

Oral presentation

# Comparing axial loaded MRI to standing radiographs in the evaluation of AIS

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from 7th International Conference on Conservative Management of Spinal Deformities  
Montreal, Canada. 20-22 May 2010

*Scoliosis* 2010, **5**(Suppl 1):O12doi:10.1186/1748-7161-5-S1-O12

The electronic version of this abstract is the complete one and can be found online at:

<http://www.scoliosisjournal.com/content/5/S1/O12>

Published: 10 September 2010 © 2010 Knott et al;

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## Introduction

In patients with AIS, standing radiographs are the standard of care for curve surveillance, but have negative long-term effects from repeated x-ray exposure. MRI provides high quality images in the coronal plane that can be used to measure Cobb angles. Because MRI is done in the supine position, there is no gravitational effect and curve magnitudes appear smaller. Gravity can be reproduced by an axial load on the spine while supine in the MRI. This study will examine whether those supine axial loaded MRI images produce Cobb angles that are similar to those from standing radiographs.

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## Methods

Patients with AIS were recruited for prospective comparison of x-ray and MRI. A 3 Tesla MRI was used with an axial loading device (DynaWell Diagnostics, Inc., Las Vegas, NV) to produce a compressive effect on the spine. The amount of compression delivered by the device is proportional to the patient's weight. The MRI technique used a small series of coronal images from C7 to L5. No axial or sagittal images were obtained, reducing the acquisition time to approx. 10 min. Thirteen patients between the ages of 11 and 22 with curve magnitudes between 13° and 60° were evaluated and compared.

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## Results

The MRI and standing radiographs from the same day were compared by a radiologist and an orthopaedist for inter-rater reliability. These differed by an average of 2.4°, with a range of 0° to 7°. The primary curves measured on MRI were compared to radiographs done by the same orthopaedist. They differed by an average of 2.5°, with a range of 0° to 7°. The secondary curves were similarly measured, and differed by an average of 4.5°, with a range of 0° to 20°.

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## Conclusion

Supine axial loaded MRI scans produced images with Cobb angles that are very similar to those obtained on standing radiographs. Differences of 2.5-4.5 degrees are similar to the amount of error that is seen with repeated radiographic measurements, or measurements done by different examiners.

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## Discussion

Supine axial loaded MRI is a reliable alternative to standing radiographs. Its benefit is the lack of patient exposure to radiation. Its drawbacks are the time it takes to acquire the image and the cost. Limiting the MRI to only a few coronal images cuts time and cost, allowing it to be used during clinic.