**Paper #25: Unilateral Thoracic Nerve Neurotomy Causes Rib Cage Torsion and Idiopathic-Like Thoracic Scoliosis**

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**Introduction:** The initiating factor of idiopathic scoliosis is unknown. The present study was performed to test whether neurogenic thorax imbalance can initially cause scoliosis in an immature pig model.

**Method:** Seventeen 1-month-old pigs were assigned to 3 groups: group-1 (n=6) in which the right thoracic nerve root was cut from T7 to T14 with bilateral paraspinal muscle stripping; group-2 (n=5): treated in the same way except the left paraspinal muscle was intact; group-3 (n=6) in which the thoracic nerve root was bilaterally cut from T7 to T14. All animals were euthanized at 17 weeks. The radiographs and true axial CT images of the spine were obtained. The parameters of the rib cage deformity including the rib hump (RH), rib vertebral angle difference (RVAD), apical rib spread difference (ARSD), apical vertebral body-rib ratio (AVB-R), and the rib length difference (RLD) were measured. The spinal deformity including the Cobb, sagittal kyphosis, and apical vertebral rotation (AVR) were measured. A histological examination of the intercostal muscle was performed.

**Results:** An average 53.0 degrees right thoracic scoliosis with a mean -3.6 degrees apical hypokyphosis was created in the right thoracic nerve neurotomy groups at 17-weeks follow up. The AVR (mean 32.8 degrees) occurred toward the right side. The RH (mean 10.5 mm), RVAD (mean 27.5 degrees), ARSD (mean 13.8 mm), AVB-R (mean 3.0) and RLD (mean 15.8 mm) measurements demonstrated the rib cage torsion to the convex side. The histological examination of the right intercostal muscle showed denervation. In the bilateral thoracic nerve neurotomy group, no scoliosis or thoracic torsion was seen, but an average thoracic lordosis of -32.3 degree was created.

**Conclusion:** Unilateral thoracic nerve neurotomy induced rib cage torsion toward the operative side resulting in idiopathic-like thoracic hypokyphotic scoliosis in an immature pig model. Neurogenic thorax imbalance may be the initiating cause of idiopathic scoliosis.