Ponte vs VCR Osteotomies in EOS

Alternate Title: VCR in EOS: Are you Crazy!?

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Disclaimer: I have never served in our Armed Forces but respect and appreciate those who do and have borrowed this uniform from one of them, with no offense intended.

*Ramo IPOS
Top Gun 2017

Cahill, daily, circa 2017
13.7 year average age; 63/147 were revisions. Excellent radiographic correction: example KS group sagittal Cobb of 104 to 47

Complications:
86 patients with a complication; 67 intraop, generally IONM change or excessive EBL>2L

39/147 (29%) had an intra-op neuromonitoring event.
Complications After 147 Consecutive Vertebral Column Resections for Severe Pediatric Spinal Deformity

A Multicenter Analysis

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- “This surgical procedure should remain one of last resort when no simpler method of spinal reconstruction will suffice.”
- However, radiographical and clinical corrections along with outcomes are quite dramatic, and the VCR procedure has produced a viable alternative to other techniques for the correction of severe fixed pediatric spinal deformities.
SCOPE OF THE DISCUSSION?

43/2,315 patients between 2 databases = 1.86%

Age $6.1 \pm 3.0$ years

Diagnoses: congenital 56%
myelomeningocele 19%
post-tubercular 14%
other 11%.

kyphosis 56%, scoliosis 23% and kyphoscoliosis 21%
Complication rate: 33% pts
- Neuro/IONM change 57%
- wound 29%
- medical 11%

6/13 had preop deficits
8/13 IONM wave changes only
4/13 had IONM changes + deficit
2/13 had no wave changes but a postop deficit

All patients with a postop deficit had a complete or partial recovery.
Retrospective review 1996 to 2013.
Patients treated with multiple Ponte osteotomies (PO group) were compared with those managed with 3-column osteotomies (HV/VCR group).

49 patients [17 PO, 32 HV/VCR (26 HV, 6 VCR)].
For the PO group, mean age was 14 years, and they had an average of 4 ponte osteotomies and 11 levels fused. Mean total DAR was 25
The HV/VCR group had a mean age of 7 years and 5 levels fused. Mean total DAR was 28

Patients had a mean of 54.1% correction of coronal deformity in the PO group and 54.4% in the HV/VCR group (P=0.78).

Signal changes were observed less frequently with PO (1/17) and HV (1/26) than with VCR (4/6), P=0.001.

Revision rates were 17.6% (3/17) in the PO group and 37.5% (12/32) in the HV/VCR group (P=0.35).
VCR in EOS: Yes It Can be Done

- 4 children (age 2.5-5.2)
- Predominantly done for Kyphosis
  - Scoli (mean 69, range 50-99)
  - Kyphosis (mean 126, range 87-151)
- Improved to 61 kyphosis and 29 scoliosis
- 2 complications (both reop)
- 3 growing rod constructs
- no neuro deficits
- Spectacular Results!
When there’s no (or not much) data, go with case examples
Presented at 11 months with unknown syndrome, complex medical problems including G-tube
• Now 22 months

• tracheostomy requiring ventilation by age 21 months.
Halo pins got loose....
Age 22 months

Age 25 months

Age 30 months

112°
• MRSA!
Age 5+10

Yes, it’s very simple, just cut there!

Just cut here?

97°
Stop!, please Dr Cahill, aren’t there any other options besides cutting my spine in half?!?
### Summary of sagittal balance-correction osteotomy

<table>
<thead>
<tr>
<th>Schwan grade</th>
<th>SPO/Ponte</th>
<th>PSO Category</th>
<th>VCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resection area</td>
<td>1 and 2 Posterior element only</td>
<td>3 and 4 Included part of vertebral body</td>
<td>5 and 6 Entire vertebra</td>
</tr>
<tr>
<td>Indication</td>
<td>Long, gradual, rounded kyphosis eg, Scheurmann kyphosis</td>
<td>Sharp, focal kyphosis with fixed disc space, ie, SPO not applicable</td>
<td>Sharp, focal kyphosis at thoracic vertebra</td>
</tr>
<tr>
<td>Need disc space mobility?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sharp angular kyphosis correction?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Thoracic spine correction?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Kypnotic curvature correction**

- SPO/Ponte: $\sim 10^\circ$/level
- PSO Category: $30^\circ$–$40^\circ$/level
- VCR: $45^\circ$–$70^\circ$

**Indicated SVA (cm):**
- SPO/Ponte: $>6$–$8$ cm but $<10$ cm (positive SVA)
- PSO Category: $>10$–$12$ cm (very positive SVA)
- VCR: $14.3$ cm

**Mean neurologic/overall complication rate (%):**
- SPO/Ponte: $2.1/40.4$
- PSO Category: $9.1/38.5$
- VCR: $14.3/39$
Age 6+5
back in halo

4 level Ponte osteotomies
to correct focal kyphosis at
time of GR implant

Age 6+6

Age 7+3

67°

55°
Battle shall continue....
Not a “dramatic” result but when less is more......
Age 5+6

VCR recommended by outside surgeon

Family not comfortable with risks (appropriately) described
4.5 years postop, age 9+6, family pleased
Side by Side Example Coming Up

- Obligatory and fantastic
10 year old female from Africa

12 year old male from Honduras
Pontes with anterior strut

VCR
Rumble in the Jungle

Thrilla in Manilla

Big Fun in Lis-Bon
Thank You!