

Preop Halo Gravity Traction (HGT) Associated with Decreased Implant Complications in MCGR

MICHELLE WELBORN MD, DANIEL BOUTON MD, IVAN KRAJBICH MD



Shriners Hospitals
for Children™

Disclosures

Michelle Welborn: Depuy Synthes- Consultant; K2M advisory panel; POSNA research grant recipient; editor JPO, Spine deformity

Dan Bouton: nothing to disclose

Ivan Krajcich: K2M- Consultant



Shriners Hospitals
for Children™

MCGR background

- implant related complications in MCGR range from **0-100%** with an **ave complication rate of 44%** and **UPROR of >30%** [1-9]
 - Earlier generations had increased failure rates due to o-ring and pin fractures
- 10% rate of rod fracture, 10% rate of rod failure
 - Rod fracture and failure has been attributed in part to increased curve rigidity.



Shriners Hospitals
for Children™

How can we decrease complications in patients with severe EOS treated with MCGR:

Goal: decrease stress on implants

- Preop:
 - Patients with large, rigid curves undergo preop HGT
 - Preop HGT theoretically makes the curve is less rigid.
 - Decreasing curve rigidity may potentially decreasing implant related complications
- Postop small magnitude high frequency lengthenings
 - Small magnitude lengthenings would decrease the strain exerted on the implants
 - High frequency lengthenings would allow us to keep up with growth



Shriners Hospitals
for Children™

Concerns- can HGT have a negative impact?

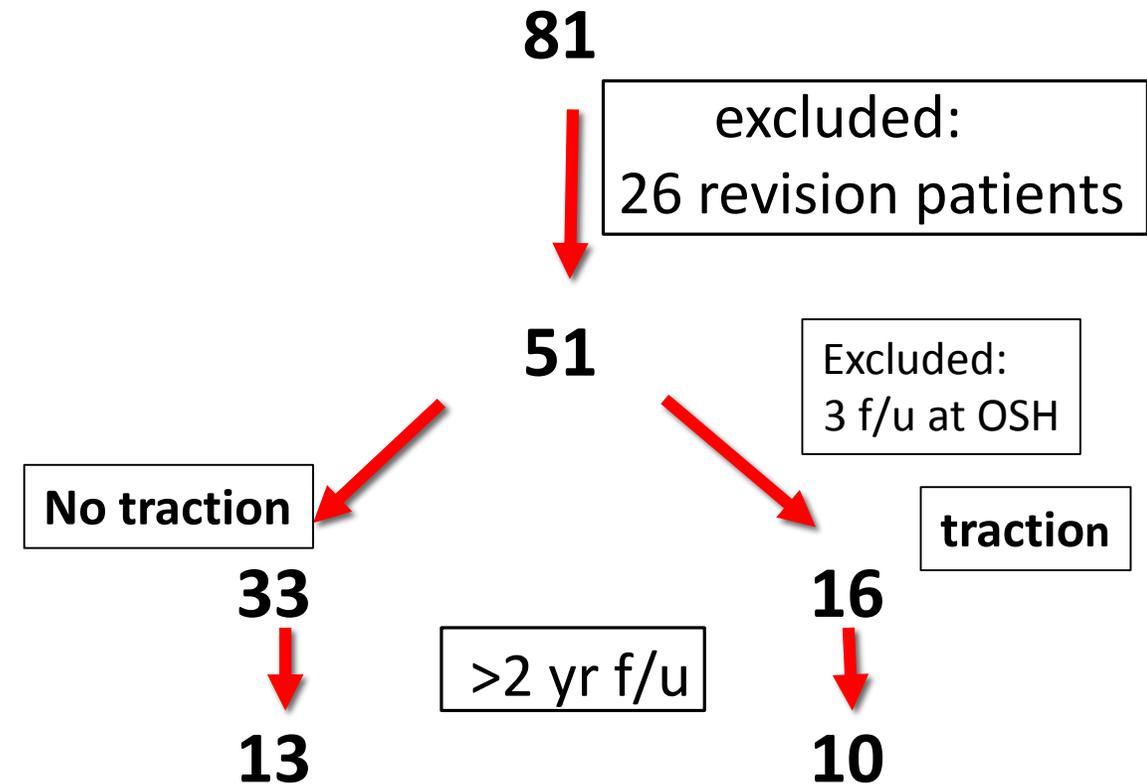
- HGT impacts the soft tissues of the whole spine
- So would patients that undergo HGT have a higher or a lower complication rate?



Shriners Hospitals
for Children™

Methods

- IRB approved retrospective cohort study of a prospectively collected database
- 51 MCGR patients from 2014-2018 treated at a single institution
 - All patients failed conservative management
 - all genders, ethnicities, and underlying diagnosis were included
 - <2 yr follow-up and revision patients excluded



MCGR >2 yr followup

	Preop Cobb	% correction on flexibility film	Postop Cobb	% correction	Complication Rate	UPROR	Ave follow-up days
Traction N=10	89°	17%	44°	51%	10%	0%	1020
No-Traction N=13	77°	39%	35°	55%	31%	15.4%	1067
P-value	0.027	0.000	0.421	0.244	.123	.397	.3409

Traction protocol

- 6+ pins
- weight increased BID
- 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



Shriners Hospitals
for Children™

Postop Lengthening protocol

Maximum correction sought in OR

First lengthening 8 weeks postop

Frequency:

