

Prospective correlation study between ultrasound and radiographs for monitoring distractions in magnetically-controlled growing rods

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Surgical treatment for early onset scoliosis (EOS)

- Traditional growing rods (TGR)
 - Repeated surgeries for distractions every 6 months
 - Increased risk for anesthetic and wound complications
 - Psychological distress to both the child and family
- Magnetically-controlled growing rods (MCGR)
 - Non-invasive distractions done at out-patient clinic
 - More frequent distractions to mimic normal spinal growth



Magnetically controlled growing rods for severe spinal curvature in young children: a prospective case series



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Lancet 2012; 379: 1967-74



- More frequent distractions
 - More frequent x-rays for monitoring distraction
 - Increasing ionizing radiation





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Clinical Study

Reducing radiation exposure in early-onset scoliosis surgery patients:
novel use of ultrasonography to measure lengthening in
magnetically-controlled growing rods

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- The use of ultrasound, which emits no radiation, has been found in our previous cross-sectional study to be reliable in measuring MCGR distractions.

Aim: To address the prospective clinical utility of ultrasound compared to x-ray for MCGR distractions.



Clinical protocol for MCGR distractions at our clinic since 2013

First and Every
6th Monthly Visit

Every Monthly Visit



Patient lied prone on the examination table with his arms stretched out in front of him and a pillow positioned under the upper thorax for comfort.

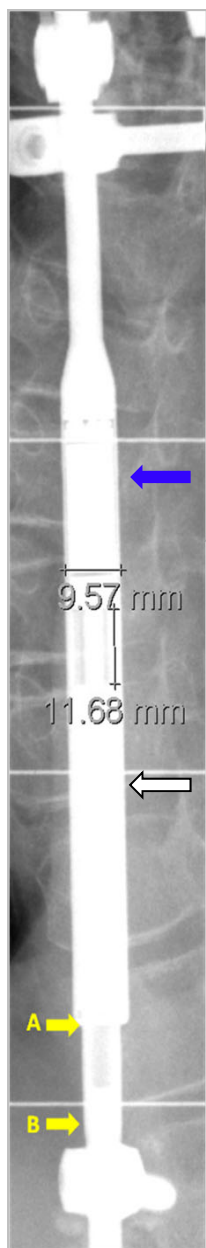
Stokes et al. The Spine Journal, Volume 14, Issue 10, 2014, 2397 - 2404


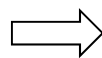



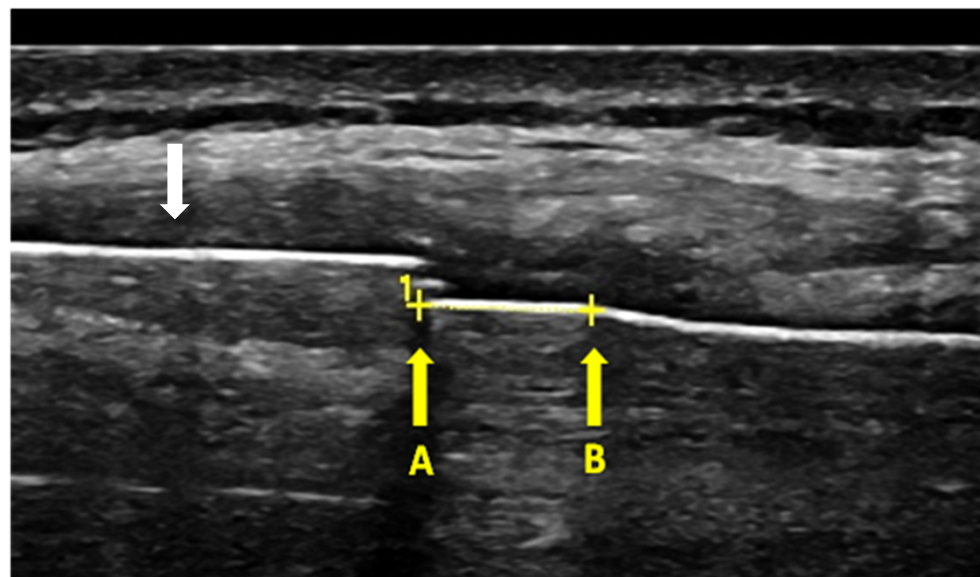
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香港大學矯形及創傷外科學系





-  **Magnetic motor**
-  **Housing of the rod**
-  **Distracted part of the rod**
 - A. End of the housing**
 - B. Start of the narrowing part**



Compared the change in length measured on USG/XR at every 6 months



RESULTS

- Prospective case series of 9 EOS patients treated with MCGR.

