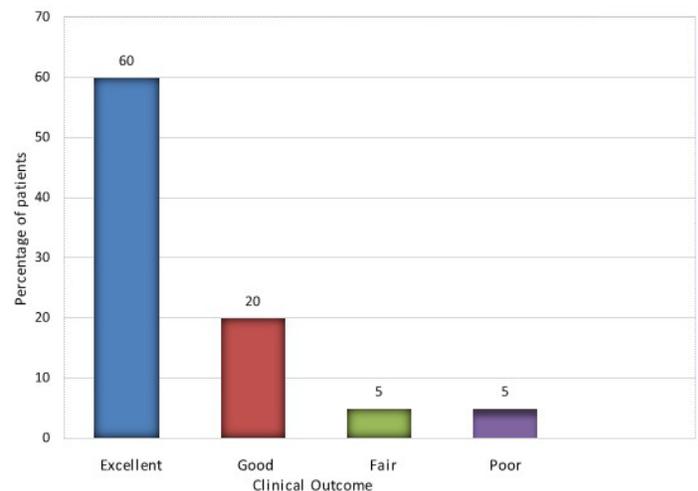
### Results

All the patients were punctured successfully under angiofluoroscopic guidance. Patients were followed for 6 months. 60% of the patients (2322) showed complete recovery with disappearance of symptoms. 20% of the patients (774) complained of occasional episodic neck pain and arms pain with no limitation of occupational activity. 5% of the patients (193) showed some improvement. 5% of the patients (193) had insufficient or no improvement and went for surgery. 10% of the patients (387) never turned up after the first visit. No side effects were reported at short or long term follow up. Modified MacNab method was used to evaluate the clinical results showing 80% success rate.



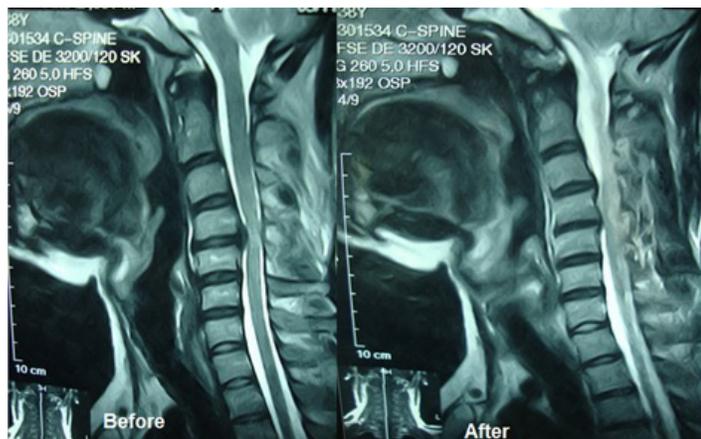
Outcome	Description
Excellent	Disappearance of symptoms, No pain, Complete recovery, Return to normal work and activities.
Good	Occasional episodes of neck pain or brachialgia No limitation of occupational activities.
Fair	Some improvement with modified activities.
Poor	Insufficient or no improvement of symptoms with limitation of physical activities.

**Table 1:** Modified Macnab Method for assessing clinical outcome after ozone therapy.



## Discussion

Disc degeneration is the initial pathological change in Spondylosis followed by crack formation of the annulus fibrosis. This results in displacement of nucleus pulposus through the crack in the annulus fibrosis and compression of the nerves or the spinal cord causing radiculopathy and myelopathy. Repeated chronic trauma, injury and accumulation of the metabolic products and inflammatory factors may irritate the radicular and sympathetic nerves and cause clinical symptoms. Patients are reluctant to undergo surgical therapy due to significant soft tissue injury, extensive hospitalization and recovery time of six weeks or longer. Ozone injection is used for early clinical response. The proper concentration and dose of ozone injected in the disc can oxidize the nucleus pulposus and reduce the pressure on the disc.



This may result in the return of the protruded disc material or reduction of nerve root compression. Ozone injected in to the perispinal tissue may exert its analgesic and anti-inflammatory effects and improves local microcirculation, increasing the supply of oxygen due to reduced venous stasis caused by disc compression of vessels, at the same time reducing hypoxia due to deoxidation of ozone into oxygen. Ozone injection due to its minimal invasion, simple procedure, efficacy and safety is widely used. Comparing our results with those of already published studies in literature are of same level or better. This treatment is useful in patients who have not responded to physical therapy and conventional pain therapy. Most of these patients had no FDA surgical indications. The patients who failed to benefit underwent surgery. In all the cases the previous Oxygen-Ozone gas therapy had no negative effects on the surgical procedure.

## Conclusion

In our experience the oxygen Ozone therapy in the treatment of herniated disc has revolutionized the percutaneous approach to nerve root disease making it safer, cheaper and easier to repeat than treatments currently in use. Therefore, Oxygen Ozone therapy should be the first choice of treatment in cervical disc prolapse.

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