Intradiscal Pressure Changes in a Growing Rod Cadaver Model

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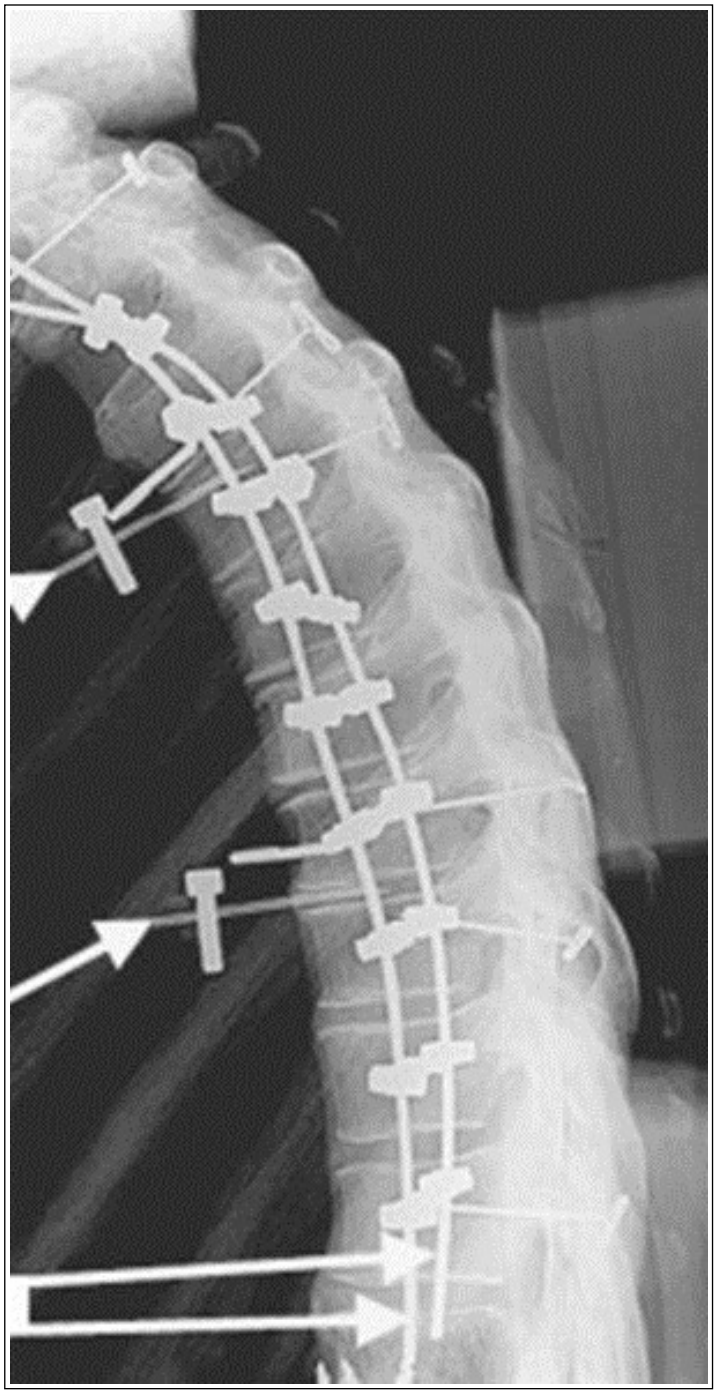
CNS 2016 ANNUAL MEETING San Diego CALIFORNIA SEPTEMBER 24-28, 2016

Introduction

Distraction growing rods for early onset scoliosis (EOS) stabilize the thorax and improve lung function by applying distraction forces at the rib and/or spine. Over-stabilizing can lead to adjacent level complications necessitating revisions. We investigated the effect on thoracic intradiscal pressure of a unilateral cadaveric growing rod construct implanted in a simulated rib-to-lumbar attachment.

Methods

Needle tip pressure transducers were inserted into T4/T5 and T8/T9 discs in five thoracic spine specimens (three male, mean age 68), which were tested in lateral bending, flexion/extension, and axial rotation to a load limit of ± 5Nm. After testing the intact thoracic spine, a single growing rod was proximally attached to the T5 rib, 2.5cm lateral to the costotransverse joint. The distal attachment was secured to the inferior potting, simulating rib-to-lumbar attachment. The cadaver specimen was tested under the same conditions.



Results

There was no significant difference between intradiscal pressure pre- and post-implantation. The average maximum intradiscal pressure at T4/T5 decreased post-implantation by 13% during axial rotation, 13% during flexion/extension, and 15% during lateral bending. However, at the superior adjacent level, the average range of intradiscal pressure increased 9% during axial rotation, decreased 9% during flexion/extension, and decreased 14% during lateral bending. Between attachment sites (T8/T9), average maximum intradiscal pressure increased 6% during axial rotation, 10% during flexion/extension, and 18% during lateral bending; average range of intradiscal pressure decreased 19% during axial rotation, 10% during flexion/extension, and 2% during lateral bending.

Conclusions

The unilateral rib-attached construct is less rigid than other configurations, suggesting allowance for similar loading above and within, resulting in no significant intradiscal pressure changes at the superior adjacent level. This less rigid construct did not significantly affect intradiscal pressure in a cadaver model and could be used to provide adequate stability in EOS corrections without causing significant pressure changes.