

Pre-operative Thoracic Kyphosis Can Predict Complications in Growing Rod Surgery for Early Onset Scoliosis

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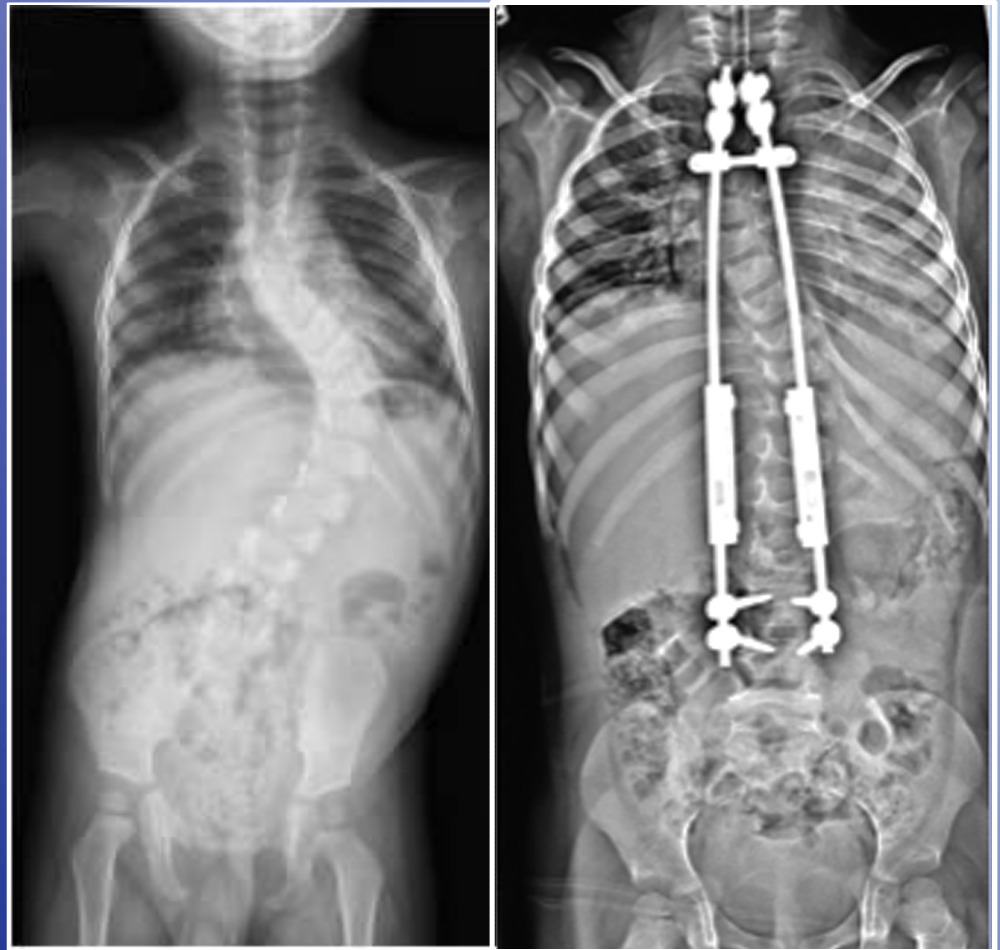


Disclosures

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Introduction

- Studies evaluating patient outcomes after growing rod surgery have largely focused on radiographic parameters in the coronal plane:
 - Cobb angle
 - Coronal balance
 - T1-S1



