Evaluation of Vertebral Anomalies and Vertebral Osteotomy in Congenital Spinal Deformity

Noriaki Kawakami, Taichi Tsuji, Kazuyoshi Miyasaka, Tetsuya Ohara, Yasunori Tatara, Kei Ando, Ayato Nohara

Dept. of Orthopedics & Spine Surgery Meijo Hospital, Nagoya, Japan

#### Three-Dimensional Evaluation of Congenital Vertebral Anomalies

**Congenital Vertebral Anomalies (Closed defect)** 





Nakajima, Kawakami, et al. SPINE 2007 Kawakami, et al. presented at pre-course, SRS, 2007



#### Surgical Treatment of Congenital Spinal Deformity Hemvertebrectomy

Combined Ant & Post Vertebrectomy

VS.

Posterior only vertebrectomy



# Purpose

To assess the type of congenital vertebral anomaly three-dimensionally for determining which types should be treated using a combined anterior and posterior procedure.

# Cases

- 1993-2006
- Congenital spinal deformity
- Surgical treatment

123 pts.

Vertebrectomy 60 pts.
Sex M 31, F 29
Age 13.2 (2+4~68+9)
61 ops. (One patient underwent two ops for discrete vertebral anomalies separately)

**Retrospectively analyzed** 

# **Approach & Stage of Operations**



Two-staged operation
Ant. Strut bone graft
Ant. Fusion
Correction of upper curve



### **Types of Vertebral Anomaly**



#### The reasons of Ant & Post Ops.



- Ostotomy and multiple segment release
   9
- Osteotomy more than two segments
- To Prevent Crankshaft
- Learning curve
- Big gap in the anterior vertebral column
- Atypical vert. anomalies

2

11

### Comparison of Vertebral Anomaly with Surgical Approach (1) Solitary & Multiple



#### Comparison of Vertebral Anomaly with Surgical Approach (2) Simple (Unison) & Complex (Discordant)



#### **Correction of Spinal Deformity**



Both two groups of posterior and combined significantly demonstrated good correction of scoliosis.



The more complicated the deformity, the less correction rate.



# Surgical Complications 27/61 (44.3%)

#### **Posterior Approach**

| Inst. related          |   |
|------------------------|---|
| Pedicle cut-out        | 4 |
| Screw displacement     | 1 |
| Neurological           |   |
| Radiculopathy          | 4 |
| Paraparesis(transient) | 2 |
| Dural tear             | 1 |
| Respiratory            |   |
| Pneumothorax           | 1 |
| Pneumonia              | 1 |

#### Ant. & Post. Approach

| Inst. related          |   |
|------------------------|---|
| Screw displacement     | 2 |
| Junctional kyphosis    | 4 |
| Neurological           |   |
| Radiculopathy          | 4 |
| Dural tear             | 2 |
| Paraparesis(transient) | 1 |
| Respiratory            |   |
| Atelectasis            | 1 |
| Lung injury            | 1 |
| Halo traction related  | 3 |



## 7/25(28.0%)

Preop. Scoliosis magnitude

Post. Only  $43.2\pm24.2^{\circ} <<$  Ant. & Post.



### Case 9+2 Female Congenital scoliosis with fused ribs

Multiple malformation complex (MC)



## Case 10y/o Female Contralateral hemivertebrae (Hemimetamelic Shift)





It is necessary for obtaining good correction of CSD to perform osteotomy through either posterior only or combined anterior and posterior approach. This study was conducted to investigate clinical significance of an anterior procedure.

## In Summary

- 1. Solitary type, and mild curve of multiple type of congenital spinal deformity could be managed by a posterior procedure only.
- 2. Many severe deformities due to more complicated anomalies necessitated combined ant and post procedures.
- 3. More severe curves and multiple complicated anomaly may be factors that necessitate the combined anterior and posterior operations.



