

Impact of Patient Characteristics on Successful Lengthening of Magnetically Controlled Growing Rods in Early Onset Scoliosis

Zachary Crawford¹, John Bonamer, Brian Johnson¹, Sarah E Gilday, Benjamin Shane Parr², Peter F Sturm³

¹University of Cincinnati, ²Orthopaedic Surgery, ³Cincinnati Children's Hosp Med Ctr

INTRODUCTION:

Magnetically controlled growing rods (MGCRs) are increasingly used in the treatment of early onset scoliosis (EOS). Few studies have reported on patient characteristics in successful desired lengthening of MGCRs in EOS. In this clinical study of EOS patients, it was hypothesized that patients without previous growing rods and patients with neuromuscular type EOS would have improved successful lengthening compared to those with previous standard growing rods or non-neuromuscular type EOS.

METHODS:

A retrospective chart review was conducted on EOS patients with single and dual MGCRs placed 4/2014-4/2022 and distracted at a single institution. Rod distraction was measured at each visit using ultrasound. Preoperative major curve at time of implantation and patient demographics including scoliosis type, underlying diagnosis, and previous growing rods were collected. Differences between programmed and actual distraction were represented as a percentage of intended distraction. Student's t-test and One-way ANOVA with Post-Hoc Tukey were used to identify differences in percent of intended distraction between patients with and without prior instrumentation and scoliosis types, respectively.

RESULTS:

Eighty-five patients were included, 39 (49%) males, 46 (51%) females, age 7.59 (± 2.34) years with major curves measuring 60.90 (± 19.97) degrees at time of MGCR insertion. There were 26 (31%) patients with prior growing rods or posterior spinal instrumentation with an average major curve size of 73.2 (± 19.97) degrees at time of initial instrumentation. Types of early onset scoliosis included 27 neuromuscular, 24 syndromic, 18 idiopathic, and 16 congenital. Distraction success at initial, one-year, and all-time lengthening was similar between patients with or without previous hardware (p-value: 0.745, 0.241, and 0.907, respectively). Those with neuromuscular EOS demonstrated no significantly improved lengthening compared to other types. Patients with idiopathic scoliosis had worse lengthening success compared to syndromic or congenital at one-year and compared to syndromic in all-time lengthening (p-value: 0.033 and 0.021; 0.043 and 0.077, respectively).

DISCUSSION AND CONCLUSION:

Magnetically controlled growing rods are effective and increasingly utilized in early onset scoliosis. This study shows prior instrumentation does not reduce rod lengthening success. Patients with neuromuscular scoliosis achieve similar lengthening success compared to other scoliosis types. Patients with idiopathic scoliosis may be less likely to achieve success in lengthening compared to syndromic or congenital scoliosis.