

12th International Congress on Early Onset Scoliosis
November 15-16, 2018 | Lisbon, Portugal

#41 Comparing Risk of Unplanned Return to the Operating Room (UPROR): Magnetically Controlled Growing Rod (MCGR) System vs Prosthetic Rib Contructs (PRC)

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-Disclosures-

Royalties: Biomet, ECOP

Consultant: Stryker, Biomet; Wellinks; Nuvasive

Grant/Research Support: SRS, POSNA, CSSG

BOD: POSNA (PL); CSSG, SP3



Introduction

- Since FDA approval in 2014 (USA), **use of MCGR has grown dramatically** for patients with early onset scoliosis (EOS)

Utilized as alternative to Traditional Growing Rods (TGR) or “Prosthetic Rib Constructs (PRC)” *in effort to reduce surgeries*



Does MCGR Actually Reduce Surgeries ?

(Planned and /or unplanned)

- **Purpose:** To compare unplanned return to OR (UPROR) between MCGR and PRC - ...2 years follow up
- We hypothesized that MCGR patients will have fewer unplanned surgeries compared to PRC at 2 years



Study Design

Retrospective cohort study

- Single academic medical center (CHONY)
- Consecutive PRC and MCGR patients receiving a *primary* implant
- **Outcomes:**
 - Unplanned return to OR (UPROR)

Cause of UPROR
Instrumentation Failure
Rod Fracture
I&D/Infection
I&D/Wound Dehiscence
Revision or Removal

Primary Outcome: “UPROR”

- Outcomes were reported as:
 - **2 year risk**, represented as risk per patient of UPROR
 - **Hazard model showing failure over time**
 - Probability of UPROR over time
 - Accounts for unequal follow up times due to construct availability
 - (PRCs available longer)

Patient Demographics

Variables	MCGR (N=22)	PRC (N=50)	p-value
Age at Surgery, mean year $\pm$ SD	6.0 $\pm$ 1.2	6.1 $\pm$ 2.6	0.410
Male	16 (72.7%)	27 (54.0%)	0.136
Female	6 (27.3%)	23 (46.0%)	
BMI mean %tile $\pm$ SD	46.2 $\pm$ 37.2	52.6 $\pm$ 35.9	0.252
CEOS, Etiology			0.895
Congenital/Structural	2 (9.1%)	7 (14.0%)	
Neuromuscular	4 (18.2%)	6 (12.0%)	
Syndromic	10 (45.5%)	23 (46.0%)	
Idiopathic	6 (27.3%)	14 (28.0%)	
Tone			0.950
Low	10 (45.5%)	21 (40.0%)	
Normal	9 (40.9%)	21 (42.0%)	
High	3 (13.6%)	8 (16.0%)	

No Difference in Age, BMI, CEOS, Tone

Patient Demographics

Variables	MCGR (N=22)	PRC (N=50)	p-value
	46.2 $\pm$ 37.2	52.6 $\pm$ 35.9	0.252
Major Coronal Curve, mean degree $\pm$ SD	71.1 $\pm$ 20.9	58.6 $\pm$ 18.7	0.007
Kyphosis Curve, mean degree $\pm$ SD	51.5 $\pm$ 28.2	31.8 $\pm$ 18.5	0.004

Cobb and Kyphosis Larger with MCGR

Total Surgeries – Planned and Unplanned

- **Patients with PRC (50):**
 - 206 total surgeries → 3.2 per patient/yr
- **Patients with MCGR (22):**
 - 37 total surgeries → 0.9 per patient/yr

