ONE-STAGE POSTERIOR HEMIVERTEBRA RESECTION AND CORRECTION OF AN EXTREMELY SEVERE KYPHOSCOLIOSIS CURVE IN A YOUNG ADULT.

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CLINICAL FINDINGS and PHYSICAL EXAMINATION

- 34 years old woman.
- No significant family medical history
- Bladder and anal sphincter incontinence (2-3 months).
- Bilateral hyposthesia lower limbs
- Motor strength
  - 4/5 right lower limb.
  - 3/5 left lower limb.
- Hyperreflexic. (Patellar tendon and Achilles)
- Babinsky sign ++.
- Esthetic thoracic kyphoscoliosis deformity.

(She was first seen at office 4 years ago and she rejected surgery because of fear)
X-RAY
QUESTION 1

- Which diagnostic tests and in what order would you use for this case?

- 1. MRI, CT, SSEP.
- 2. MRI, SSEP, CT
- 3. SSEP, MRI, CT
- 4. CT, MRI, SSEP
- 5. CT, SSEP, MRI
- 6. Others
QUESTION 1

- Which diagnostic tests and in what order would you use for this case?

1. MRI, CT, SSEP.
2. MRI, SSEP, CT 49%
3. SSEP, MRI, CT 21%
4. CT, MRI, SSEP 5%
5. CT, SSEP, MRI 26%
6. Others 0%
ANSWER 1

- 1st MRI
  - Study spinal cord and spine anatomy
- 2nd SSEP
  - Study cord condition
- 3rd CT
  - Surgery planning
SSEP

- **SSEP**
  - **Median Nerve:**
    - Right: conduction alteration in cervical spinal cord
    - Left: no pathologic changes
  - **Tibial Nerve:**
    - Right: severe conduction alteration in thoracic/lumbar spinal cord
    - Left: severe conduction alteration in thoracic/lumbar spinal cord
DIAGNOSIS

• Congenital thoracic kyphoscoliosis

  • *Type I McMaster and Singh Classification* (partial failure of formation of the anterior part of the vertebral body).
  • due to an incarcerated segmented hemivertebrae at T4 (*Type I-B Winter Classification*)

  • Cobb angle 36°//Kyphosis angle 83°
QUESTION 2

- *Which approach would you use for this surgery?*
  
  - 1. Anterior-only approach
  
  - 2. One-stage anterior and posterior approach
  
  - 3. Two-stage anterior and posterior approach
  
  - 4. Posterior-only approach
  
  - 5. Others
QUESTION 2

• Which approach would you use for this surgery?

• 1. Anterior-only approach
  0%

• 2. One-stage anterior and posterior approach
  27%

• 3. Two-stage anterior and posterior approach
  24%

• 4. Posterior-only approach
  49%

• 5. Others
  0%
QUESTION 3

• Which of these surgical techniques would you use for this case?

• 1. Decompression + Postero-lateral fusion in situ.

• 2. Decompression + Postero-lateral fusion in situ with hook-rod instrumentation.

• 3. Decompression + Postero-lateral fusion in situ with pedicle screws-rod instrumentation.

• 4. Hemivertebrae excision + postero-lateral fusion + interbody fusion and hook-rod instrumentation.

• 5. Hemivertebrae excision + postero-lateral fusion + interbody fusion and pedicle screws-rod instrumentation.

• 6. Others
QUESTION 3

- Which of these surgical techniques would you use for this case?

  1. Decompression + Postero-lateral fusion in situ. 0%
  2. Decompression + Postero-lateral fusion in situ with hook-rod instrumentation. 2%
  3. Decompression + Postero-lateral fusion in situ with pedicle screws-rod instrumentation. 2%
  4. Hemivertebrae excision + postero-lateral fusion + interbody fusion and hook-rod instrumentation. 7%
  5. Hemivertebrae excision + postero-lateral fusion + interbody fusion and pedicle screws-rod instrumentation. 9%
  6. Others 80%

International ArgoSpine Symposium
QUESTION 4

- Which levels of fusion would you have executed in this case cranial and caudal to the hemivertebra?

- 1. One cranial-One caudal
- 2. Two cranial-Two caudal
- 3. Three cranial-Three caudal
- 4. Two cranial-Three caudal
- 5. Three cranial-Two caudal
- 6. Others
QUESTION 4

- **Which levels of fusion would you have executed in this case cranial and caudal to the hemivertebra?**

<table>
<thead>
<tr>
<th>Option</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. One cranial-One caudal</td>
<td>4%</td>
</tr>
<tr>
<td>2. Two cranial-Two caudal</td>
<td>22%</td>
</tr>
<tr>
<td>3. Three cranial-Three caudal</td>
<td>38%</td>
</tr>
<tr>
<td>4. Two cranial-Three caudal</td>
<td>27%</td>
</tr>
<tr>
<td>5. Three cranial-Two caudal</td>
<td>9%</td>
</tr>
<tr>
<td>6. Others</td>
<td>0%</td>
</tr>
</tbody>
</table>
• 4. Posterior-only approach
  – Advantages:
    • Single anesthetic session.
    • Single skin scision.
    • “Close wedge osteotomy” concept
    • Safe process:
      – Transpedicular decancellation
      – Lateral extracavitary approach
  – Disadvantages
    • Technically demanding surgery
ANSWER 3

- 5. Hemivertebra excision + postero-lateral fusion + interbody fusion and pedicle screws-rod instrumentation.
ANSWER 4

• 4. Two cranial-Three caudal to the hemivertebra.
1. Prone position
2. SSEP control
3. Standard midline longitudinal incision
4. Subperiosteal posterior exposure of the spine
5. Radioscopy to check the hemivertebra level
• 1. *Pedicular screws*
  – Radioscopy + SSEP checking
• 2. *Costotransversectomy* ( three ribs bilaterally at the level of the anomalous vertebral body)
3. Hemivertebra excision due to transpedicular decancellation
   - Preserving anterior longitudinal ligament (as a rotational hinge).
   - A wedge of the desired amount of correction was created in the anterior column.
   - Contouring of two rods with the desired amount of correction in both planes (sagittal and coronal).
   - Cantilever bending and translation forces were applied.
• 4. **Interbody fusion** with bone graft and demineralized bone matrix was performed using an interbody cage.
• 5. **Standard posterior arthrodesis** is performed.
  – Autogenous bone graft and desmineralized bone matrix were used
  – Bone graft from the ribs excised were used to protect the dural sac posteriorly.
• 6. Newyorker + SUMI

• 7. Therapy programme
RESULTS
4 MONTHS AFTER SURGERY

- Cobb angle 1º // Kyphosis angle 38º
- Anal incontinence is solved.
- Starting to feel sensation of full bladder.
- Motor strength
  - 4/5 right lower limb
  - 4/5 left lower limb
CONCLUSIONS

• 1. Congenital kyphoscoliosis is associated with a great risk of anterior cord compression and neurologic compromise with growth and progression of the deformity if is not treated.

• 2. There are no standard treatment recommendations for congenital complex kyphoscoliosis, because several approaches and techniques have been used for this pathology.
• 3. Thoracic hemivertebrae that require surgical treatment can be resected via **posteror-only approach** avoiding surgical complications from anterior approach.

• 4. The combined use of **transpedicular decancellation** and a **lateral extracavitary approach** makes the resection safe at the spinal cord level.

• 5. **Thoracic pedicle screws** makes stabilization and rapid postoperative mobilization possible.