

DEPARTMENT OF SURGERY | Office of Surgical Fellowship



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STAGED MAGEC RODS INSERTION TO MANAGE EARLY ONSET SCOLIOSIS

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- NO POTENTIAL CONFLICT OF INTEREST

- Implant failure is a common cause for unplanned revision surgeries in MCGR. **Kwan et al (2017)¹**
- Risks factors for complications have been reported, **including poor bone density and large deformity, particularly kyphotic deformities³⁻⁴**
- **Can we mitigate the risk of mechanic failure in complex EOS cases?**

1.-Kwan KYH, Alanay A, Yazici M, Demirkiran G, Helenius I, Nnadi C, Ferguson J, Akbarnia BA, Cheung JPY, Cheung KMC. 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

2.-Tis JE, Karlin LI, Akbarnia BA, et al. Early onset scoliosis: modern treatment and results. J Pediatr Orthop 2012;32:647–657.

3-Elsebai HB, Yazici M, Thompson GH, et al. Safety and efficacy of growing rod technique for pediatric congenital spinal deformities. J Pediatr Orthop. 2011;31:1–5

MATERIAL AND METHODS

- Retrospective cohort, single-center, quality improvement study*
- N= 17 EOS patients 2013-2016 (18 months follow-up median)

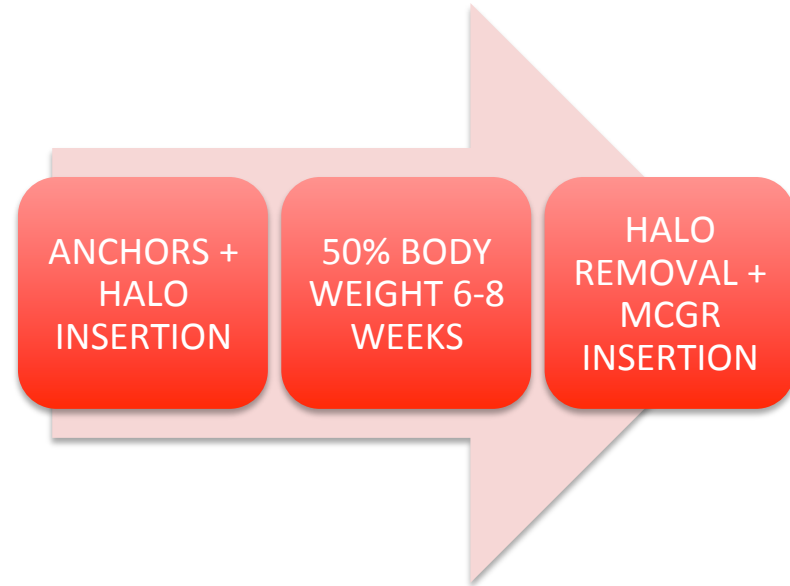
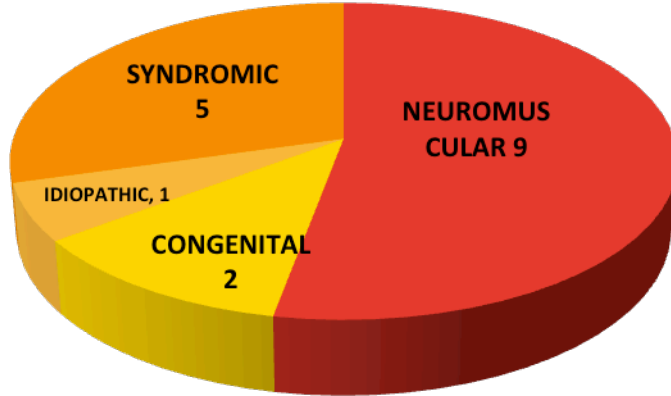


Table 1. Patient demographics

Patient ID	Age	Sex	Diagnosis	Previous construct	C-EOS	Staging indication	Weight traction	Length of stay	N° Hooks	N° Screws
1	10	M	Neuromuscular	GR	N3N	Instrument failure	20	2	6	4
2	9	F	Congenital	VEPTR	C3N	Instrument failure	19	80	6	4
3	6	M	Syndromic		S3+	Hyperkyphosis	15	59	4	4
4	3	F	Neuromuscular		N3+	Short T1T12	9	90	4	6
5	6	M	Syndromic		S3N	Short T1T12		4	4	4
6	7	M	Neuromuscular		N3-	Poor bone		106	6	6
7	7	F	Neuromuscular		N3+	Short T1T12	10	87	4	4
8	9	M	Idiopathic		I3-	Stiffness		4	6	4
9	9	M	Neuromuscular		N3N	Poor bone		4	6	6
10	6	F	Syndromic		S3N	Short T1T12	15	86	4	6
11	9	F	Neuromuscular	MAGEC	N3N	Instrument failure	25	5	6	4
12	8	F	Syndromic		S3-	Poor bone		6	4	6
13	11	F	Syndromic		S3N	Stiffness		5	4	4
14	3	F	Congenital		C3N	Short T1T12	12	66	4	4
15	8	F	Neuromuscular		N4N	Poor bone	17	89	6	6
16	5	M	Neuromuscular	VEPTR	N3+	Short T1T12	13	120	4	4
17	6	M	Neuromuscular		N3N	Poor bone	18	92	4	4

