

Anterior And Posterior Spinal Arthrodesis with
Pedicle Screw Instrumentation for
Thoracolumbar Kyphosis in Children with
Mucopolysaccharidosis

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5th International Congress on Early Onset Scoliosis and Growing Spine (ICEOS)
Orlando, USA, November 18-19, 2011

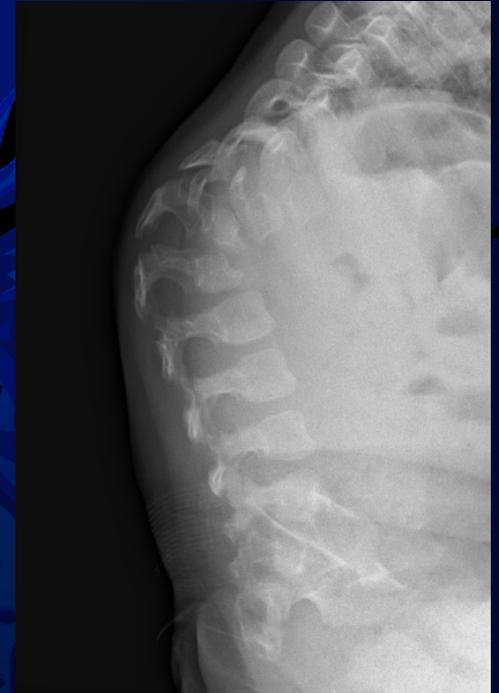
Disclosure

- No financial relationships to disclose



Background

- ❑ Characteristic spinal deformities occur in patients with MPS: Odontoid hypoplasia and/or progressive thoracolumbar kyphosis is frequently present.
- ❑ Progression of the thoracolumbar kyphosis can lead to spinal cord compression, claudication symptoms and poor trunk balance.
- ❑ Due to the rarity of Mucopolysaccharidosis relatively little has been published on the treatment of the thoracolumbar gibbus in the last 10 years.
- ❑ To the current authors knowledge there are no reports of successful instrumentation of the thoracolumbar spine with pedicle screws in children with Mucopolysaccharidosis.



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Subjects and Methods

- ❑ Retrospectively review of three consecutive patients with MPS who underwent single staged anterior and posterior arthrodesis of the thoracolumbar spine with pedicle screw instrumentation
- ❑ Two had a diagnosis of MPS type I (after Hematopoietic Cell Transplantation) and one MPS type IV (Morquio)
- ❑ Indications for arthrodesis was progressive thoracolumbar kyphosis $> 60^\circ$
- ❑ All patients were ambulant at the time of surgery.
- ❑ Average age at the time of surgery was 37 months (range 30 to 45 months).
- ❑ Patients were reviewed post-operatively at 3, 6 and 12 months

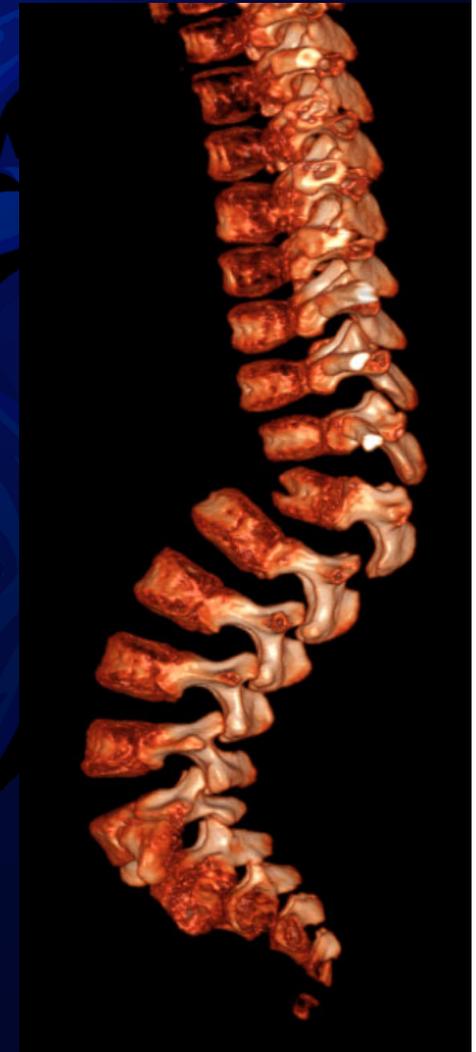
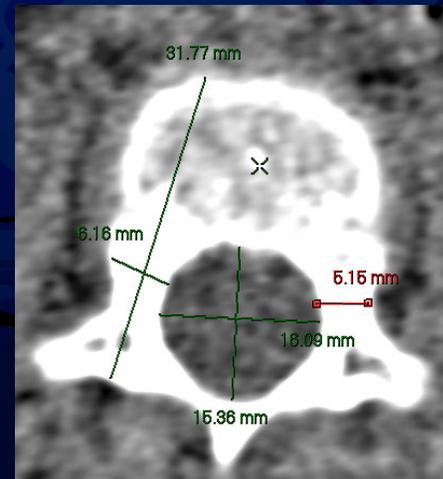


