Kyphosis and Implantation: Modeling a Clinical Phenomenon

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Rib construct a product of desperation for managing kyphotic deformity in boy with VATER syndrome and osteoporosis

Preop sternal compression on stomach, relieved by kyphos correction

Current studies 66 month followup
Purpose: Test strength of current fixation methods (growing rods, VEPTR, rib construct) to kyphotic pullout forces in a porcine model.

Synthes spine refused to make VEPTR’s available for study.

2 groups tested – 6 spines each from 21.6 plus or minus 1.5 Kg pigs. The pig has 15 ribs.

Pedicle screws in T3-4. Flouroscopic confirmation of screw location.

2 downgoing hooks on 3-4, upgoing hooks on 5-6.
As kyphtotic deflection and force increased, there was a partial failure (arrow), then complete failure in all specimens.
Rib construct

No failure in any of the 6 constructs tested
Results

- No failure observed with rib construct. Average deflection 50.3 degrees, maximum bending force 119.7 N
- For pedicle screws, failure recorded on all 6 spines. Average deflection angle at failure 35.8 degrees. Average bending force at failure 118.6 N
Conclusions

✓ The rib construct offers superior resistance to kyphotic pullout forces when compared to pedicle screws. Unfortunately, we were unable to test the VEPTR.

✓ One clinical paper reported poor results with the VEPTR for patients with kyphosis


✓ Thus, at this time, we feel the rib construct is the only reliable method for control of kyphosis in the management of early onset spinal deformity