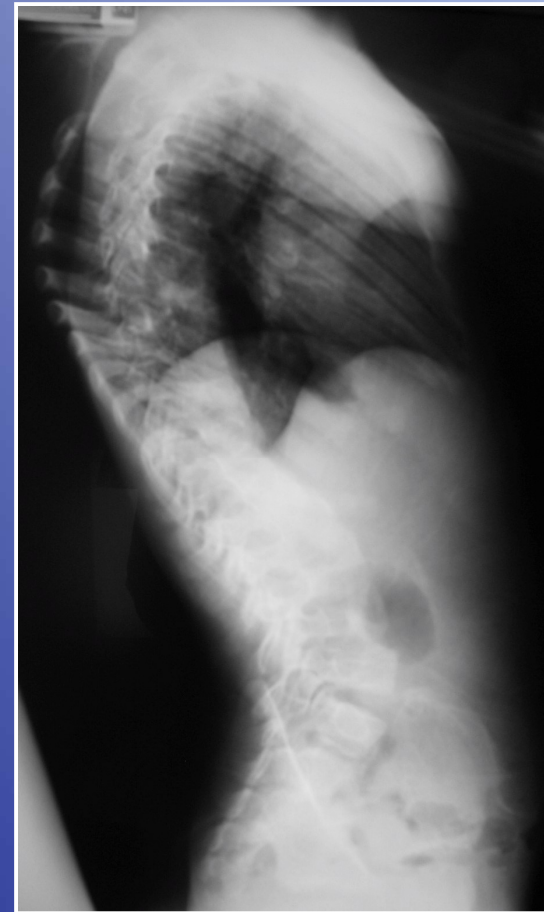
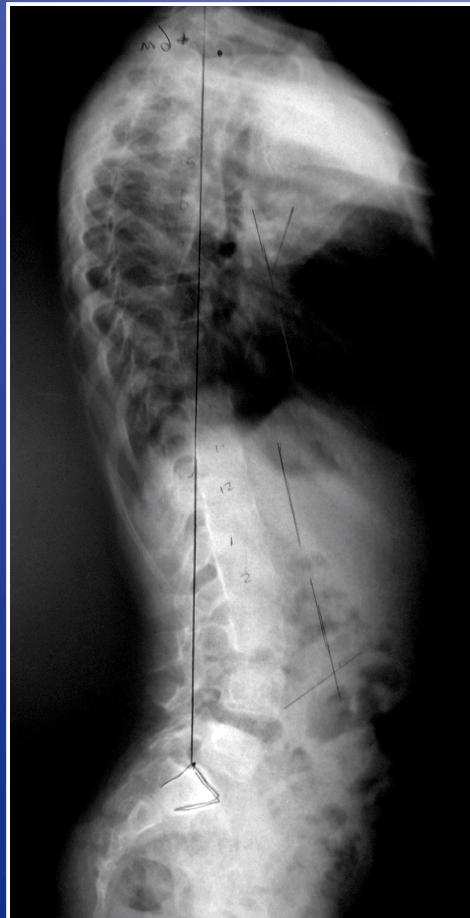
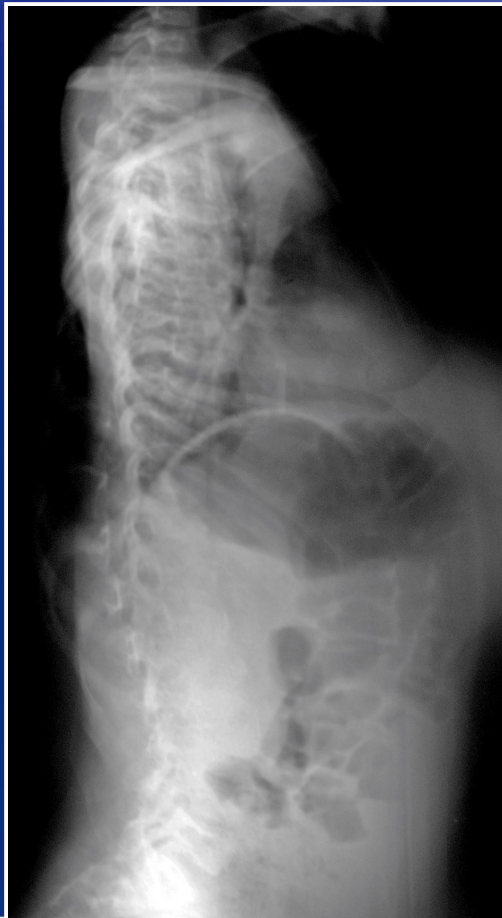
Introduction

