Three-column osteotomy in cervicothoracic congenital deformity

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Cervicothoracic deformity

Definition

*Spine deformity with apex at C7-T1*

Manifestation

cosmetic problem

*Torticollis*

*Head tilting*

*Prominence of scapula*

Etiology

*Congenital*

*Neurofibromatosis type-I*
Cervicothoracic deformity

Definition
Spine deformity with apex at C7-T1

Manifestation
cosmetic problem
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Etiology
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Neurofibromatosis type-I
Cervicothoracic deformity

16 of 18 total patients receive HV resection below T1!
Retrospective study (PUMCH)

30 cases
F/14  M/16
Age at surgery 11 (5-16) yrs
Type of the deformities

Failure of formation 19
Failure of segmentation 4
Mixed type 7

Intraspinal anomalies 7 (23.3%)
Syringomyelia 4
Diastomyelia 1
Tethered cord 2
Meningocele 2

Neurologic deficits 3
Radiological finding

Curve Pattern

Single CT curve 10

Double curve 20

CT curve + upper thoracic curve
# Surgical Procedure

## Cervicothoracic deformities

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV resection</td>
<td>21</td>
</tr>
<tr>
<td>PVCR</td>
<td>8</td>
</tr>
<tr>
<td>PSO</td>
<td>1</td>
</tr>
</tbody>
</table>

## Level of osteotomy

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical (C7)</td>
<td>11</td>
</tr>
<tr>
<td>Upper thoracic (T1)</td>
<td>19</td>
</tr>
</tbody>
</table>

## Thoracic curve

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posterior fusion</td>
<td>2</td>
</tr>
<tr>
<td>Growing rod</td>
<td>2</td>
</tr>
<tr>
<td>None surgery</td>
<td>16</td>
</tr>
</tbody>
</table>

MEP of both upper and lower limbs!
Results

Correction of the cervicothoracic deformities (30)

Scoliosis (°) 55.3-15.3-16.4 (72.3%)
Kyphosis (°) 81.3-22.3-22.9 (72.6%)

Spontaneous correction of the thoracic curves (16)

Scoliosis (°) 37.1-16.6-19.1 (55.2%)

Surgical correction of the thoracic curves (4)

Scoliosis (°) 80-25.5-27.3 (68.1%) — Fusion (2)
Scoliosis (°) 101-57-58.5 (43.6%) — Growing rod (2)
Case 1. F/5y

Spinal bifida
T1&T2 HV resection with C4-T4 fusion

5y Post-op
Case 3. M/14y
Combined A-P hemivertebra resection & fusion (C5-6) and staged T6 PSO with fusion C4-L3
Case 5. F/8y

T2,3 HV Resection+ staged growing rod insertion
2y Post-1\textsuperscript{st} op

Post-op of 2\textsuperscript{nd} lengthening
## Complications (13) 44%

<table>
<thead>
<tr>
<th>Complication</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transient root injuries</td>
<td>6</td>
</tr>
<tr>
<td>Transient cord injury</td>
<td>1</td>
</tr>
<tr>
<td>Implant failures</td>
<td>2</td>
</tr>
<tr>
<td>Hemothorax</td>
<td>2</td>
</tr>
<tr>
<td>Wound delayed Union</td>
<td>1</td>
</tr>
<tr>
<td>Atelectasis</td>
<td>1</td>
</tr>
</tbody>
</table>
M14 Walking difficulty

9m Post-T1&2 Osteotomy
Summary

Congenital cervicothoracic deformities

Not common but complicated deformities

3 column osteotomy ---- *Needed*

Higher complications (40%)---*Transient Brachial plexus palsy*

*CTA* is essential for *C7/T1* osteotomy to avoid *VA injury*

Staged surgery usually needed when with structural thoracic curve

*Instrumentation requires combination*

of *3.5mm, 4.5mm or 5.5mm systems*
Thanks!