Magnetically controlled growing rods

Magnetically Controlled Growing Rods (MCGR) are an advanced treatment modality for early-onset scoliosis (EOS) that allow for non-invasive spinal lengthening to correct deformity while accommodating a child's growth.

Key Features: Implantation: MCGRs are surgically implanted along the spine, anchored with screws or hooks.

Magnetic Lengthening: They contain internal magnets that can be remotely lengthened using an external magnetic controller, usually in a clinical setting.

No Repeated Surgeries: Unlike traditional growing rods, which require repeated surgeries for lengthening, MCGRs reduce the need for multiple operations, lowering anesthesia risks and infection rates.

Purpose: To control scoliosis progression.

To preserve thoracic growth and thereby support lung development.

Limitations: Mechanical failure over time (e.g., rod fracture, actuator failure).

Limited correction in severe, rigid curves.

Systematic reviews

A systematic review was conducted according to the PRISMA guidelines. PubMed, Google Scholar, Embase and Scopus were accessed in May 2022. All the clinical trials which investigate the role of MCGR for early-onset scoliosis were accessed. Only studies reporting data in patients younger than 10 years with a preoperative Cobb Angle greater than 40° were eligible. The following data were extracted at baseline and at last follow-up: mean kyphosis angle, overall mean Cobb angle, and mean T1-S1 length. Data from complications were also collected.

Data from 23 clinical studies (504 patients) were included in the present study. 56% (282 of 504) were females. The average length of the follow-up was 28.9 ± 16.0 months. The mean age of the patients was 8.7 ± 1.9 years old. The mean BMI was 17.7 ± 7.6 kg/m2. The mean kyphosis angle had reduced by the last follow-up ($P = 0.04$), as did the overall mean Cobb angle ($P < 0.0001$), while the overall T1-S1 length increased ($P = 0.0002$). Implant-associated complications, followed by spinal alignment failure, wound healing ailments, pulmonary complications, progressive trunk stiffness, persistent back pain, and fracture.

The management of EOS remains challenging. The current evidence indicates that MCGR may be effective to distract the spine and modeling the curve in EOS [1].

1)
Migliorini F, Chiu WO, Scrofani R, Chiu WK, Baroncini A, Iaconetta G, Maffulli N. Magnetically controlled growing rods in the management of early onset scoliosis: a systematic review. J Orthop Surg Res. 2022 Jun 11;17(1):309. doi: 10.1186/s13018-022-03200-7. PMID: 35690867.