Magnetic Spinal Growth Rods (MCGR) with and without Preoperative Traction for the Treatment of Severe Scoliosis

Free Paper #33:

MICHELLE WELBORN MD, TIMOTHY DEGAN DO, CHARLES D'AMATO MD, IVAN KRAJBICH MD

Disclosures

Michelle Welborn MD: K2M consultant growing spine advisory board

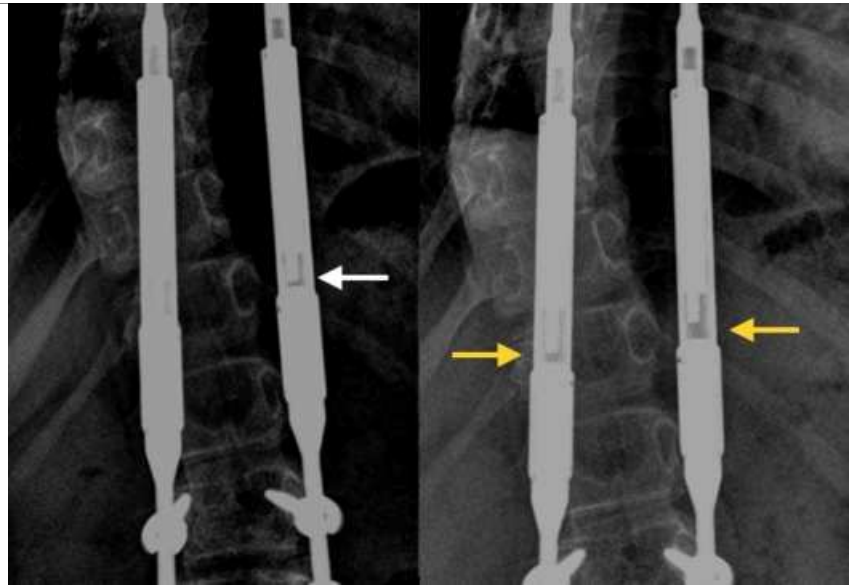
Timothy Degan DO: none

Charles D'Amato MD K2M consultant

Ivan Krajbich: K2M consultant

MCGR background

- To date over 5,000 cases have been performed throughout the world
- While studies have found that MCGR decreases the risk of infection (3.7 vs 11.1%)[1].
- implant related complications remain frequent
  - reported revision rates ranging from 27.7-46.7% in under two years[1-7].



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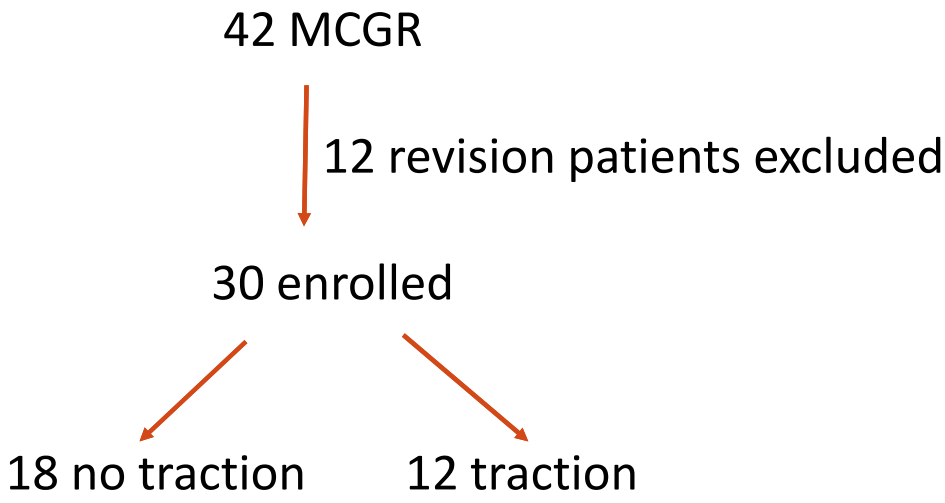
Objectives

- Evaluate MCGR patients with severe scoliosis treated with and without traction
  - Postoperative correction
  - Complication rates
  - Compare to literature

Methods

- IRB approved retrospective cohort study of a prospectively collected database
- 42 MCGR patients from 2014-2017 treated at a single institution
  - All patients failed conservative management
    - all genders, ethnicities, and underlying diagnosis were included.