- Sagittal plane analysis has become a standard in outcome studies for adolescent scoliosis
- The effect of sagittal alignment in growing rod patients has yet to be studied



Purpose

- To evaluate the relationship between the pre-op thoracic kyphosis and complications in growing rod surgery



Methods

- Out of 387 pts from the GSSG database, 90 pts had complete sagittal and coronal x-ray data with two-year follow-up after GR index surgery
- Demographics, surgical data, and complication events were also analyzed
- How do we classify varying degrees of thoracic kyphosis in our patient series?

Methods

- Reported average kyphosis range: 17-48 degrees
- Measurement techniques varied
- Need to use a reliable reference guide that is most consistent with our measurement technique

	Average Thoracic Kyphosis
Cil, et al; 2005	3 to 6 yrs old: 45° 7 to 9 yrs old: 48°
Bernhardt, Bridwell; 1989	4 to 29 yrs old: 28° (mean 12.8 yrs)
Fon, et al; 1980	2 to 27 yrs old: 45° (max)
Mac-Thiong, et al; 2004	4 to 18 yrs old: 43°
Probst, et al; 1983	27° (21-33°) in normal kids 28° (17-36°) in scoliotic kids



Methods

- Lenke's thoracic sagittal profile
- Widely used
- Defines three categories of thoracic kyphosis
- Patients were divided into three groups based on degree of thoracic kyphosis (T5-T12):
 - K- group: <10 degrees
 - N group: 10-40 degrees
 - K+ group: >40 degrees

Results: Demographics

	K- Group < 10°	N Group 10-40°	K+ Group > 40°
Number of pts	26	35	29
Pre-op age (years)	6+10 years (range 2-10)	5+1 years (range 2-8)	5+9 years (range 1-11)
Length of follow up (months)	82 months (range 25-124)	61 months (range 26-106)	69 months (range 23-135)
Syndromic (n=25)	11	6	8
Congenital (n=19)	3	10	6
Neuromuscular (n=18)	7	3	8
Idiopathic (n=28)	5	16	7



Results: Radiographic Data

	K- Group < 10°	N Group 10-40°	K+ Group > 40°
Pre-op Coronal Cobb angle	75° (33-125°)	66° (25-94)	82° (48-110°)
Latest Follow-up Coronal Cobb angle	40° (2-84°)	31° (4-88)	55° (22-105°)
Pre-op T5-T12 kyphosis	-3° (-41-9°)	24° (10-40°)	59° (41-115°)
Latest follow up T5-T12 kyphosis	8° (-15-28°)	26° (2-87°)	43° (9-105°)



Results: Complications

	K- Group < 10°	N Group 10-40°	K+ Group > 40°
Total Complications	27	20	55
Implant Failures	11	16	34
Rod breakages	7	13	25
Screw or hook loosening/pullout	4	3	9
General medical complications	15	4	22
Wound Infection	3	1	9
Pulmonary	2	2	2
Wound Closure	0	0	1
Death	1	0	0
Neurologic	0	0	3