Radiological Assessment

- ❑ All patients had standing antero-posterior and lateral radiographs of the whole spine taken at first presentation, pre- and postoperatively and at latest follow-up
- ❑ The dysplastic vertebrae were located at T12 and L1
- ❑ Anterior translation of the vertebral body on the dysplastic vertebra in the sagittal plane was expressed as a percentage slip.
- ❑ The thoracolumbar kyphosis was measured using the Cobb method.
- ❑ Pedicle and spinal canal parameters of the lower thoracic and lumbar vertebrae were measured using CT and MRI

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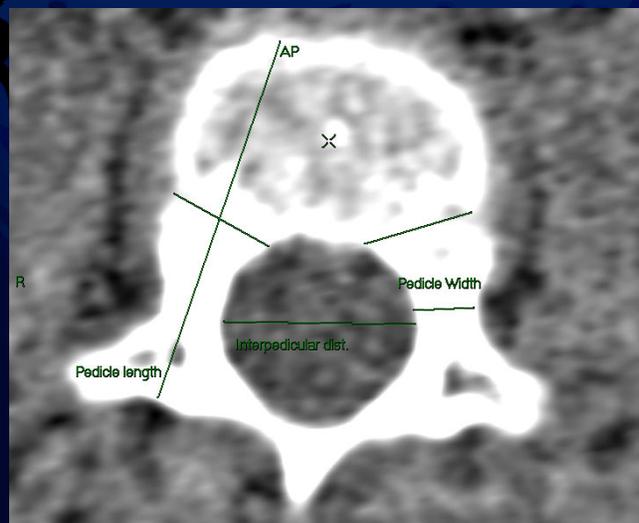
Surgical Technique

- ❑ Intraoperative spinal cord monitoring with multimodal lower SSEP's was performed
- ❑ All levels forming part of the thoracolumbar kyphosis on the standing radiograph were included in the fusion.
- ❑ A thoracolumbar approach was performed through the tenth rib.
- ❑ A 5 level discectomy. Rib strut grafts are wedged into the disc spaces
- ❑ All segments of the kyphosis were instrumented posteriorly.
- ❑ The entry point of the pedicle was marked with needles at the usual landmarks.
- ❑ Under radiographic control using anteroposterior and lateral projections the optimal orientation of the pedicle screw was selected as to maximise the trajectory of the screw in bone
- ❑ The pedicle entry point was then opened with a sharp awl and a 2mm cervicle pedicle finder advanced under radiographic control into the vertebral body.
- ❑ A spinal jacket was applied for 3 months postoperatively.



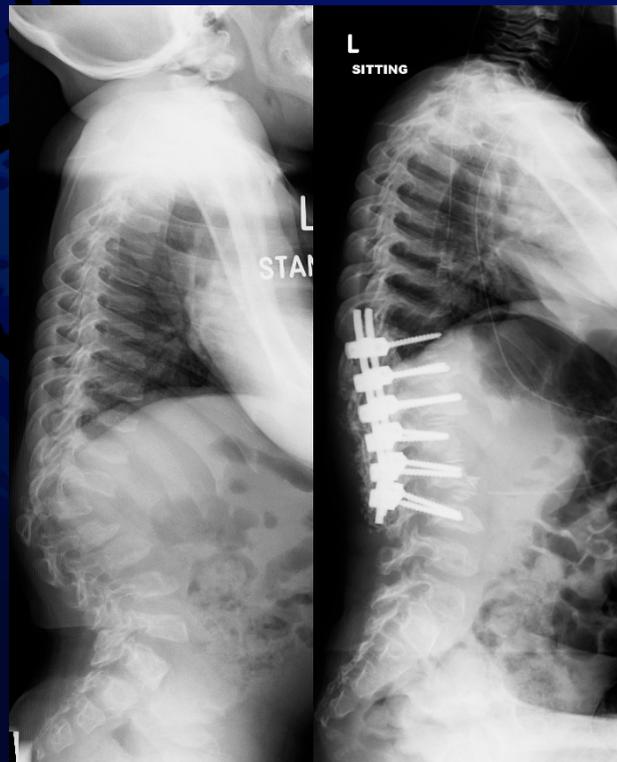
Morphometric analysis of thoracolumbar vertebrae

Spinal Level	Average Pedicle width (mm)	Average Pedicle length (mm)	Average AP length (mm)	Average Interpedicular distance (mm)	Average AP canal diameter (mm)	Average Vertebral body width (mm)
T10	4.375	14.85	26.95	13.55	14	22.4
T11	4.6	13.975	27.925	13.6	15.15	22.95
T12	3.475	13.8	26.3	15.6	15.5	24.35
L1	4.125	13.7	24.2	16.9	15.1	25.4
L2	4.475	15.55	29.325	17.8	14.25	27
L3	4.6	17.1	26.95	17.4	15.9	27.1

