Cervico-Thoracic Malalignment

-unreported late complication after growing rod surgery for early onset scoliosis-

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Disclosure

Author	*Relationships Disclosed*
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Hiroshi Miyamoto	*No Relationship*
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(b) Consultant
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(d) Speakers' Bureau
(e) Other Financial Support

Introduction

Proximal junctional kyphosis sometimes developed and resulted in severe cervico-thoracic malalignment (cervical hyperlordosis and upper thoracic hyperkyphosis) in some of the early onset scoliosis(EOS) patients.

Throughout our experience of more than 40 cases of growing rod surgery, we recognized this malalignment in 7 cases.

To our knowledge, however, there was no report concerning this condition.

The purpose of this study is to report this condition and the strategy of the treatments.

Material and Methods

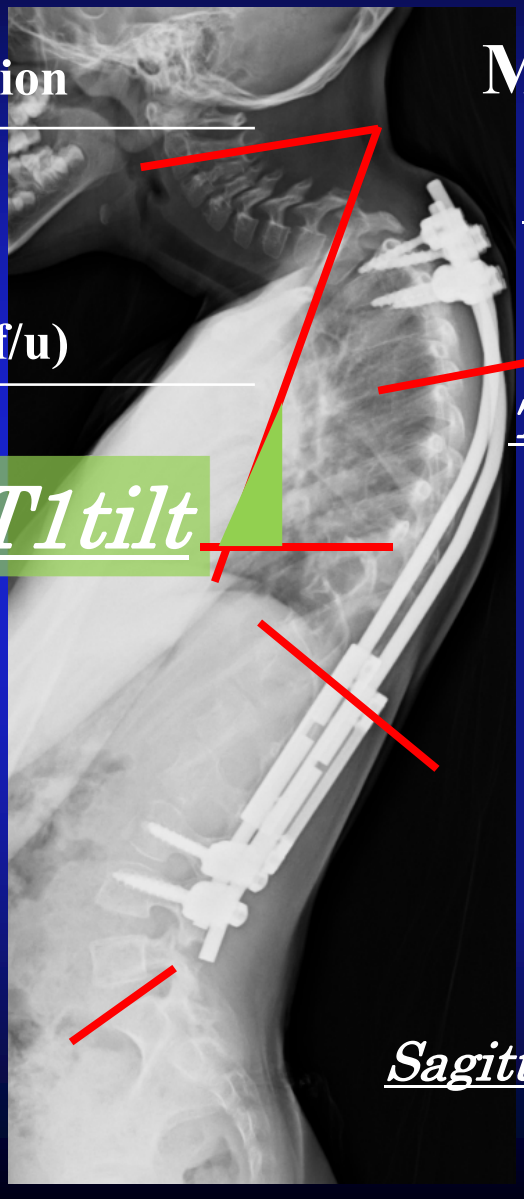
Consecutive **41** patients at a single institution

Inclusion criteria

Minimum **2** year follow-up

Kyphosis(T1-12) > **80** degree (at final f/u)

No. of cases	**7** cases
Gender (M:F)	**2:5**
Age at initial surgery	**6.3**±2.9y.o.
Follow-up	**8.8**±1.9yrs