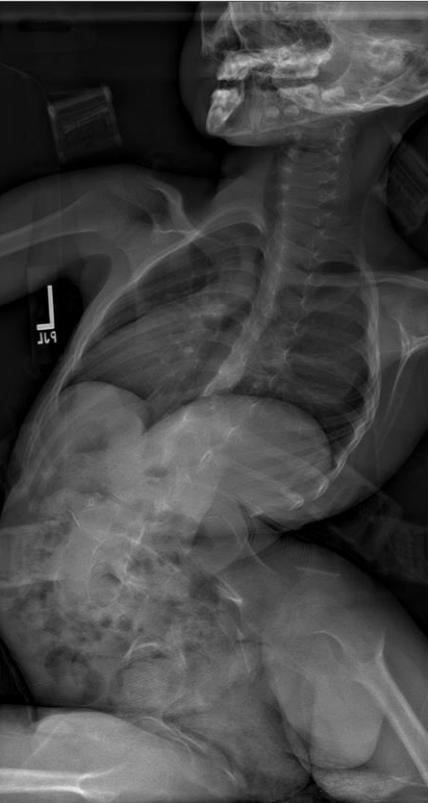
- q6-8 weeks

Lengthen: 2-3mm

Preop

PA

Lateral



Final in traction

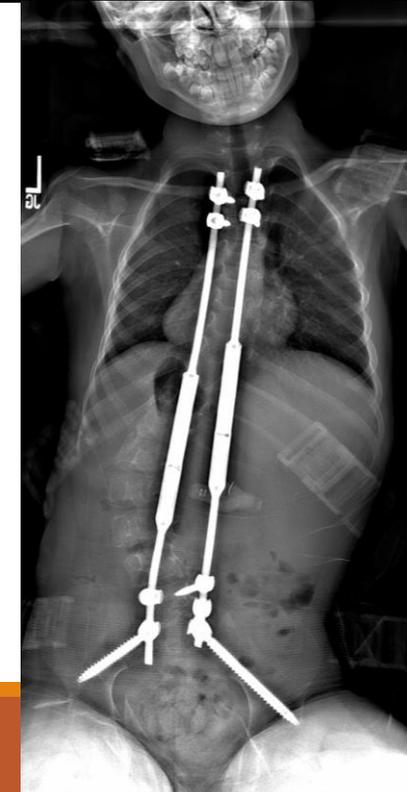


PA



Most Recent Follow-up

lateral



Lateral

Radiographs:

- EOS microdose PA/Lateral full spine q3-4 lengthenings

Clinical exam:

- Palpate anchors at each visit to evaluate for increasing pain, prominence or bursa

Most recent follow-up Rod status- >2 yr follow-up

Traction: **no rod failures**

- 7/10 achieved maximal length of rod
- 3/10 continuing to lengthen

Non-traction:

- 3/13 still lengthening primary mcgr
- 2/13 skeletally mature, lengthening stopped
- 2/13 proximal anchor failures
- 2/13 rod failures – both patients Preop Cobb >80 and generation 1.2 rods,
- 5/13 revised due to max length of rod



Shriners Hospitals
for Children™

Complications

○ **traction group: 10%**

- Ave follow-up 1020 days
- Intraop dural tear
- **0% UPROR**

○ **Non-traction group: 30.8%**

- Ave follow-up 1067 days
- 2 patients with rods that failed to lengthen
 - both patients at or near skeletal maturity
- 1 patient with v mild PJK,
 - Associated with proximal hook failure
- 1 anchor migration requiring revision
- **15.4% UPROR**



Shriners Hospitals
for Children™

Junctional Kyphosis

	Preop T1-T12 kyphosis	Preop T5- T12 kyphosis	Postop T1-T12 kyphosis	Postop T5-T12 kyphosis	Postop PJA	Most recent PJA	Duration F/u
HGT n=8	38.7 (-2.96-74.5)	28.1 (-6.26-62.9)	28.5 (5.04-61.8)	23.5 (-9.87-39.3)	4.8 (0.41- 8.66)	4.8 (0.79-10)	853 days
Non HGT n =11	28.7 (-24.6-52.9)	25.1 (-24.2-73.2)	27.7 (7.45-48.1)	23.2 (- 7.74- 33.5)	3.2 (- 7.84- 9.36)	4.4 (- 3.49-11)	812 days

Conclusion:

PJA is a direct result of intraop sagittal contour

- PJA did not change between initial postop and most recent follow-up

No INCREASED RISK OF PJK with HGT

- Patients with 11° PJA had proximal anchor failure -> revised anchor

Complications: all patients including <2 yr follow-up

- 81 MCGR procedures
- 51 primary MCGR

○18 traction

- 2 Dural Tears
- 1 Proximal anchor failure
- 6% UPROR**
- 19% complication rate**
- Ave follow-up 757 days**

○33 no traction

- 2 rod failures
- 2 v mild pjk, 1 observed, 1 revised due to implant failure
- 1 anchor migration
- 2 wound infection (both high risk neuromuscular patients)
- 1 symptomatic screw
- 15% UPROR**
- 24% complication rate**
- Ave follow-up 674 days**

Conclusion

- **Large curves can be effectively and safely treated with MCGR**
 - Rigid curves achieved equivalent correction to flexible curves with preop HGT
 - **HGT does not result in a higher complication rate**
 - PJA is a direct result of intraoperative rod contouring and did not increase with HGT



Shriners Hospitals
for Children™