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Traction protocol

- preoperative halo traction 6+ pins
- traction increased BID as tolerated
  - max traction: weight in pounds = pt weight in kilos
- traction for 4-8 weeks total based on:
  - severity of curvature, preop nutrition status, and response to traction.
  - Average of 48 days range (30-76)
- Max activity encouraged:
  - School, traction walkers, wheelchairs, bikes, accessible playground

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Demographics

	Ave age	Gender	diagnosis	BMI
Traction n= 12	9	4males 9 females	8 syndromic 2 congenital 2 idiopathic	16
No traction n=18	9	9 males 9 females	11 neuromuscular 4 syndromic 2 congenital 1 idiopathic	16

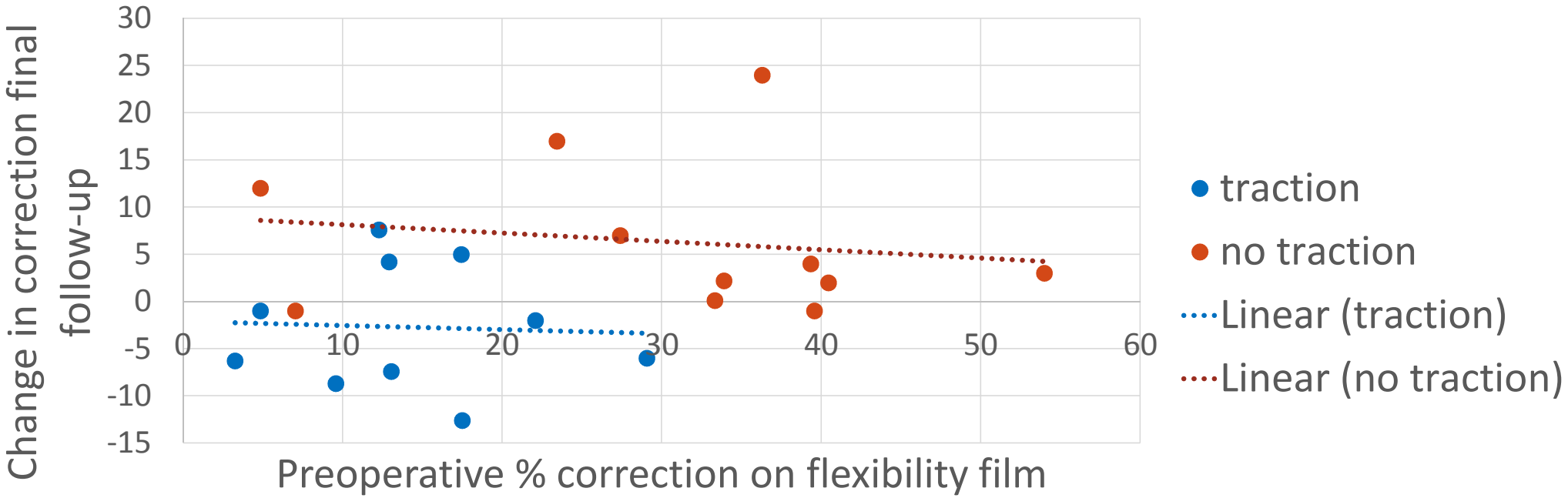
Results

	Preop Cobb	Flexibility film Cobb	Absolute correction flexibility film	Percent correction flexibility film	Post traction Cobb	Postop Cobb	Ave Correction
Traction n=12	**90°** (69-114°)	78° (60-100°)	13° (3-59°)	**14%** (3-29)	59° (40-86°)	46° (31-57°)	45° (37-59°)
No traction n=18	**77°** (56-113°)	46° (19-66°)	32° (5-70°)	**40%** (7-66)	na	34° (18-50°)	44° (19-74°)
P-value	**0.027**	**0.000**	**0.002**	**0.000**	na	**0.421**	**.743**

Results

	Preop Cobb	Postop Cobb	Most recent Cobb	Change in Cobb postop vs most recent	Average Follow-up (days)
Traction n=12	90° (69-114°)	46° (31-57°)	**44°** (28-65°)	-2° (-13-9)	614
No traction n=18	77° (56-113°)	34° (18-50°)	**40°** (17-63°)	6° (-5–17)	516
P-value	**0.027**	**0.421**	**.838**	**0.019**	**.212**

