Proximal Junctional Kyphosis in Surgically Treated Young Children With Scoliosis: Incidence, Risk Factors, and Management

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88 patients with EOS treated with dual growing rods

PJK developed in 23 patients (26%)

The significant independent risk factors for PJK:
- an LIV at or cranial to L3,
- a proximal thoracic scoliosis of 40° or more,
- and a main thoracic kyphosis of 60° or more.
A total of 68 patients underwent VEPTR treatment at a single institution.

Four patients developed PJK (6%).

Patients with preoperative thoracic hyperkyphosis may be at higher risk. PJK can develop within the first year of VEPTR treatment.
PJK in children treated with fusion surgery

# 9634 M 7y
# 6770 F 6y

CS, T10-L2, T12'
HV VCR

CS, PSF T7-L1
Natural Course of PJK in AIS

- Most of PJK was progressed within 3 months after surgery and did not progress significantly after 2 years postoperatively.

- The incidence of PJK at 7.3 years postoperation was 26% (50 of 193 patients).

- The average PJA increased 15.2° until 2 years postoperatively and then increased 1.7° until final follow-up in the PJK group.
# Prevalence of PJK

<table>
<thead>
<tr>
<th>AIS</th>
<th>Adults</th>
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<tbody>
<tr>
<td>Lee</td>
<td>46%</td>
</tr>
<tr>
<td>Kim</td>
<td>28%</td>
</tr>
<tr>
<td>Hollenbeck</td>
<td>9.2%</td>
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<td>Helgeson</td>
<td>8.1% (PS)</td>
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Objective

To determine the incidence, risk factors, and behavior of proximal junctional kyphosis (PJK) in young children undergoing posterior instrumented spinal fusion.
Material and Methods

Inclusion criteria

- Age at surgery less than 10 yrs
- Diagnosed with congenital scoliosis
- Surgery: posterior fusion ≥ 4 levels
- Follow-up > 2y
- UIV location: T1-T11
The proximal junction was defined as the caudal endplate of the UIV to the cephalad endplate of 2 proximal vertebrae.
Results

- From 2009 to 2011 in our institution
- 5.4 years (2-10 years)
- 2.7 years (2-4 years)

61 consecutive patients

Age

Follow-up
Results

Overall incidence of PJK was 18.0% (11/61) at follow-up

- 3m-po-op: 10 PJK
- 3-6m: 11 PJK
- 2y-po-op: 9 PJK

61 consecutive young children with scoliosis were included

Incidence of PJK
Results

Progression of PJA in PJK group

- Pre-op: 6.2°
- 3m-Post-op: 20.6°
- 2y-post-op: 23.1°
Radiographic Findings of PJK

- Kyphotic deformity
- Bone implant interface failure
- Bone failure

36°
Bone failure of UIV

38°
Dislodgement of upmost screws

24°
No clinical symptoms

#9094 M 6y
PJK

#8535 M 9y
Non-PJK
Discussion

Hyperkyphosis

#8689 F 8Y

PJA: 7°

Po-op

2y-Po-op

PJA: 21°

PJA: 27°
Proximal instrumentation failure

#7021 M 6y

Po-op

2y-Po-op
Un-matching of rod contour

#6670 M 8y 3m-Po-op 9m-Po-op

Spine Surgery, Drum Tower Hospital, Nanjing University, CHINA
Bracing for PJK

#5746 M 6y

Po-op

3m-Po-op
Spine Surgery, Drum Tower Hospital, Nanjing University, CHINA

9m-Po-op
Begin bracing

24m-Po-op

36m-Po-op

42m-Po-op
Occurrence of DJK after Bracing

#8994 F 5y

Po-op 6m-Po-op

PJK

6m-Po-op

PJK

19°
Conclusion

Not a lower incidence of PJK in children with fusion surgery.

PJK mainly occurred within 6 months postoperatively, and its risk factors included preoperative hyperkyphosis, proximal instrumentation failure, and un-matching of rod contour.

Bracing served as a salvage option for PJK in young children.
Thank you for your attention!