

Spinal MRI Utilization in Patients with Early-Onset Scoliosis – Review of a Multi-Center Database

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Background

- Spinal MRI is commonly included in the evaluation of EOS due to higher frequencies of intraspinal abnormalities reported in this population
- Actual provider utilization of this imaging modality across the EOS spectrum has not been well described

Objectives

- 1) To report patterns of MRI utilization in patients with EOS across an international cohort of centers regularly treating patients with this condition
- 2) To determine if patient-related variables are associated with MRI use prior to treatment in EOS



Methods

Design: *Retrospective review of a prospective, multi-center database*

Inclusion criteria: *Idiopathic, Congenital, Neuromuscular or Syndromic EOS*

Exclusion criteria:

- *Incomplete or unverifiable data regarding pre-treatment imaging*
- *Structural deformities secondary to tumor or infection*

Independent variables:

- *Patient demographics: Age, race/ethnicity*
- *Etiology of EOS*
- *Major curve size (Degrees)*
- *Type of treatment (Operative or Non-operative)*

Dependent variable: *Pre-treatment MRI (MRI Obtained or No MRI Obtained)*

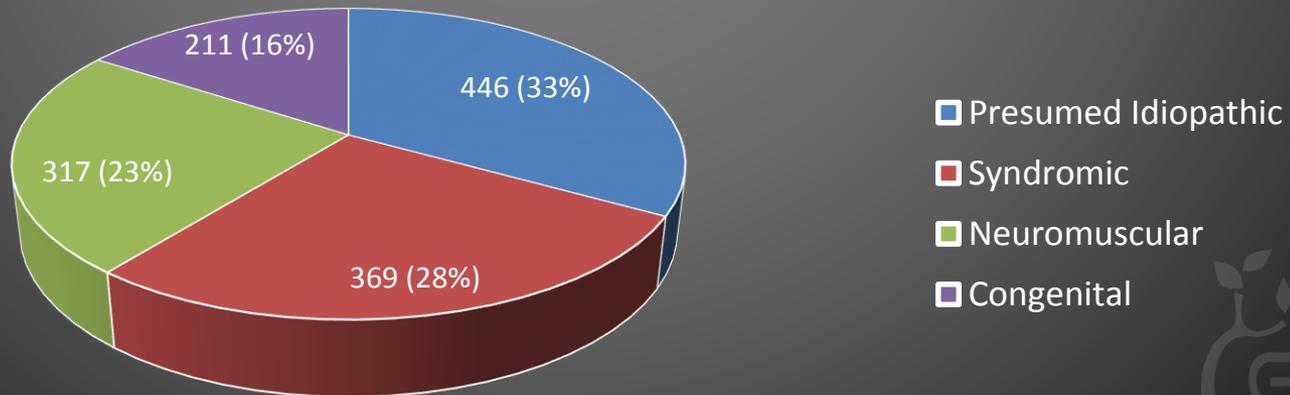
Statistical Analysis

- Demographic, clinical and radiographic characteristics summarized with descriptive statistics
- Univariate analyses were performed using Pearson's chi-square (χ^2) for categorical variables and two-tailed student's t-test for continuous variables
- Multivariate logistic regression was performed to identify significant predictors of MRI utilization

Cohort Demographics

- 1,343 (70%) of total registry subjects managed at 21 institutions by 50 surgeons met study criteria
- Age at treatment: 6.3 +/- 3.5 years
- Major curve prior to treatment: 66 +/- 25 degrees
- Treatment type was surgical in 75% of patients

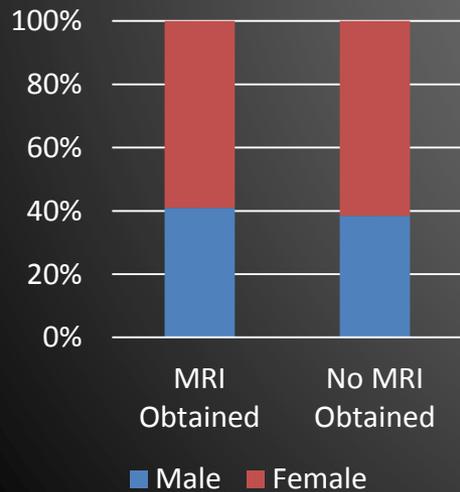
Patient Etiology



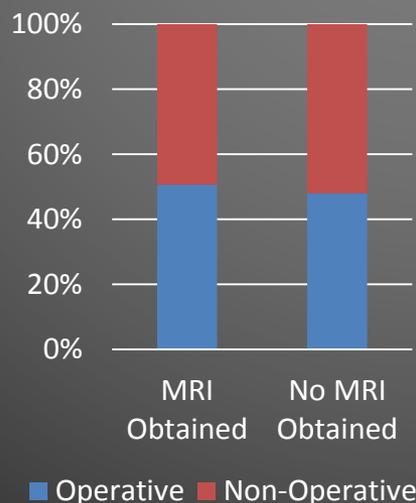
MRI Utilization

- MRI was obtained in 62% (836/1343) of patients at a mean age of 5.8 ± 4.0 years.
- MRI Utilization showed no association ($p > 0.05$) with gender, treatment type, major curve size and age at treatment