Measurements

Cervical Lordosis

C2-7

Thoracic Kyphosis

T1-5

T5-12

Lumbar Lordosis

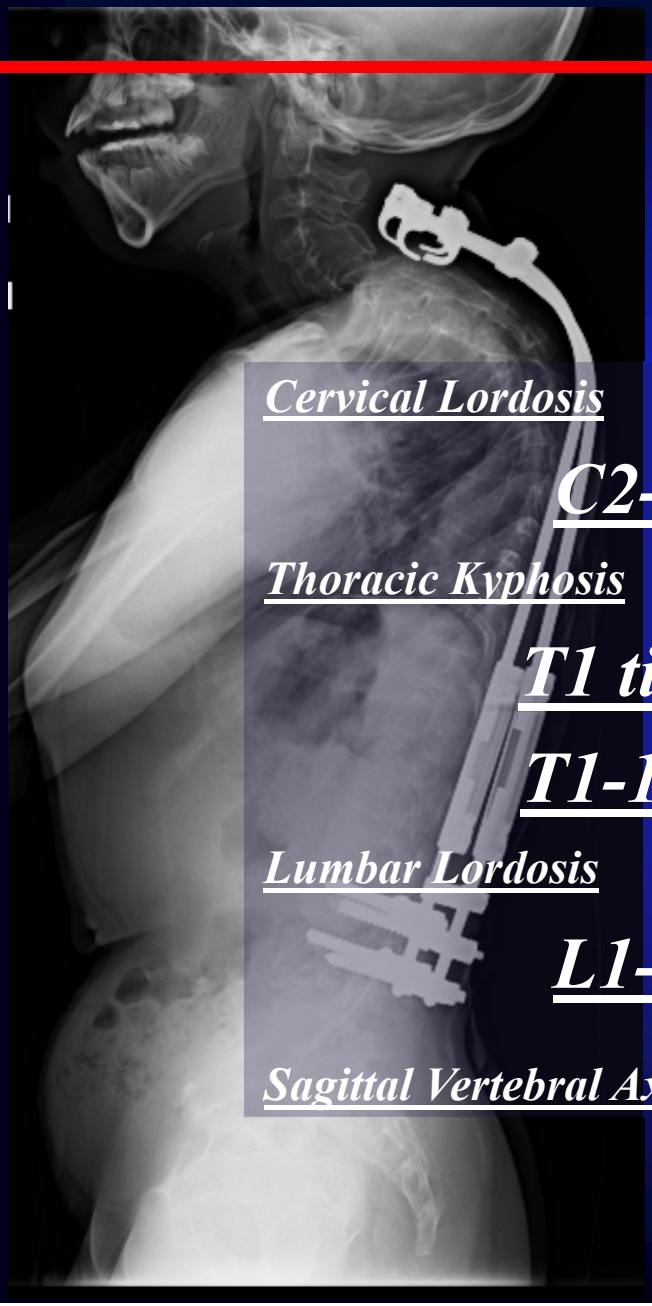
L1-S

Sagittal Vertebral Axis

Patient Data

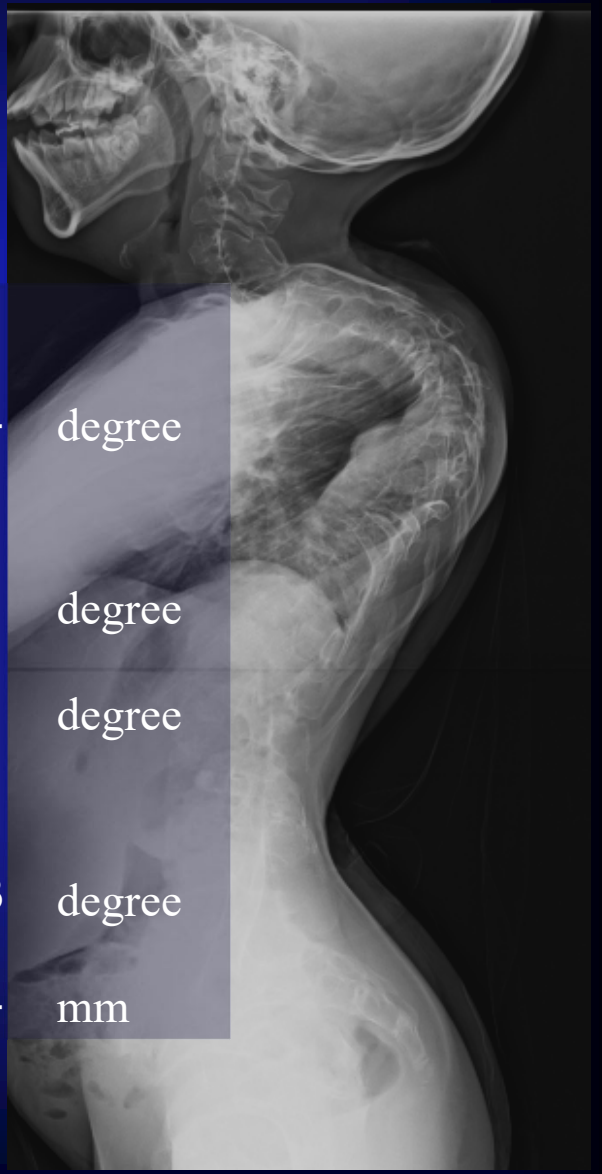
Pt No.	Eiology	surgery	Surgery for the malalignment	Symptom	Outcome
1	Bone Dysplasia	Growing Rod	OCTF (Occipit-cervico-thoracic fusion	Dyspnea	Improved
2	Neurofibromatosis	Growing Rod	OCTF	Dyspnea	Improved
3	Unknown Syndromic	Growing Rod	External Fixator Correction	No	No change
4	Bone Dysplasia	Growing Rod	Untreated	No	
5	Unknown Syndromic	Growing Rod Graduate	Untreated	Pain	
6	Unknown Syndromic	Growing Rod	Untreated	No	
7	Unknown Syndromic	Growing Rod Graduate	Untreated	No	Died 2yrs after final fusion (Unkown Reason)

