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Comparison of Complications and Unplanned OR visits between Magnetically Controlled Growing Rods and Vertical Expandable Prosthetic Titanium Rib

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Introduction

- **Approved in 2014, magnetically controlled growing rods (MCGR) are now widely used to treat progressive early onset scoliosis (EOS)**
 - Alternative to:
 - > Traditional Growing Rods (TGR)
 - > VEPTR
 - Less repetitive surgery -- should result in:
 - > Less SSI
 - > Less psychosocial impairment
- **However, it is still unproven whether MCGR is superior in reducing unplanned surgeries or complications**



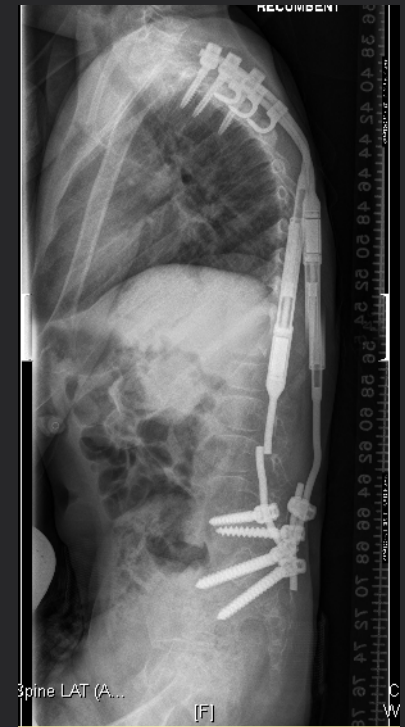
Purpose and Hypothesis

- **Purpose**
 - Compare complications between MCGR and VEPTR in the first 2 years after primary device implant
- **Hypothesis**
 - Patients with MCGR will experience both lower risks of complications and unplanned OR visits than patients with VEPTR

Study Design

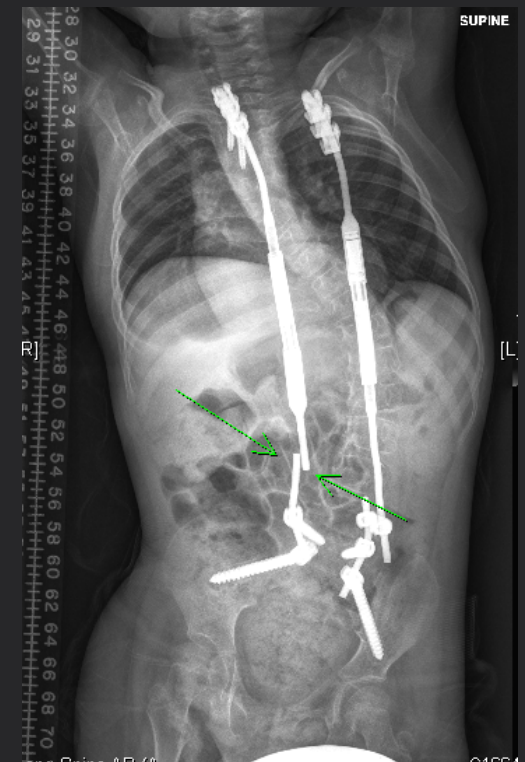
Retrospective cohort study

- Single institution
- Consecutive patients undergoing **primary** implant of VEPTR or MCGR
- Inclusion Criteria:
 - > Diagnosis of EOS
 - > Age < 10 years at surgery
 - > 2 years follow up



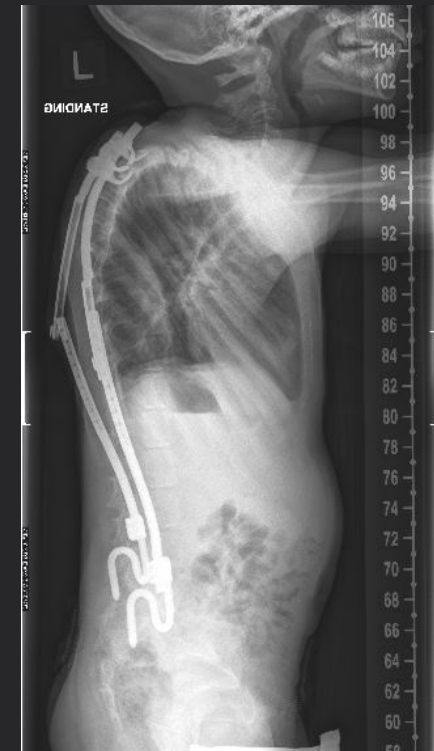
Outcomes - Complications

- Wound
- Medical
- Implant
 - Rod breakage
 - Anchor migration – hook displacement, screw pullout, rib erosion
 - Lengthening Failure (MCGR)