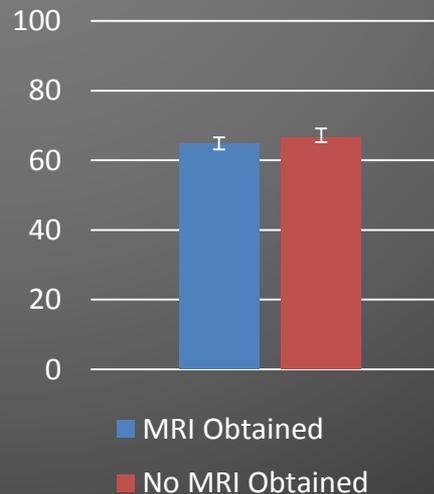
Gender



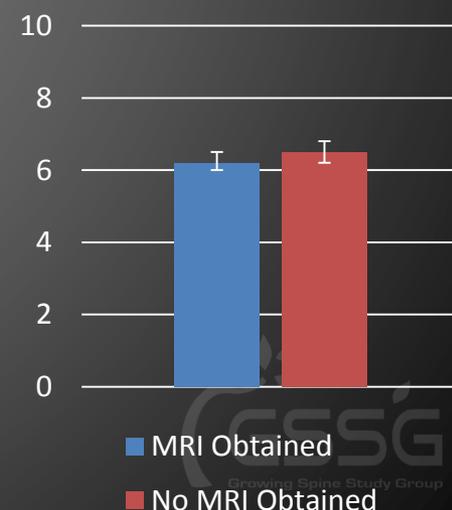
Treatment Type



Major Curve (degrees)



Age at Treatment



MRI Utilization - By Etiology

Univariate Analysis

Etiology	MRI Obtained n = 836 (62%)	No MRI Obtained n = 507 (38%)	P - value
Presumed Idiopathic	314 (37.6%)	132 (26.0%)	P < 0.001
Syndromic	232 (27.8%)	137 (27.0%)	
Neuromuscular	134 (16.0%)	183 (36.1%)	
Congenital	156 (18.7%)	55 (10.9%)	

Multivariate Regression

Etiology	Odd Ratio	95% CI	Adjusted OR*	95% CI
Syndromic	1		1	
Neuromuscular	0.4	(0.32, 0.59)	0.4	(0.31, 0.57)
Idiopathic	1.4	(1.05, 1.88)	1.4	(1.03, 1.87)
Congenital	1.7	(1.15, 2.43)	1.6	(1.09, 2.31)

*Adjusted for race/ethnicity

MRI Utilization - By Race/Ethnicity

Univariate Analysis

Race/Ethnicity	MRI Obtained n = 836 (62%)	No MRI Obtained n = 507 (38%)	P - value
White/Caucasian	524 (62.7%)	324 (63.9%)	P < 0.05
African/African-American	112 (13.4%)	61 (12.0%)	
Hispanic	72 (8.6%)	29 (5.7%)	
Asian/Asian-American	37 (4.4%)	10 (2.0%)	
Other/Unspecified	91 (11%)	83 (16.4%)	

Multivariate Regression

Race/Ethnicity	Odd Ratio	95% CI	Adjusted OR*	95% CI
White/Caucasian	1		1	
African/African-American	1.1	(0.81, 1.60)	1.2	(0.81, 1.65)
Hispanic	1.5	(0.98, 2.41)	1.7	(1.07, 2.73)
Asian/Asian-American	2.3	(1.12, 4.66)	2.4	(1.13, 4.88)
Other/Unspecified	0.7	(0.49, 0.94)	0.7	(0.53, 1.05)

*Adjusted for etiology

Discussion

- Two-thirds of EOS patients across a international, multicenter cohort of treating centers underwent spinal MRI prior to intervention
- MRIs were utilized more commonly among presumed Idiopathic and Congenital etiologies and least commonly among Neuromuscular etiologies
- MRI use appeared greatest in Asian/Asian-American populations

Limitations

- Registry studies rely upon the accuracy and consistency of data collected at participating centers
- Other factors potentially influencing MRI decision-making (e.g. physical exam findings) could not be examined

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