Results



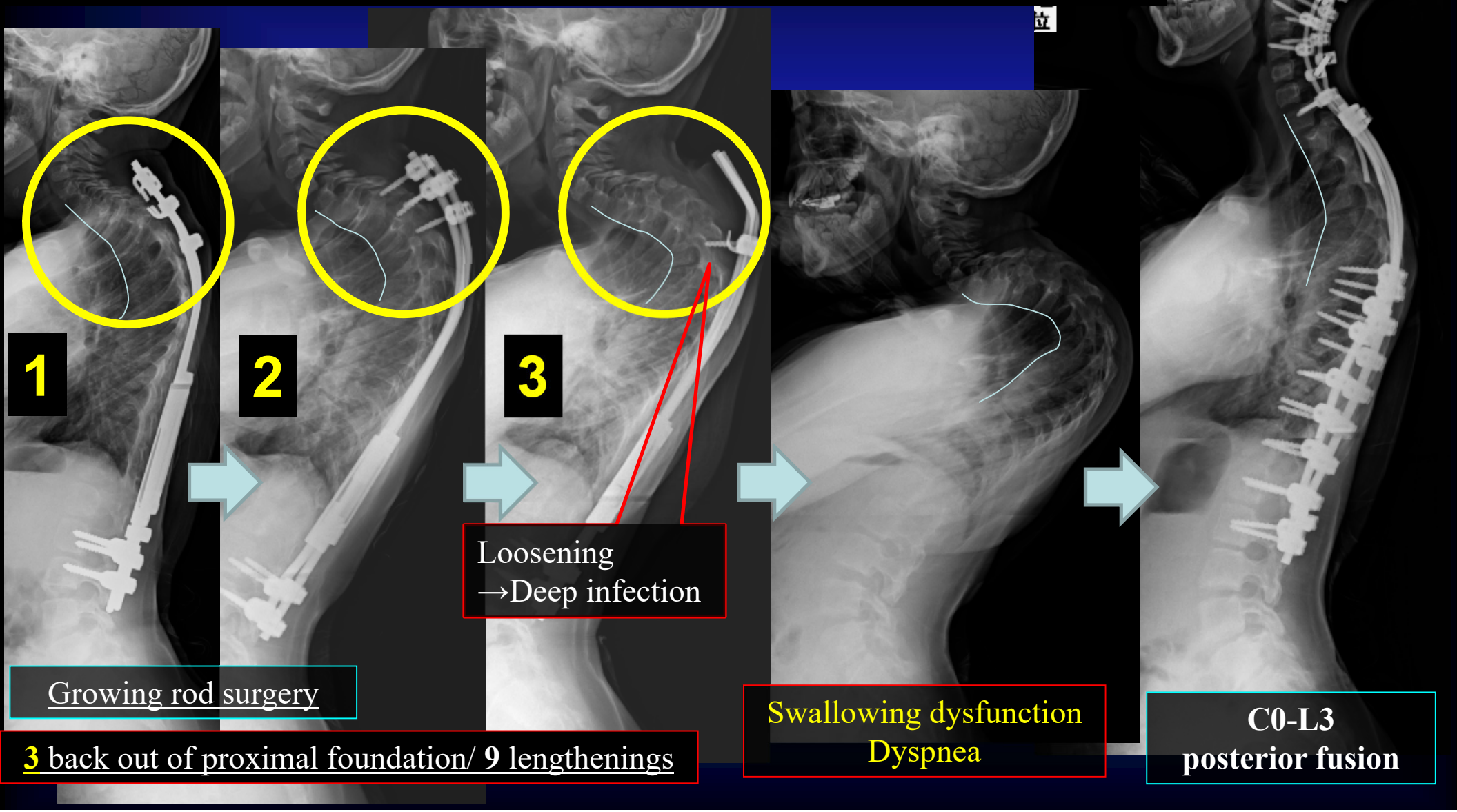
Alignment parameter

	preinitial	postinitial	FFU	
Cervical Lordosis				
C2-7	-35±15	-35±20	-58±24	degree
Thoracic Kyphosis				
T1 tilt	49±17	38±19	67±16	degree
T1-12	71±29	60±27	91±25	degree
Lumbar Lordosis				
L1-S	-56±11	-44±19	-68±13	degree
Sagittal Vertebral Axis	4±14	2±20	-25±44	mm