Outcomes – Unplanned Return to OR

- Any previously **unscheduled** OR visit
- Any previously **scheduled** OR visit that deviates from original treatment plan
 - Ex: planned = routine VEPTR lengthening



Patient Demographics

Patient Characteristics (N=74)		MCGR (N=22)	VEPTR (N=52)	p-value
Age at Implant (years)		6.1 \pm 1.2	6.3 \pm 2.9	0.70
Sex	Male	16 (73%)	26 (50%)	0.08
	Female	6 (27%)	26 (50%)	
Etiology	Congenital	2 (9.1%)	7 (13.5%)	0.96
	Idiopathic	4 (18.2%)	8 (15.4%)	
	Neuromuscular	12 (54.5%)	27 (51.9%)	
	Syndromic	4 (18.2%)	10 (19.2%)	
Major Coronal Curve (degrees)		73.7 \pm 17.6	61 \pm 17.5	<0.01*
Follow-up (years)		1.9 \pm 0.6	2**	1

* p<0.05

Patients with Complications

- NOTE:** Totals may not add up as patients may have experienced multiple complications

	MCGR (N=22)	VEPTR (N=52)	p-value
Overall Complication Events	15 (68%)	26 (50%)	0.15
Wound	3 (13.6%)	6 (11.5%)	0.80
Implant	12 (54.5%)	21 (40.4%)	0.33
Rod Breakage	2 (9.1%)	0 (0%)	0.03*
Anchor Migration	5 (22.7%)	17 (32.7%)	0.39
Lengthening Failure	4 (18.2%)	-	-
Miscellaneous	4 (18.2%)	7 (13.5%)	0.60
Medical	2 (9.1%)	3 (5.8%)	0.83

* p < 0.05

Complications per Patient

Per Patient	MCGR (N=22)	VEPTR (N=52)	p-value
Overall Complication Events	21 (0.95)	41 (0.79)	0.31
Wound	3 (13.6%)	10 (9.6%)	0.74
Implant	15 (68.1%)	27 (51.9%)	0.35
Rod Breakage	2 (9.1%)	0 (0%)	0.03*
Anchor Migration	5 (22.7%)	20 (38.4%)	0.27
Lengthening Failure	4 (18.2%)	-	-
Miscellaneous	4 (18.2%)	7 (13.5%)	0.61
Medical	3 (13.6%)	4 (7.7%)	0.88

* p < 0.05

Unplanned Return to the OR was Equivalent

Operating Room (OR) Visits	MCGR (N=22)	VEPTR (N=52)	p-value
Total Procedures / OR Visits	33	199	-
Average OR Visits per patient (range)	1.5 \pm 1.1 (1-6)	3.8 \pm 1.2 (1-8)	p < 0.001*
Total Unplanned OR Visits	12	36	-
Patients with unplanned OR visits	8/22 (36.4%)	23/52 (44.2%)	p = 0.53
Average unplanned OR visits per patient	0.55 \pm 1.1 (0-5)	0.69 \pm 1.0 (0-5)	p = 0.58

* p < 0.05

Discussion

- **Overall complications per patient between the two groups were similarly high**
 - Trend towards more complications in MGCR group
 - MCGR group fewer total procedures
- **No difference in unplanned trips to the OR**
- **Dramatic reduction in surgeries and anesthesia exposure in this vulnerable population remains a major benefit**
- **Fewer surgeries does not equate to fewer complications**

Conclusion

- **Overall complications are similar between patients who undergoing primary MCGR or VEPTR implants for EOS treatment**
- Larger prospective studies with longer follow up are necessary to further elucidate observed trends
- Identifying risk factors for complications in the MCGR cohort is the first step towards **improving care and better defining surgical indications** among these patients

Thank You



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