Materials and Methods (cont’d)

- A medical ultrasound system and a probe with a built-in positioning system were used in this study (Fig. 2).
- Five AIS subjects with curves less than 40 degrees were recruited and scanned from C7 to L5 in a standing position.
- After the 3D ultrasound data was acquired, an in-house developed program was used to process, reconstruct, and display the 3D spinal images (Fig. 3).
- Axial rotations were measured on three vertebrae from each spinal curve (at the apex and its two adjacent vertebrae levels).
- The center-of-lamina method was used on the ultrasound images (Fig. 4), while the Stokes method was used on radiographs (Fig. 5). The measurements on sonographs and radiographs were compared.

Results

- Axial rotations were measured on twenty vertebra levels.
- The range of the AVR measurements from the sonographs and radiographs were 0° – 11° and 1° – 21°, respectively.
- The linear correlation (r^2) of the two measurements was 0.46.
- The mean absolute difference between the two measurements was 3.8° ± 0.8°.
- The absolute differences ranged from 0 to 14°.
- However, if a correction factor is applied, the correlation is increased to 0.73 (r^2).

Conclusions

- The 3D ultrasound measurements are not linearly correlated to the 2D radiographic measurements.
- Applying a correction factor may improve their correlation.
- To truly evaluate the vertebral rotation measurements from the sonographs, 3D spinal images from other imaging modalities may be required.

References