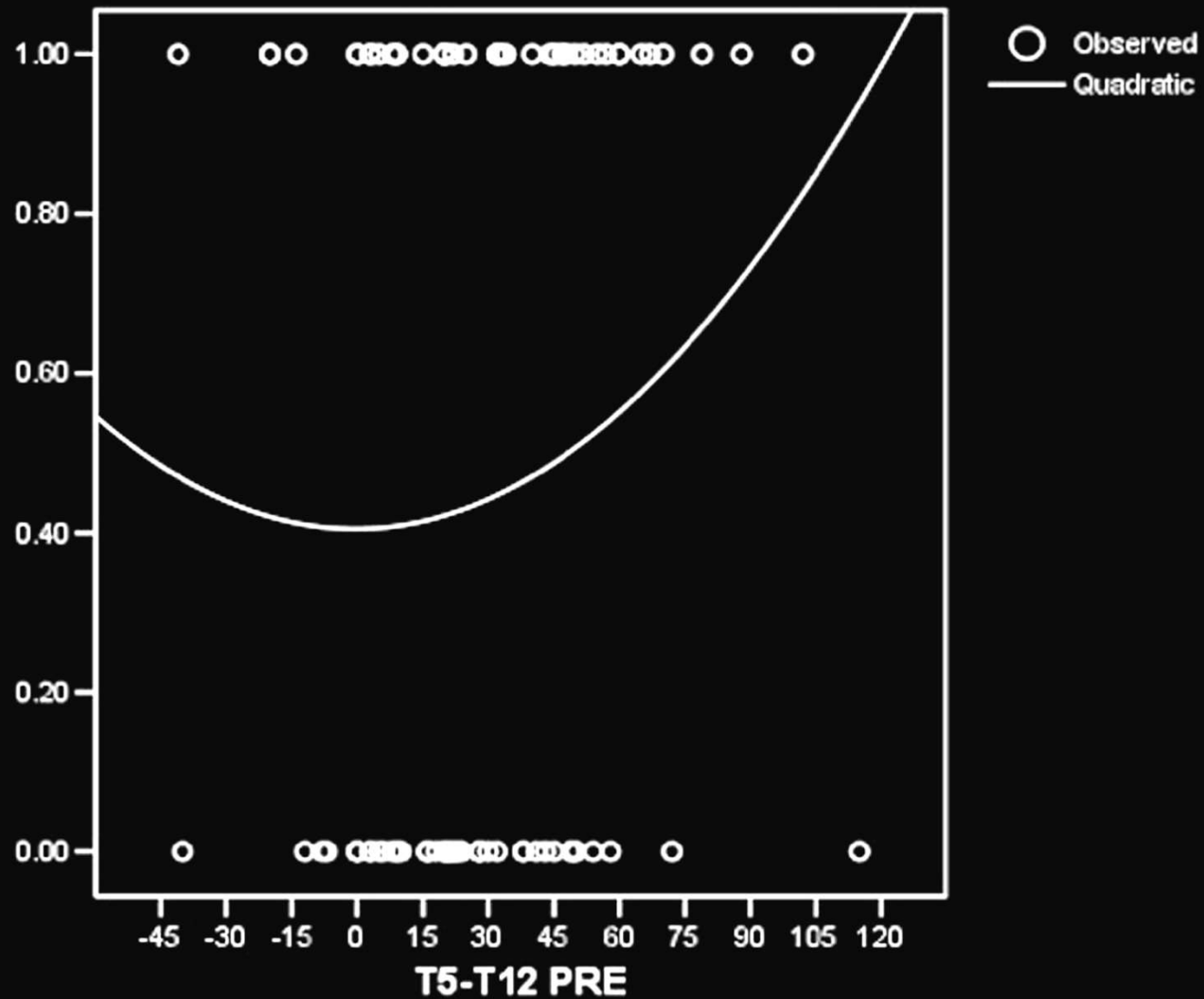
Results: Diagnoses

Diagnosis	% of patients with at least one complication	p Value
Syndromic	18 of 25 (72%)	< 0.05
Congenital	9 of 19 (47%)	
Neuromuscular	8 of 28 (28%)	
Idiopathic	7 of 18 (39%)	