Table 3.- DEFORMITY CORRECTION

	PRE Median (IQ25-75)	POST Median (IQ25-75)	CORRECTION	P value *
AVT	41 (35-61)	25 (17-61)	16 (7-24)	0.0121
Coronal balance	16 (12-33)	19 (11-28)	0 (-7,10)	0.887
Lumbar Cobb	60.5 (54.25-67.5)	32 (25-38)	2 (-7,23)	0.00391
Lumbar lordosis	44 (39-56)	38 (29-53)		0.185
Thoracic Kyphosis	35 (30-49)	21 (18-28)	17 (2-28)	0.00485
T2T5 Kyphosis	12 (7-15)	9 (7-14)	-1 (-12,10)	0.535
Sagittal Balance	26 (11-46)	11 (0-19)	27 (-16,43)	0.0927
T1S1 height	263 (232-304)	325 (279-346)	39 (30-57)	0.000383
T1T12 height	171 (140-181)	191 (150-210)	27 (17-29)	0.000704
T1 Tilt	17 (7-25)	7 (3-15)	10 (2-12)	0.00291
Thoracic Cobb angle	68 (65-78)	38 (27-46)	37 (32-41)	0.000317
Major Cobb angle correction %			48.68 (36.8-57.9)	

*Wilcoxon signed rank test with continuity correction

* All statistical tests were done using R for statistical computing. Median values between groups were compared using Wilcoxon Rank Sum, Fischer's Exact, and Welch's T tests. A P value of less than 0.05 was considered statistically significant.

- Rate of **unplanned surgeries** was **6%**,
 - One patient with Proteus Syndrome had a broken rod requiring revision.
 - No infections.
 - No traction-related complications.
 - No anchor dislodgement at the median of 18 months
- **STUDY LIMITATIONS**
 - **Retrospective** design
 - Heterogeneity of the population
 - Relatively short follow-up
 - Lack of patient based outcomes (EOSQ24)

- **Choi et al** (2017) described a **complication rate of 42%** in 54 patients with **28% of reoperations**. Seven patients (13%) had either proximal or distal implant-related complications at an average of 8.4 months³
- **Kwan et al** (2017) reported an **unplanned reoperation rate of 46,7%** in 30 patients managed with MCGR¹
- Risks factors for complications have been reported, **including poor bone density and large deformity, particularly kyphotic deformities**³⁻⁴
- **Gomez et al** (2017) described a **2-stage TGR insertion** in 8 patients with EOS⁵. No patients had neurological complications or instrumentation-bone failure of the GR construct
 - Only 5 had preoperative traction

4.- Choi E, Yaszay B, Mundis G, Hosseini P, Pawelek J, Alanay A, Berk H, Cheung K, Demirkiran G, Ferguson J, Gregg T, Helenius I, La Rosa G, Senkoylu A, Akbarnia BA. Implant Complications After Magnetically Controlled Growing Rods for Early Onset Scoliosis: A Multicenter Retrospective Review. J Pediatr Orthop. 2017 Dec;37(8):e588-e5924.-

5.- Gomez JA, Grzywna A, Hanstein R, Emans JB, Hresko MT, Hedequist D, Karlin LI, Glotzbecker MP. Staged Growing Rods With Preimplantation of Spinal Anchors for Complex Early Onset Scoliosis. J Pediatr Orthop. 2017 Feb 27

- 2-stage strategy combined with pre-operative halo-gravity traction results in a smaller rate of unplanned revision surgeries (5.9%) at median of 18 months follow up
- Reasonable deformity correction and lower complication rate compared with previous studies suggest that this technique is effective to manage complex EOS.
- To the best of our knowledge, this is the first study reporting the radiological outcomes and complications of 2-stage MCGR instrumentation combined with preoperative halo-gravity traction.