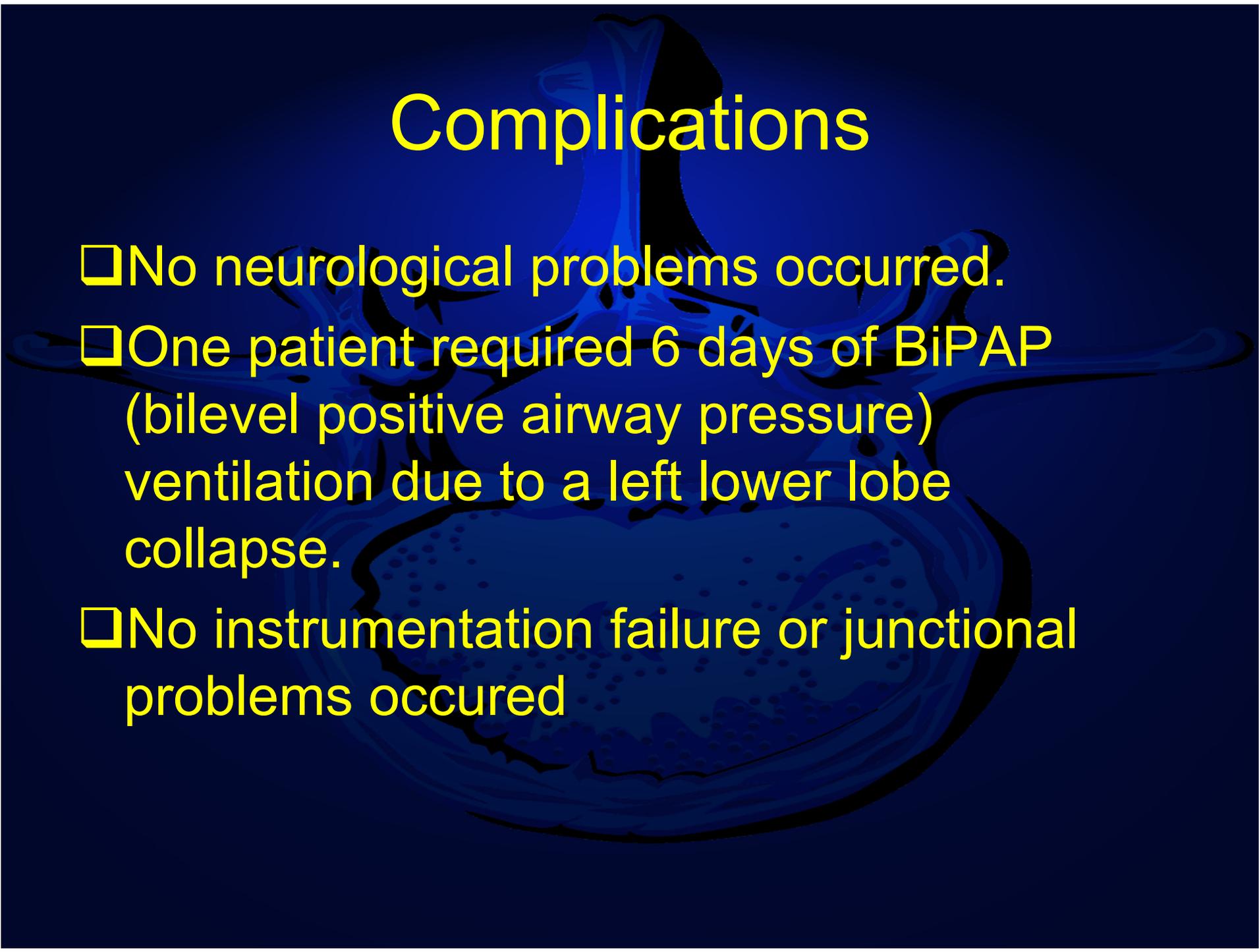


Results

Patient	Preoperative Kyphosis (°)	Vertebral subluxation preoperatively (%)	Postoperative Kyphosis (°)	Vertebral subluxation postoperatively (%)
1	64	80	8	20
2	67	60	-10	15
3	70	50	10	15
Average	67	63	3	17



Complications



- No neurological problems occurred.
- One patient required 6 days of BiPAP (bilevel positive airway pressure) ventilation due to a left lower lobe collapse.
- No instrumentation failure or junctional problems occurred

Conclusion

- Single staged anterior release and posterior segmental pedicle screw instrumentation effectively restores spinal alignment in young children with progressive thoracolumbar kyphosis associated with mucopolysaccharidosis.