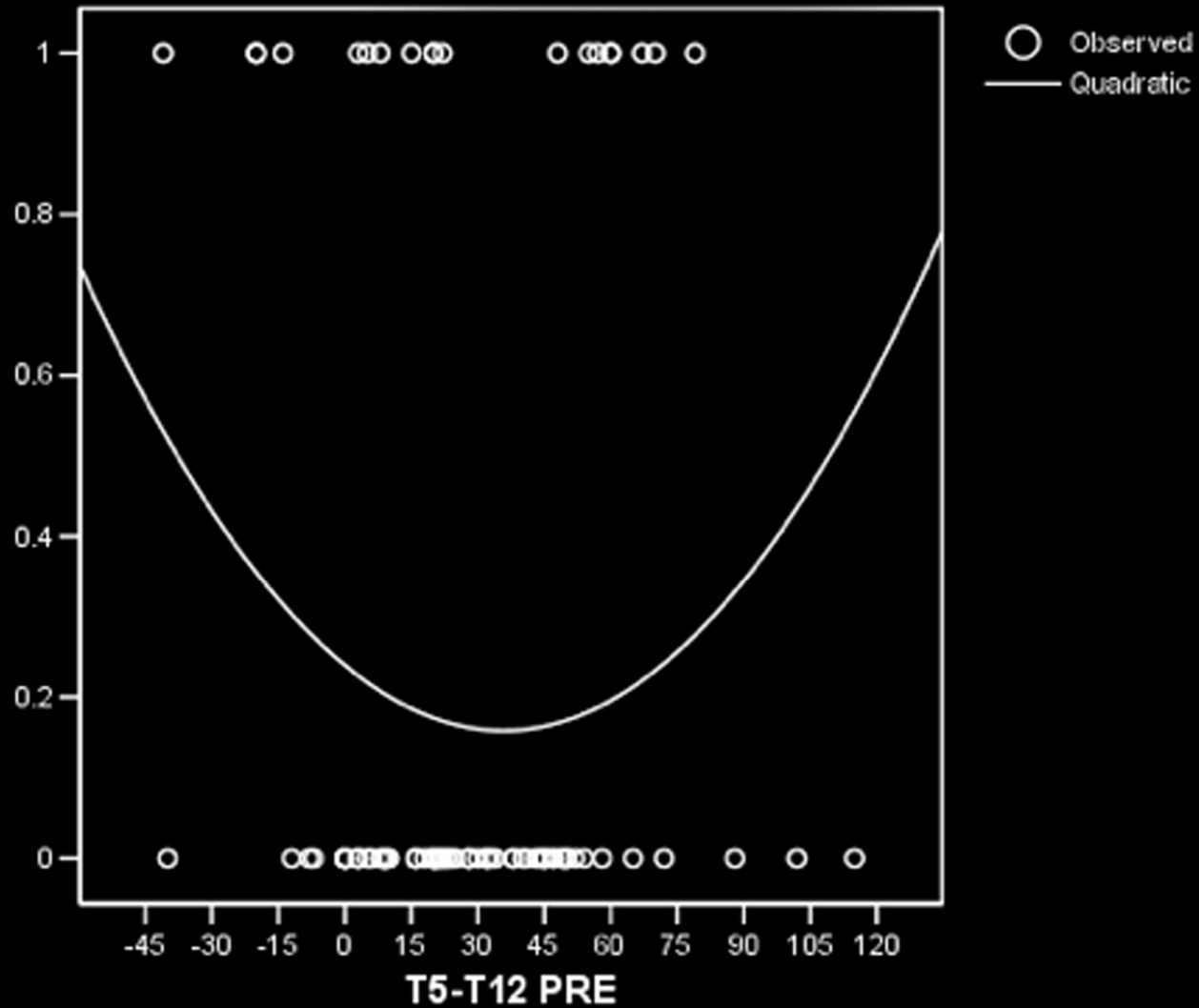
Results

Total Complications



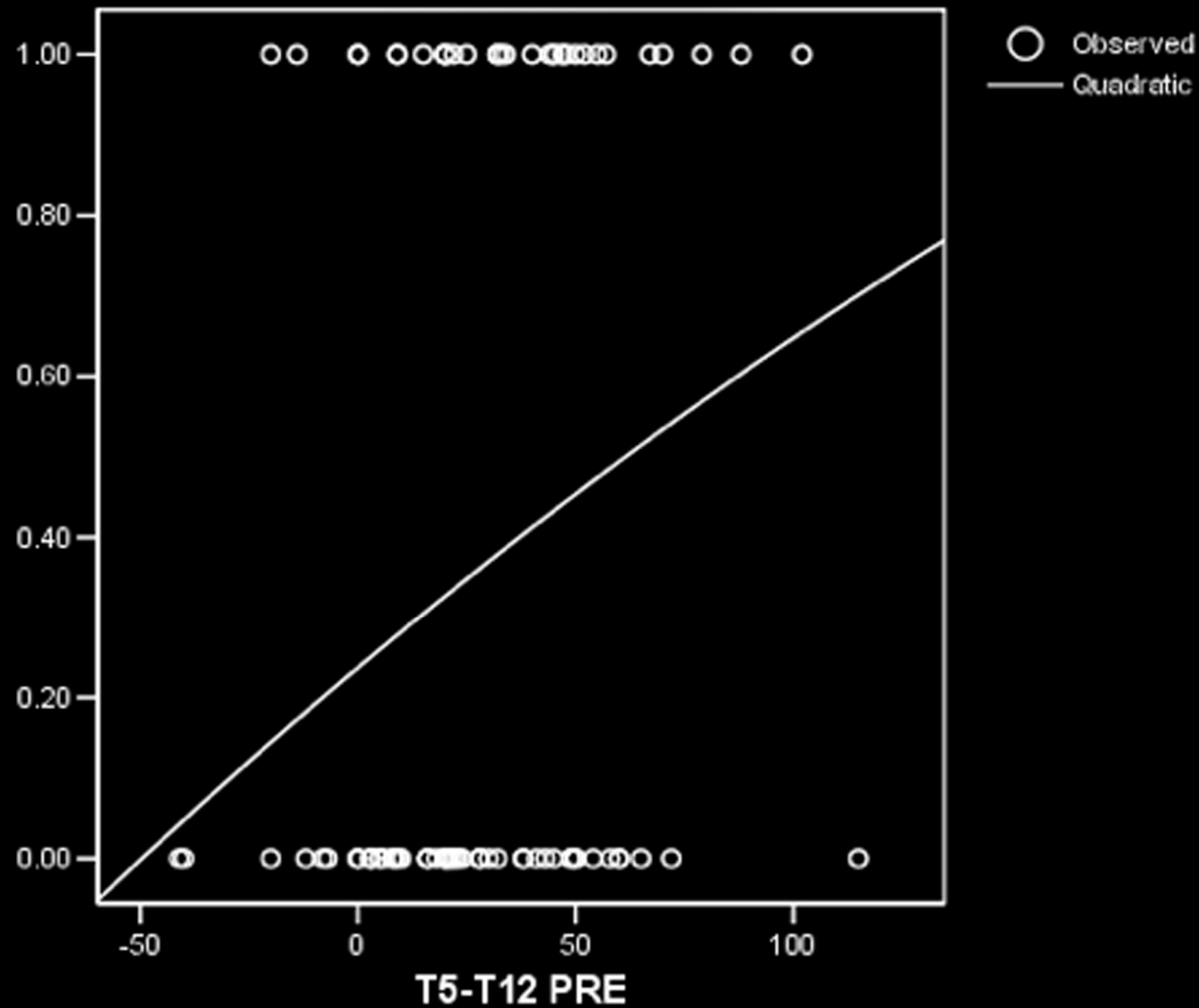
Results

General Medical Complications



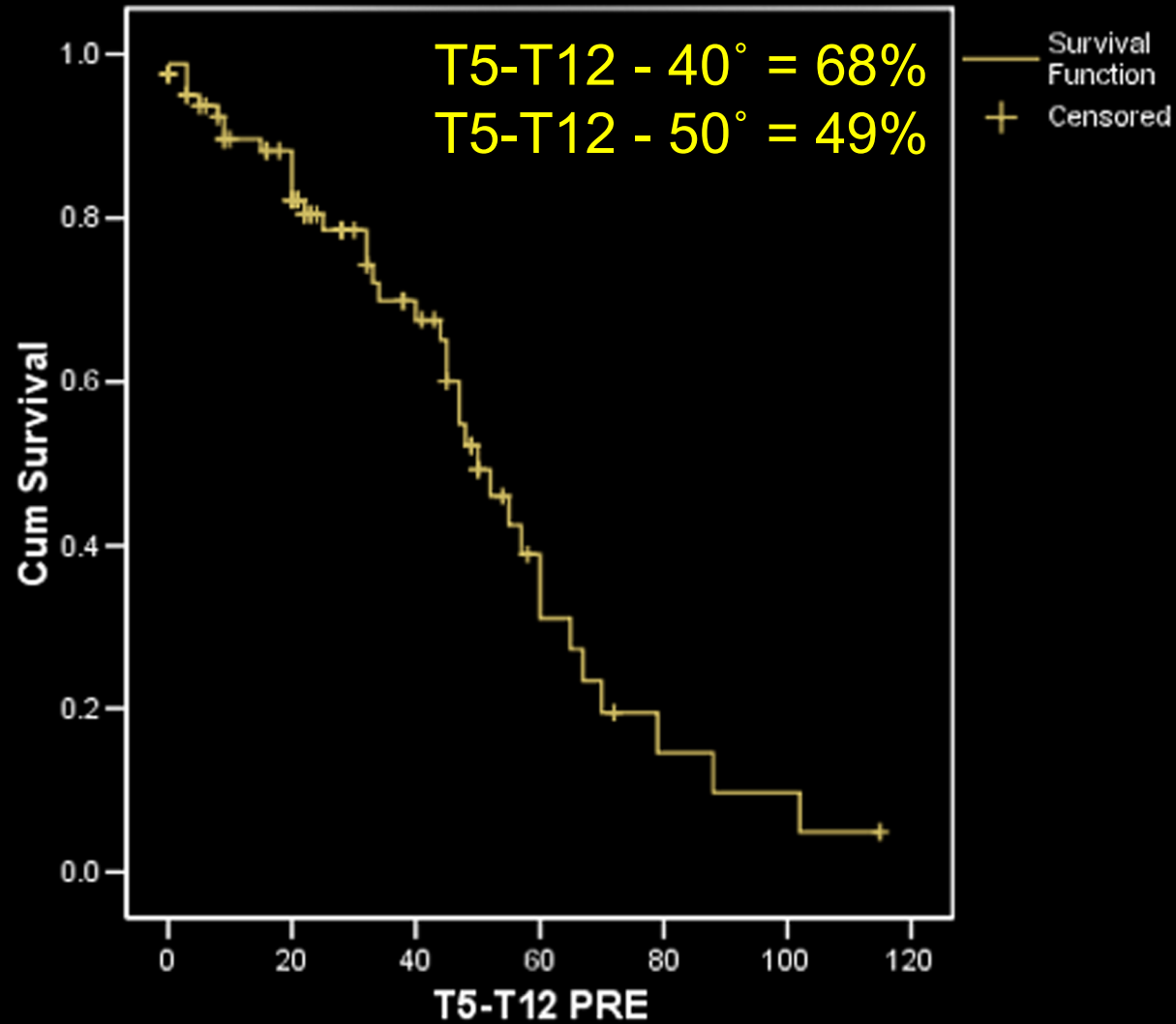
Results