maintenance of correction at final follow-up



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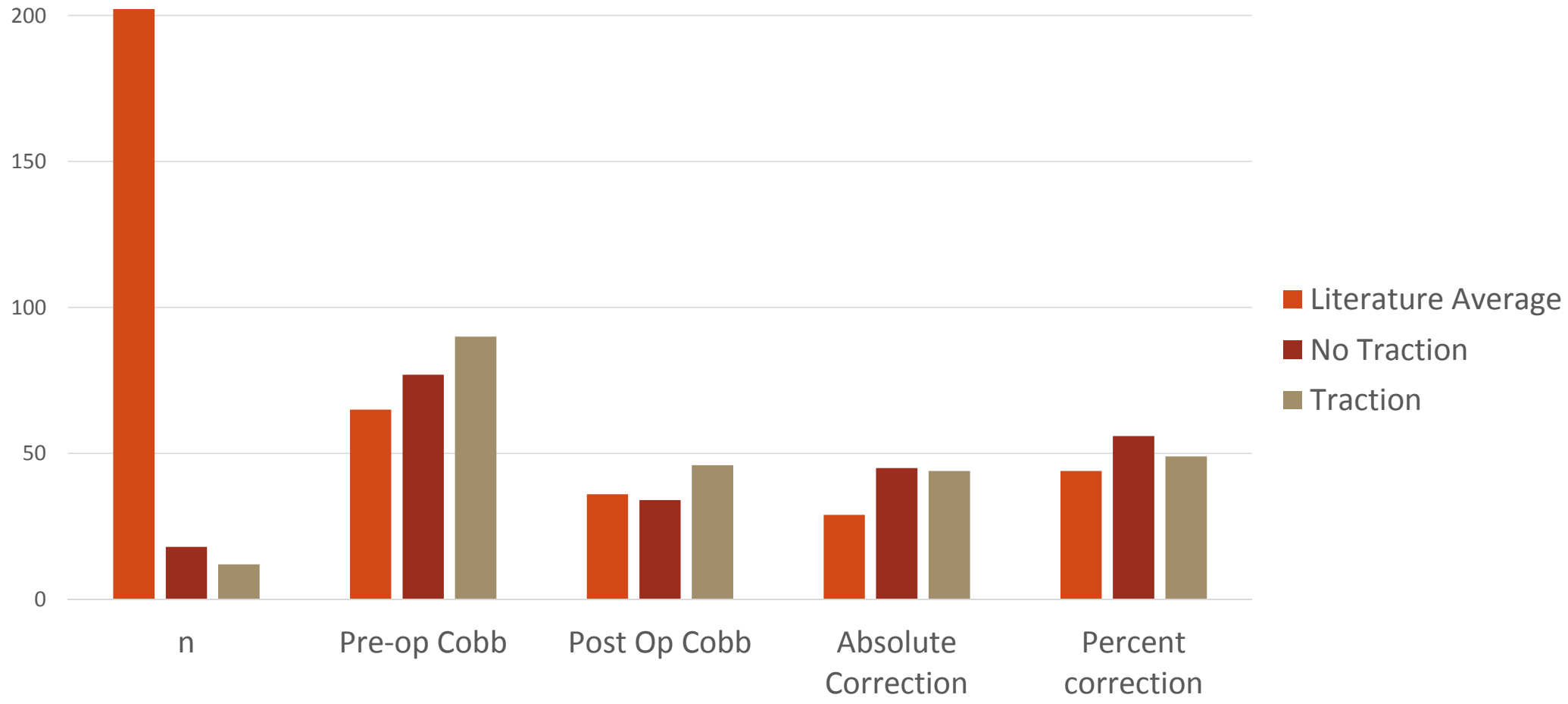
Versus the Literature



Complications

- Implant complications:
  - traction group: n=12
    - One patient had distal anchor failure that was revised
      - Later had mild pjk due to proximal implant failure
  - Non-traction group: n=18
    - 1 proximal fixation failure revised 12 months postoperatively
    - proximal implant failure after placement of a unilateral rod and was revised to bilateral rods
- Overall 13% complication rate
  - Infection = 3%
  - No rod breakage