case1 12y.o. Female Bone Dysplasias

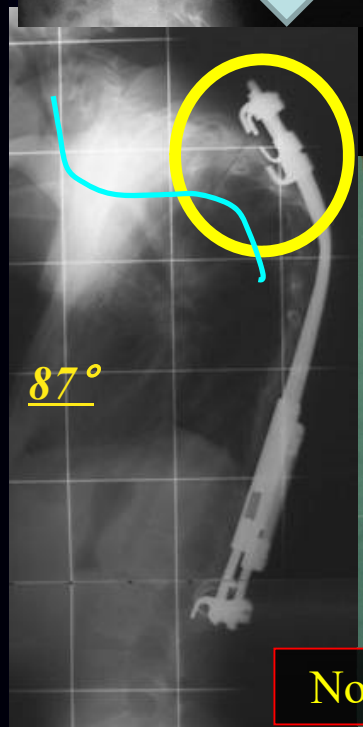
(Cleidocranial Dysostosis)

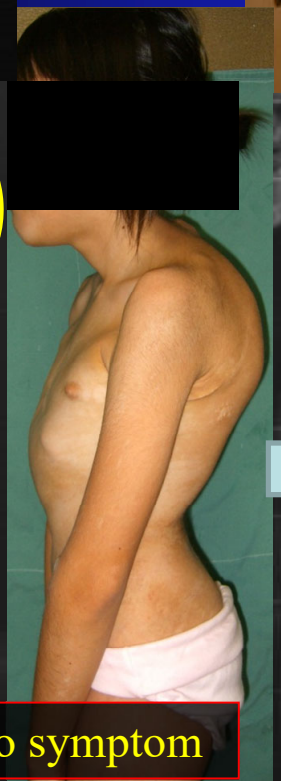


case3 11y.o. Female
Unknown Syndromic

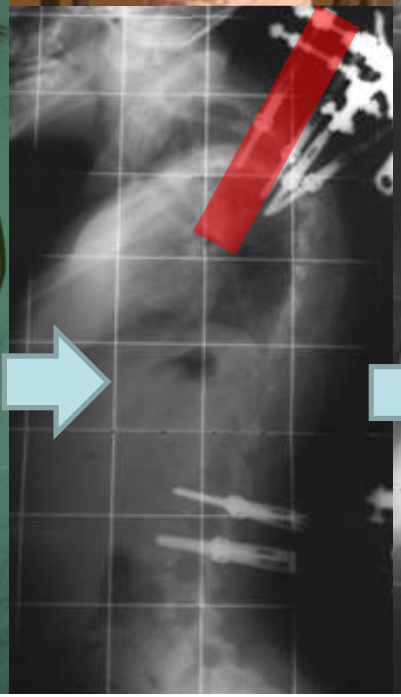
Growing rod surgery at 6 y.o.

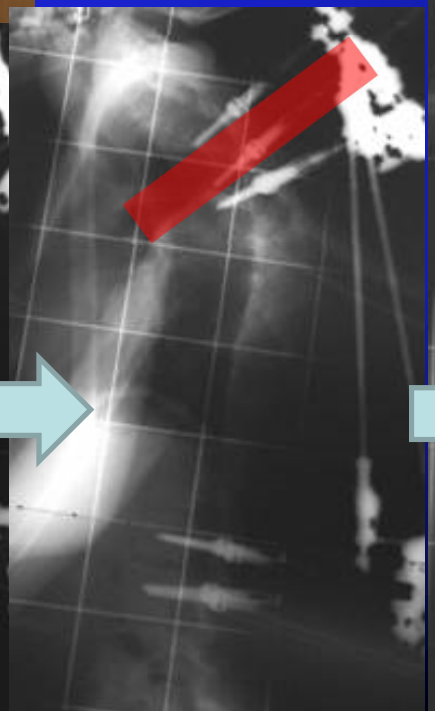
Two stage operation is consisted of the gradual correction by the external fixation device and the following internal spinal instrumentation and fusion.