Implant Complications



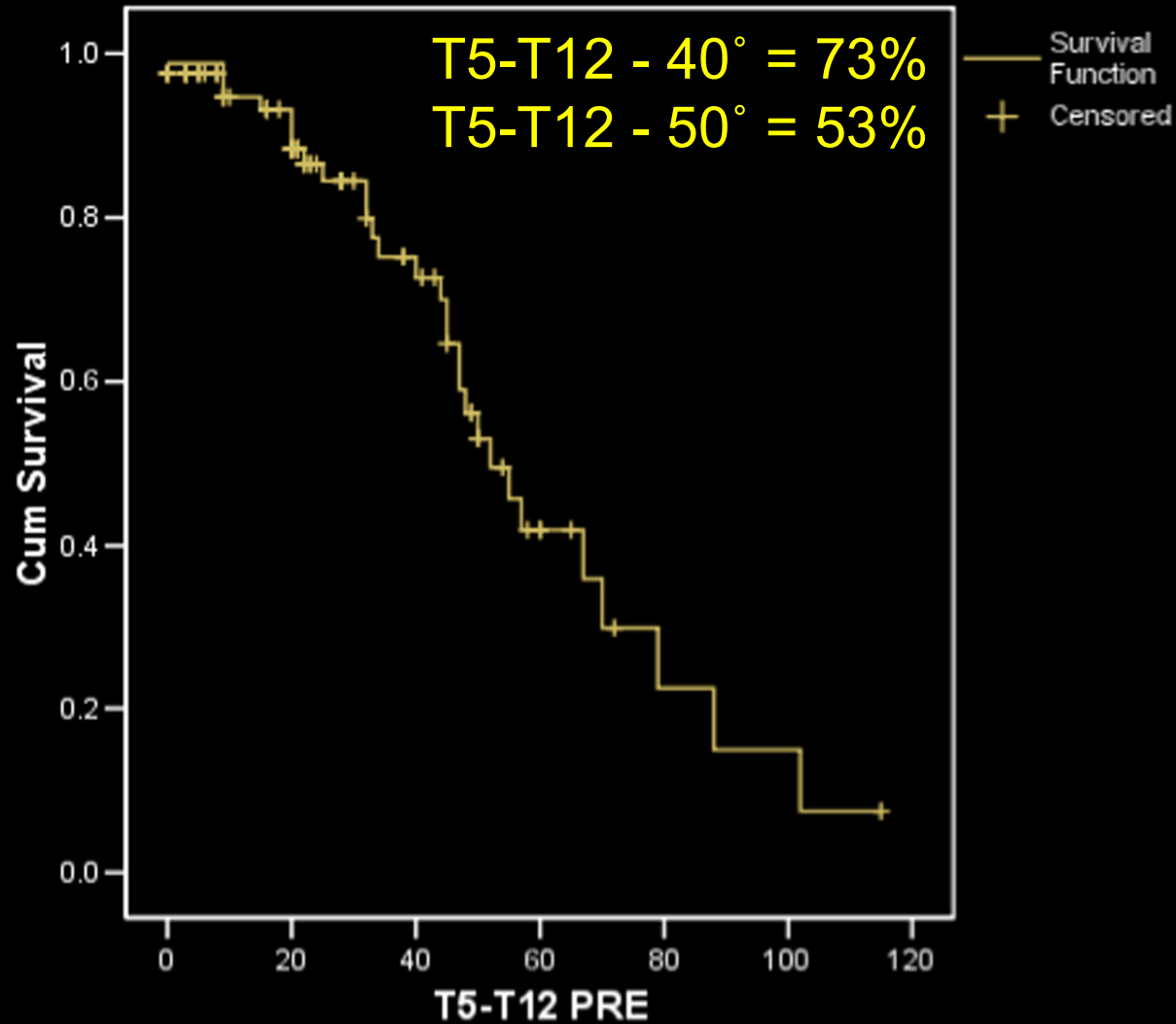
Results

SURVIVAL: Total Complications



Results

SURVIVAL: Implant Complications



Conclusions

- Patients with thoracic kyphosis greater than 40° who undergo growing rod surgery have a significantly higher risk of complications than patients with “normal” kyphosis
- Implant failure was the most common type of complication



Conclusions

- Syndromic patients with greater than normal kyphosis who undergo growing rod treatment should be monitored closely for post-operative complications.

Thank You



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