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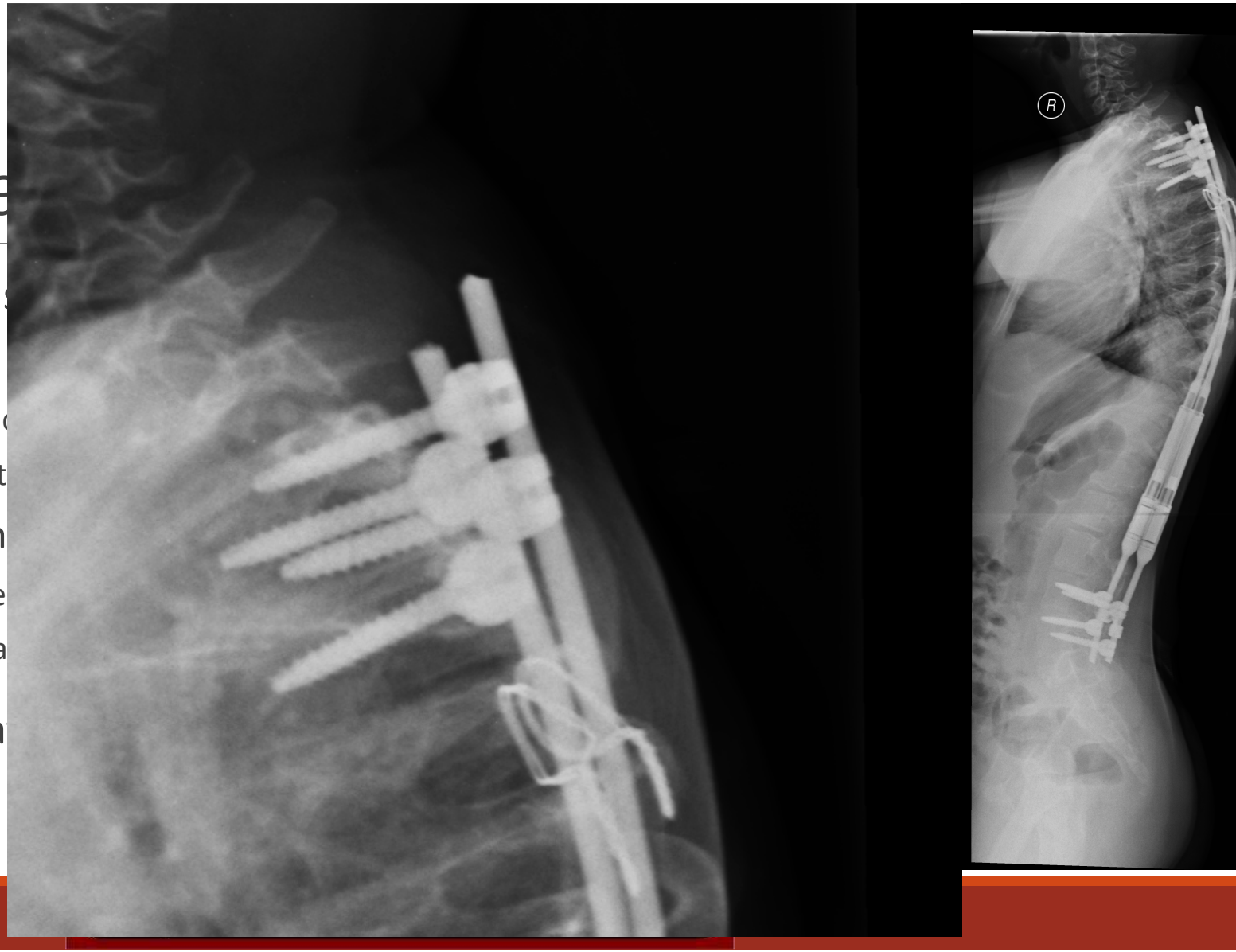

Conclusion

- Large curves can be effectively treated with MCGR.
  - Equivalent correction to flexible curves can be achieved in more rigid curves through the use of traction.
- Traction provides an additional 18% correction compared to flexibility films.
- Postoperatively neither group lost correction over time and traction patients continued to gain correction despite having more rigid curves preoperatively

References

1 Choi E, Yazsay B, Mundis G, et al. Implant Complications After Magnetically Controlled Growing Rods for Early Onset Scoliosis: A Multicenter Retrospective Review. J Pediatr Orthop. 2016 Jun 18.

2 Akbarnia BA, Cheung K, Noordeen H, et al. Next generation of growth-sparing techniques: preliminary clinical results of a magnetically controlled growing rod in 14 patients with early-onset scoliosis. Spine (Phila Pa 1976). 2013 Apr 15;38(8):665-70.

3 Dannawi Z, Altaf F, Harshavardhana NS, El Sebaie H, Noordeen H. Early results of a remotely-operated magnetic growth rod in early-onset scoliosis. Bone Joint J. 2013 Jan;95-B(1):75-80.

4 Hickey BA, Towriss C, Baxter G, et al. Early experience of MAGEC magnetic growing rods in the treatment of early onset scoliosis. Eur Spine J. 2014 Apr;23 Suppl 1:S61-5.

5 Kwan KYH, Alanay A, Yazici M, et al. Unplanned Reoperations in Magnetically Controlled Growing Rod Surgery for Early Onset Scoliosis with a Minimum of Two-Year Follow-Up. Spine (Phila Pa 1976). 2017 Jun 27.

6 La Rosa G, Oggiano L, Ruzzini L. Magnetically Controlled Growing Rods for the Management of Early-onset Scoliosis: A Preliminary Report. J Pediatr Orthop. 2017 Mar;37(2):79-85.

7 Kenneth M. Cheung JPYC, MBBS (HK), MMedSc,, Kenny Kwan BO, FRCSEd(Ortho), John Ferguson, FRACS,, Colin Nnadi M, FRCS, Ahmet Alanay, MD, Muharrem Yazici, MD,, Gokhan H. Demirkiran M, Ilkka J. Helenius, MD, PhD,, Behrooz A. Akbarnia M. Paper #32 Complications of Magnetically Controlled Growing Rod Surgery: Multicenter Study of 26 Patients With Medium-term Follow-up. Spine Deformity. 2014;2:498.