Spinal Osteotomies: VCR
When and How?

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Conflict of Interest

• Grant

DePuy & Synthes
Neglected (Severe) Scoliosis

- **Definition?**
  - To pay little or no attention to; disregard
  - Curves >80-100 degrees

- **Rigidity**
  - <30-35% flexibility in bending films

- **Pulmonary Functions**

- **Nutritional Status**

- **Idiopathic neglected curves**
  - Developing countries
  - Waiting list, delay due to unnecessary PT
  - Maltreated scoliosis
Surgical treatment Options

- Pre-intraop halo traction
- Temporary internal traction
- Anterior-posterior release & concave rib osteotomies
- PCO
- A-P or PVCR
Decision making for which to choose?

- Tailored treatment
- Curve characteristics
  - Magnitude
  - Rigidity
  - Location
  - Anterior column (disc spaces)
- Patient profile
  - Pulmonary & nutritional status
  - Expectations
- Resources
  - Facility
  - Surgeon and team experience
Posterior vertebral column resection (PVCR)

• Resection of entire vertebral body with its supra-adjacent/subadjacent discs
• Indications
  – Very severe-rigid deformity
  – Previously fused but unbalanced moderate deformities
• Amount of correction
  – Over 40°
• Prerequisites
  – Experienced surgeon
  – Neuro-monitoring
Posterior vertebral column resection (PVCR)

- **Advantages**
  - Provides as much correction as needed
  - Obviates need for anterior release

- **Disadvantages**
  - Technically challenging
  - 34-40% overall complication rate
  - Neurological injury risk 17%
  - Difficult in lumbar spine
Schwab
The Comprehensive Anatomical Spinal Osteotomy Classification

<table>
<thead>
<tr>
<th>Grade</th>
<th>Anatomic Resection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Partial facet joint</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Complete facet joint</td>
<td>Complete removal of a vertebra and both adjacent discs (rib resection in the thoracic region)</td>
</tr>
<tr>
<td>3</td>
<td>Pedicle/partial body</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Pedicle/partial body/disc</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Complete vertebra and discs</td>
<td></td>
</tr>
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Examples:
VCR
Schwab
The Comprehensive Anatomical Spinal Osteotomy Classification

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Examples:
Dubousset and Cotrel
1\textsuperscript{st} step
2nd step
3rd step
Final step
Posterior vertebral column resection in spinal deformity: a systematic review

Changsheng Yang · Zhaomin Zheng · Hui Liu · Jianru Wang · Yongjung Jay Kim · Samuel Cho

<table>
<thead>
<tr>
<th>Surgery type</th>
<th>Overall complication %</th>
<th>Neurological complication %</th>
<th>% Correction</th>
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<tbody>
<tr>
<td>PVCR</td>
<td>32</td>
<td>8</td>
<td>61</td>
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<tr>
<td>APVCR</td>
<td>?</td>
<td>?</td>
<td>60</td>
</tr>
<tr>
<td>PCO</td>
<td>↓</td>
<td>↓</td>
<td>50-60</td>
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<tr>
<td>HGT+PCO</td>
<td>↓</td>
<td>↓</td>
<td>40-60</td>
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Do your best to avoid VCR procedure!
Standing AP

Supine traction under GA (STUGA)

PF+ Convex RO

FI: 25%

R bending

L bending

Supine traction under GA (STUGA)
21y male, neglected JIS  FVC:36%

L Bending

R Bending

STUGA

COMPREHENSIVE SPINE CENTER

ACIBADEM MASLAK
Intraop halo + PCO + Convex-Concave RO

COMPREHENSIVE SPINE CENTER

ACI BADEM MASLAK
40y, F, Harrington inst 12 y old
Fused T2-L4
Back and leg pain
PCO’s + L4 PSO + L5-S1 TLIF with decompression
<table>
<thead>
<tr>
<th>Function / Activity</th>
<th>2.4</th>
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<tbody>
<tr>
<td>Pain</td>
<td>3.2</td>
</tr>
<tr>
<td>Self image / Appearance</td>
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<td>Mental health</td>
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**SRS SUBTOTAL SCORE**

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<tbody>
<tr>
<td>Pain</td>
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<tr>
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<td>4.6</td>
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<tr>
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**SRS TOTAL SCORE**

2.7

**SRS TOTAL SCORE**

4.36

**COMPREHENSIVE SPINE CENTER**

**ACIBADEM MASLAK**
When VCR?

• Only for fixed deformities

• Severe, fixed kyphosis-kyphoscoliosis

• If both facility & surgeons are experienced
7y m, MVA (T4,T5 PVCR)
ST, 14y, M

- CHST 3 deficiency
  carbohydrate sulfotransferase 3)
  (C6ST-1: chondroitin-6-O sulfotransferase-1)

previously misdiagnosed with Larsen Syndrome
History

- Bilateral operated clubfoot
- Operated right knee dislocation
- Left psoas and hamstring lengthening
- Right hip dislocation
8y female

Congenital kyphoscoliosis
6 times previous operations
T8-L3 Posterior fusion
Implant failure
68y f, osteoporosis, myelopathy postlaminectomy kyphosis, PVCR
23y, F operated at age 12 (Bilateral AF+PF)

DAR: $141^\circ/7 = 20$
FVC: 31%
PVCR 3 vertebra
24y, M neglected kypho-scoliosis (complex vertebral transposition)
PVCR T6-10
Summary

• Neglected, severe, spinal deformities are rare
• Most may be treated by preoperative and intraoperative release procedures
• VCR very rarely indicated for fixed deformities as the initial option
• VCR may be necessary if other osteotomies cannot provide the desired correction due to lengthening of spinal column
• Surgical treatment should be tailored according to patient
THANK YOU!