The Rib Construct: A Valuable Alternative for Management of Early Onset Spinal Deformity

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Some information

- 4 rib construct began as a surgical technique for EOS management in 2007
- Technique described in 2012 (J Pediatr Orthop32(6):e30-34).
- Results of mechanical strength resisting kyhotic pullout force presented here as exhibit

Very simple – 2 downgoing hooks superiorly, 2 inferior upgoing hooks

Generally ribs 2- 5 are instrumented

- We present our results of 58 cases done surgically with 4 rib construct and have at least 24 months followup,
- 41 from Nablus, 17 from MUSC
- average followup 38.8 months(24-67)

Ongoing complication of results

- 17 were syndromic, 4 idiopathic, 15 congenital, 22 neuromuscular,
- age at surgery average 10+9(1-20+9), 25 had scoliosis, 23 kyphoscoliosis, 10 kyphosis
- 13 Patients from MUSC had bone density scores, T scores ranged -2.7 to -11.2, average -4.6; Z scores ranged from -2.2 to -4.7

Results

Deformity	Preoperative	Postoperative	Correction
Thoracic scoliosis	75	58	23%
Thoracolumbar scoliosis	75	50	33%
Thoracic kyphosis	114	81	29%
Thoracolumbar kyphosis	58	22	62%
Whole spine kyphosis	133	46	65%

Complications

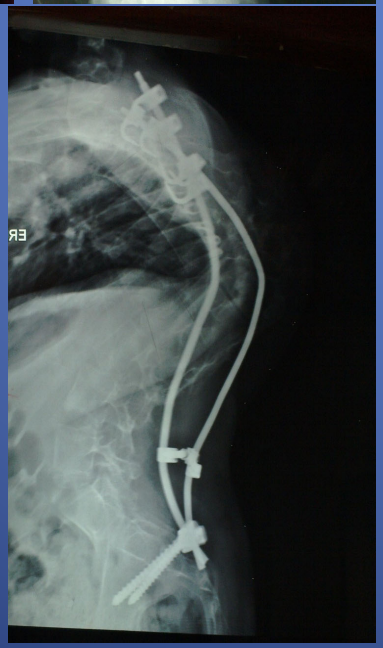
complication	Number
Proximal rib dislodgment	9
Deep infection requiring instrumentation removal	1
Superficial infection	5
Broken rods	4
Erosion of instrumentation	1
Inferior dislodgment	8
Death from unrelated causes	2
Total number of complications	30

Observations

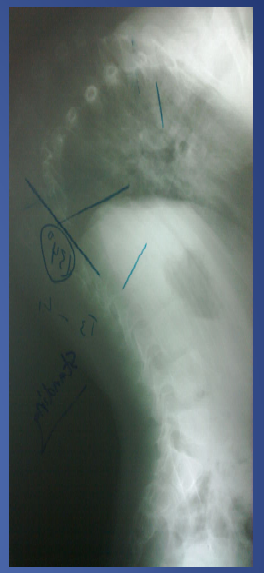
- performed better than other current methods for management of kyphosis (especially thoracic), even in patients with osteoporosis.
- useful for attaining balance of the occiput over sacrum in previously operated spines.
- useful adjunct for treatment of subluxation of the spine following vertebral column resection for congenital dislocation of the spine.
- provides a vehicle for using growth modulation for assistance with correction of deformity.
- Intermediate points of fixation are often helpful.

Some examples, starting with thoracic kyphosis

Diastematomyelia - 140 degrees preop kyphosis, 85 degrees postop

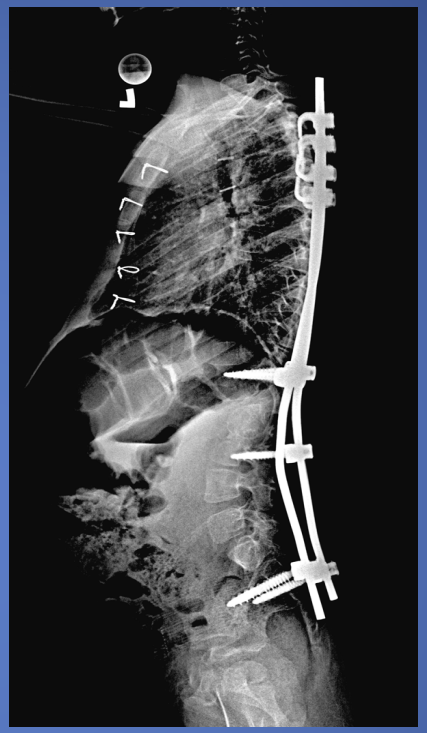


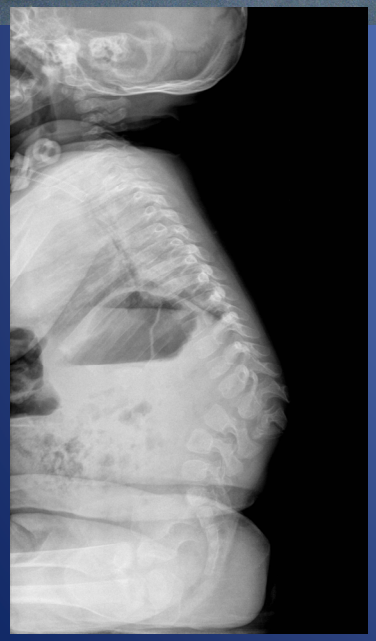
Neurofibromatosis – 134 degrees preop, 55 postop after conversion to 5.5 rods