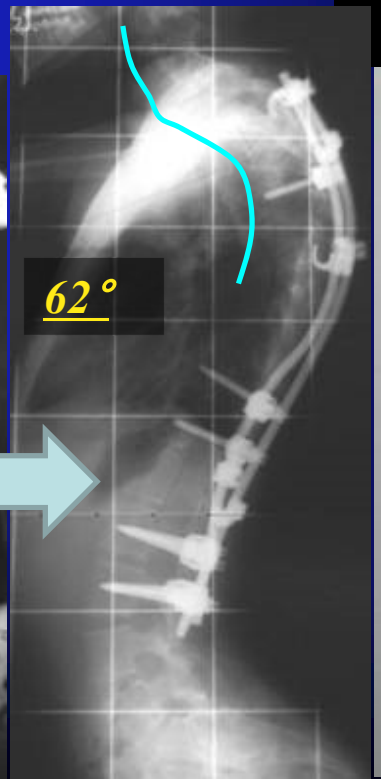




No symptom







Discussion

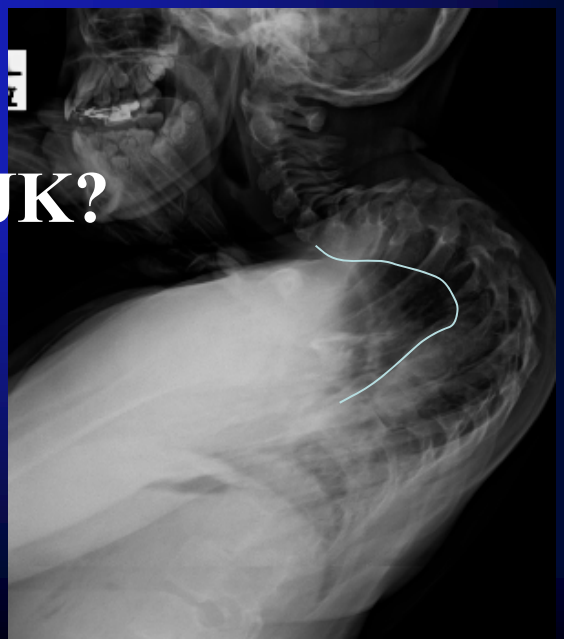
Proximal Junctional Kyphosis is defined as…

1) Proximal junction sagittal Cobb angle >≥10°
2) Proximal junction sagittal Cobb angle of at least 10° greater than the pre-operative

PJK occurs in 39% of adult deformity

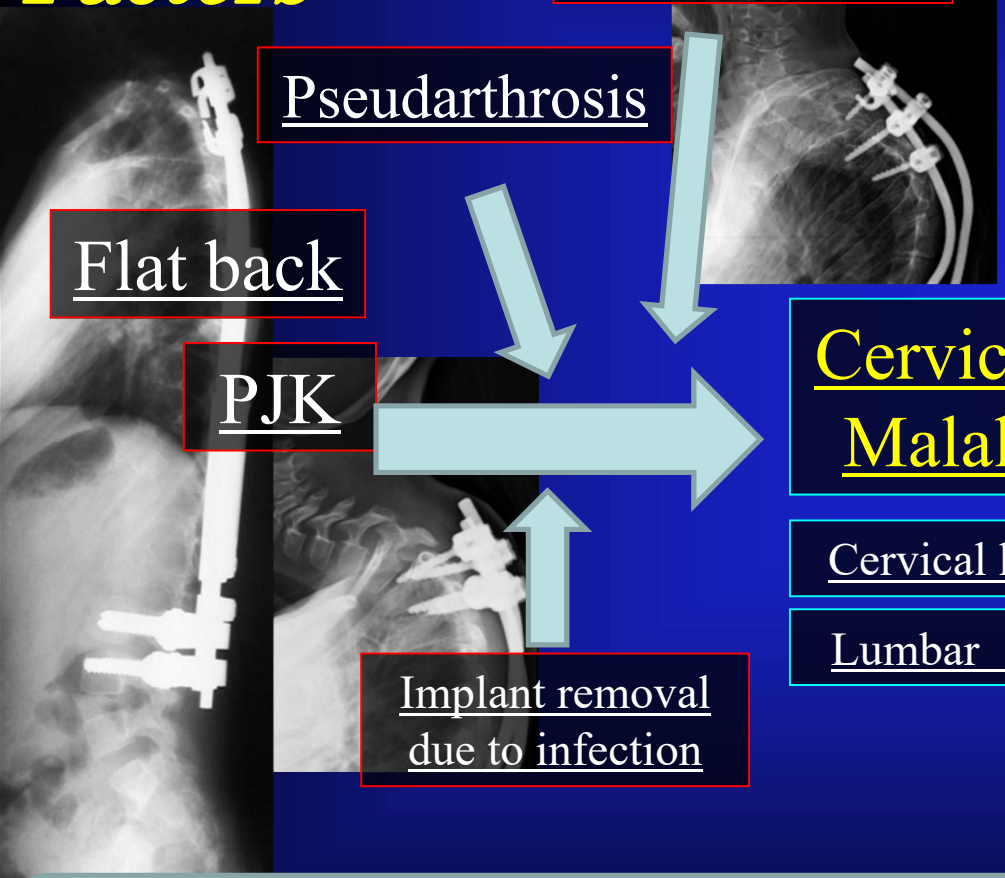
in 56% children treated with growing rod.