PRC results in >3x more surgeries at only 2 years follow up

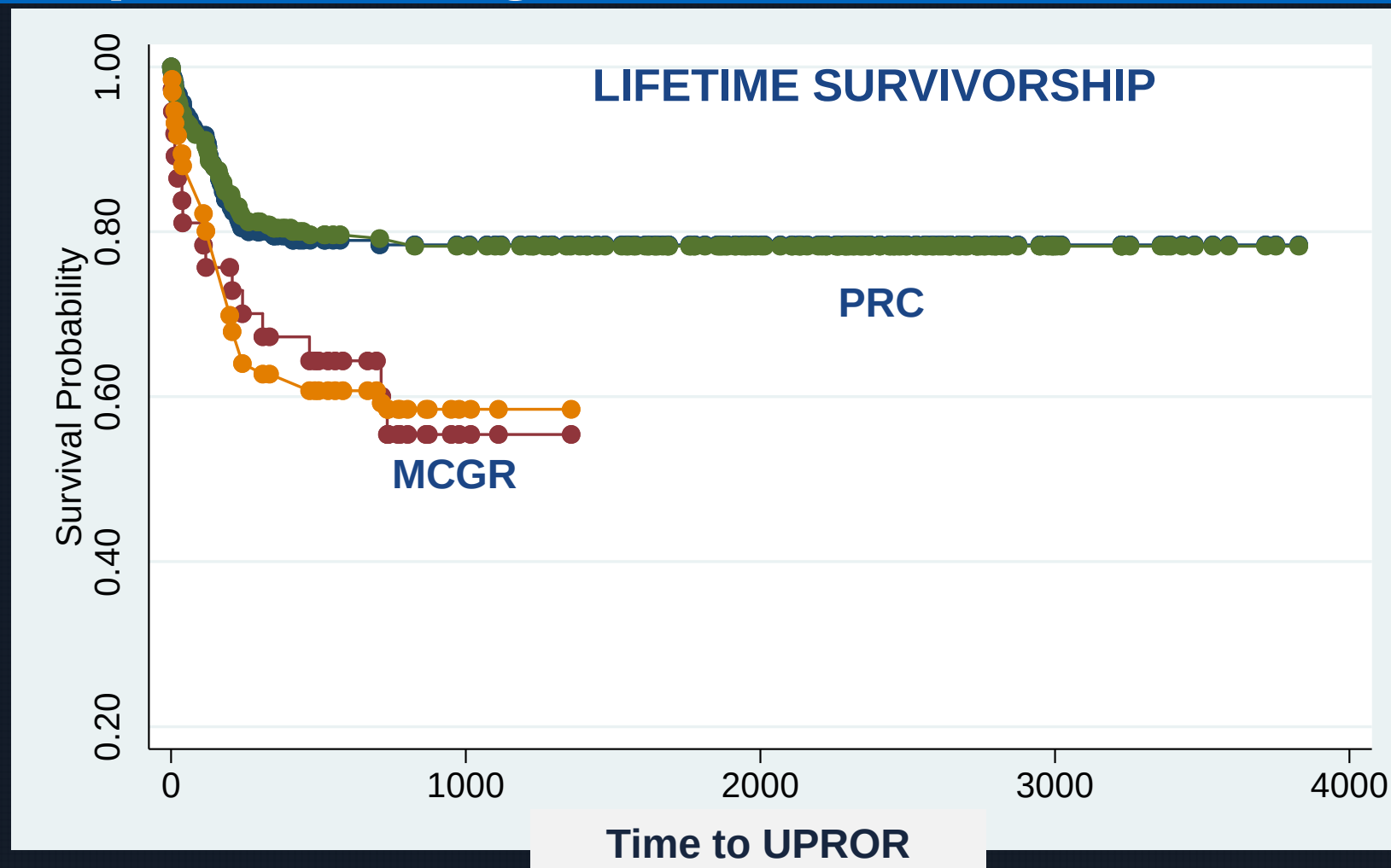
37.3% had UPROR within 2 years of index instrumentation

- **Patients with PRC (50):**
 - 0.8 UPROR per patient/year
 - 36.4% patients with at least 1 UPROR
- **Patients with MCGR (22):**
 - 0.9 UPROR per patient/year
 - 40.0% patients with at least 1 UPROR

UPROR Same at 2 years between groups

Patients with MCGR reach a 20% risk of UPROR at twice the speed of PRC patients; higher overall lifetime risk

Patients with MCGR had a 4.6 times higher **lifetime** hazard of UPROR than patients with PRC ($p=0.002$), adjusted for coronal and kyphotic curvature



Within high tone patients, MCGR has 2.59x increased risk of UPROR than VEPTR adjusting for coronal and kyphosis curvatures

Variable	Risk Ratio	95% C.I.	P value
MCGR	2.59	1.03-6.51	0.043
Major Coronal Curve	1.02	1.01-1.03	<0.001
Maximum Kyphosis	0.96	0.92-1.00	0.033

Discussion

- Study **limited** by relatively small numbers, especially in subgroups using historical control of PRC
- Though MCGR constructs require **fewer overall surgeries** than PRC, risk of UPROR is not reduced ; pattern changing...
- **Risk of UPROR seems to be higher for MCGR over time**
 - Longer follow up will better define the long term survivorship

Conclusions

- Reduction in surgical procedures and anesthesia exposure in a young, vulnerable population remains a significant benefit of MGCR
- Larger studies with longer follow up necessary to identify risk factors associated with UPROR for MCGR over time (eg high tone) as some of these patients may do better with TGR

Thank You

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