Congenital thoracolumbar kyphosis – treated with anterior release via minithoracotomy and RC with growth modulation

Congenital dislocation of spine

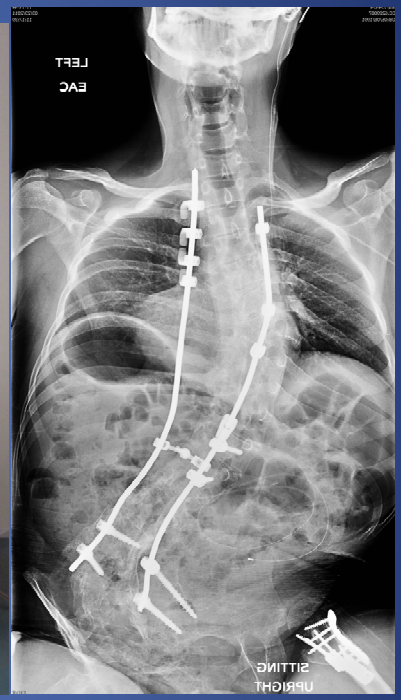




Resection of posterior hemim loss of fixation,T score -4.4

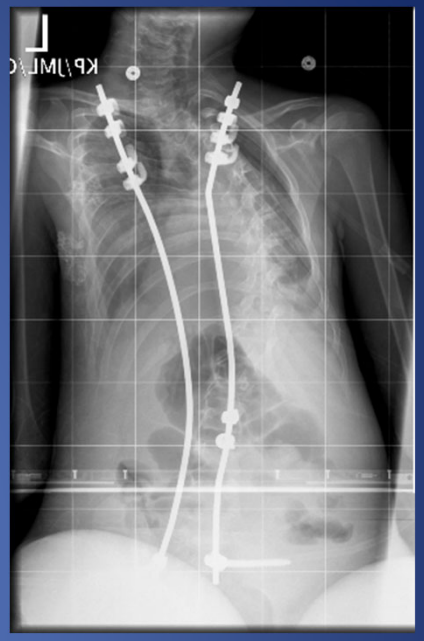
Spine remodelling, excellent clincal correction

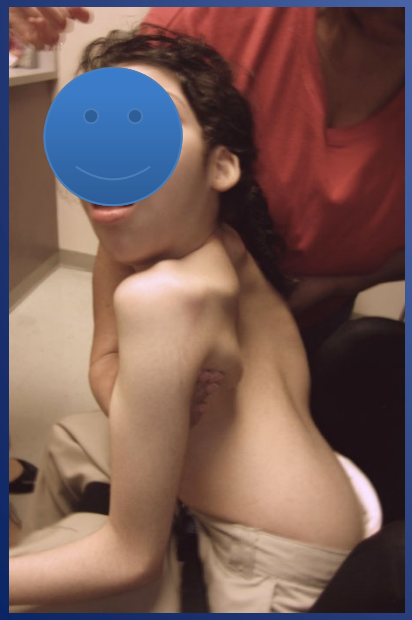
Balancing previously fused spine

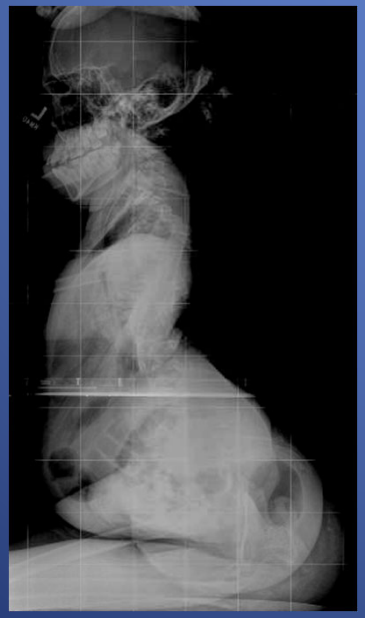


Prior fusion, instrumentation removed secondary to infection. Uncomfortable sitting

13 yo, spastic hemiparesis, cannot sit. Jehovah's Witness







Preop scoliosis 129
Preop lordosis 105
Preop Zscore -2.7
Preop T score -4.5
Postop scoliosis 89
Postop lordosis 45
Preop spine length 19.6
Postop spine length 34.8

Alaa's technique for kyphosis associated with spina bifida

postop

- In summary, The RC is an attractive alternative to more commonly used current methods of fixation for early onset deformity.

Thank you

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The Children's Hospital of South Carolina