Our series can be included in common PJK?



Mechanism of the malalignment

Risk Factors



Upper anchor failure

Pseudarthrosis

Flat back

PJK

Implant removal due to infection

Insufficient surgical intervention due to bone quality, bone maturity, size of vertebrae

Cervicothoracic Malalignment

Cervical hyperlordosis

Lumbar hyperlordosis

Untreated

Symptom

Pain
Dysphagia
Melopathy
Dyspnea etc.

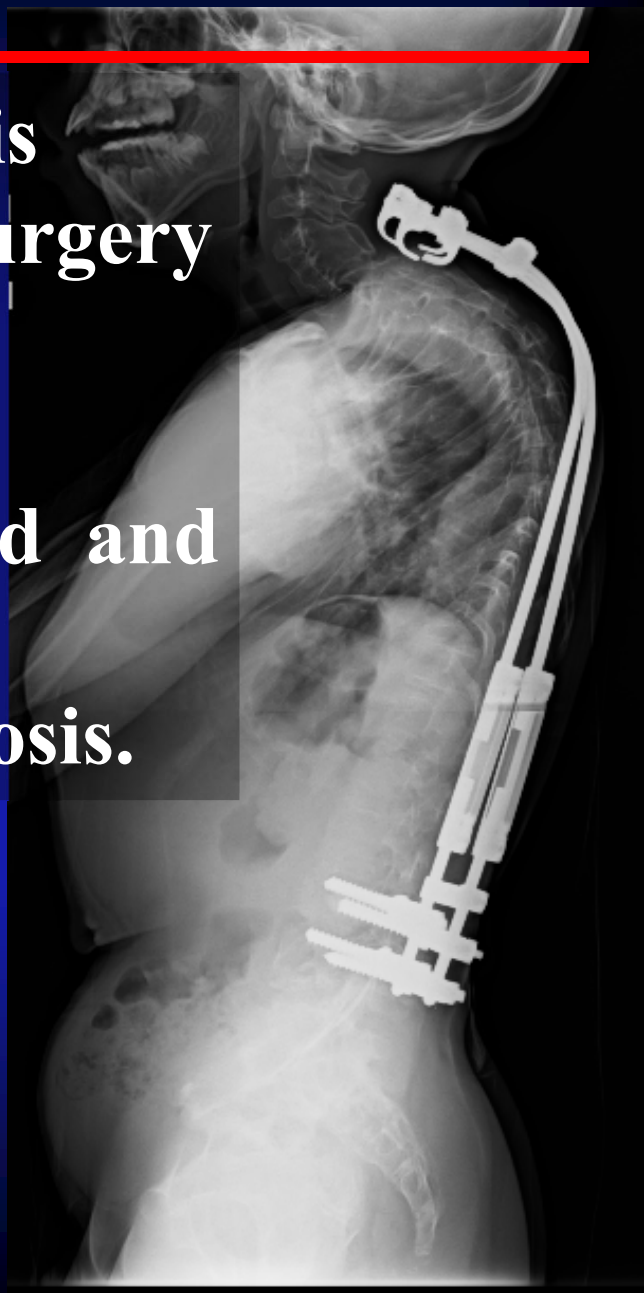
Drastical correction and fusion with instrumentation might be necessary.

Conclusion

Severe cervico-thoracic malalignment is rare complication after growing rod surgery for early onset scoliosis.

This complication should be recognized and should not be included in common proximal junctional kyphosis.

When clinical symptoms such as dyspnea or dysphagia may develop, drastic operation might be necessary.



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