Demographics

Female : Male	6 : 3
Mean Age at implantation	9.2 years (SD \pm 4.0)
Mean Follow-up duration	42.6 months (SD \pm 18.0)
Mean number of distraction episode	29 (SD \pm 14.3)



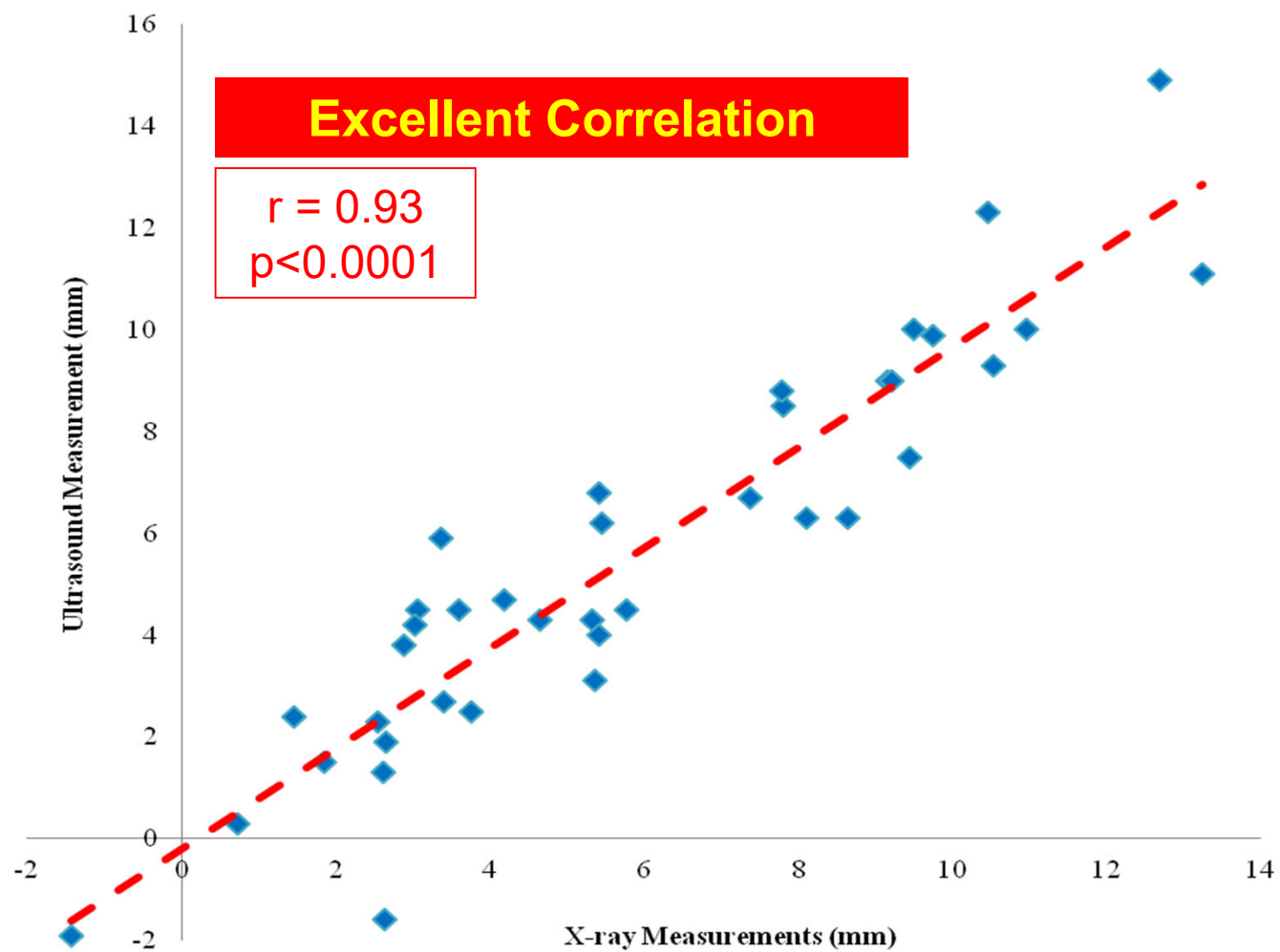
RESULTS

- A total of 34 sets of X-ray were taken. From these, 38 sets of data points were used for correlation analysis.

Mean Change in Length per 6-months	X-ray Measurement	Ultrasound Measurement
Concave rod	5.7mm (SD \pm 3.6mm)	5.2mm (SD \pm 3.9mm)
Convex rod	6.1mm (SD \pm 3.6mm)	5.9mm (SD \pm 3.8mm)

* p-value = 0.2, no difference between two measurement modalities





Conclusions

- Prospective study to note that ultrasound assessment of MCGR distraction lengths was highly comparable to that of x-rays
- Ultrasound can be a reliable alternative to x-ray for monitoring distractions
 - avoids radiation exposure in the developing child

