

Effect of percutaneous oxygen–ozone injection on percutaneous canine spinal cord injury model and dogs with intervertebral disc herniations

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Ozone therapy is one of the percutaneous minimally invasive spine surgery (MISS) to treat intervertebral disc herniation (IVDH) without access to the spinal canal. Effect of this therapy results from reduction of herniated disc volume by nucleus pulposus mummification. In addition, ozone gas has strong analgesic and anti-inflammatory effects. This study was aimed to evaluate the therapeutic effect of medical ozone on IVDH by experimental and clinical outcomes following the ozone therapy.

This study was performed with ten experimental dogs and 11 dogs diagnosed with IVDH. The percutaneous canine spinal cord injury (SCI) model induced by balloon catheter was conducted with the ten healthy adult Schnauzer dogs. Balloon was inflated at L1-2 level with contrast agent as the height of the balloon as 0% (group 1), 50% (group 2) and 70% (group 3) of the height of the spinal canal under the fluoroscopic guidance. Dogs of group 1, 2 and 3 showed mild ataxia, paraparesis and paraplegia with urinary dysfunction. Their neurological deficits were uniform during 7 days after SCI and then, all of them underwent percutaneous intradiscal injection (2 ml of 25 μ g/ml) and intervertebral foramen infiltration (4 ml of 25 μ g/ml) of oxygen-ozone gas mixture under the fluoroscopic guidance.

After the injection, dogs in the group 2 and 3 represented rapid functional recovery. All of the dogs in the group 2 were able to walk normally within 7 days after the treatment and dogs in the group 3 improved significantly even though there was limitation of functional recovery at 8 weeks after the treatment. Treated nucleus pulposus was shrunken significantly of 35.27 ± 3.37 % with dehydration in MR images and histological results while injured spinal cord improved as reduced parenchymal lesions, remyelinated nerve fibers on MR images and tractography. In addition, functional recovery demonstrated by thermograph which showed symmetrical normal heat pattern after the treatment.

Client-owned 11 dogs with thoracolumbar IVDH represented various degrees of paraparesis and paraplegia before the therapy. Mean compression ratio measured on MR images was 41.26 ± 5.26 % (22.12 %~78.82%). All of them recovered to normal without neurological deficits after the treatment. Also thermograph revealed functional recovery within 7 days after the treatment. Therefore, the ozone therapy is effective, simple without risks to treat IVDH in dogs.

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