The Coronal Plane Matters: An Evaluation of Primary Coronal Cobb Correction for Adult Spinal Deformity using Pre-Bent Sagittal Contoured Rods

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Introduction:

Patient specific rods (PSR) are pre-bent to match post-spinal fusion sagittal alignment goals. Adult idiopathic and degenerative forms of scoliosis impact can cause large, multiplanar, and rigid coronal deformities. It is unknown to what extent coronal correction is obtained with PSRs or if nearness of post-operative to planned sagittal parameters impacts coronal correction.

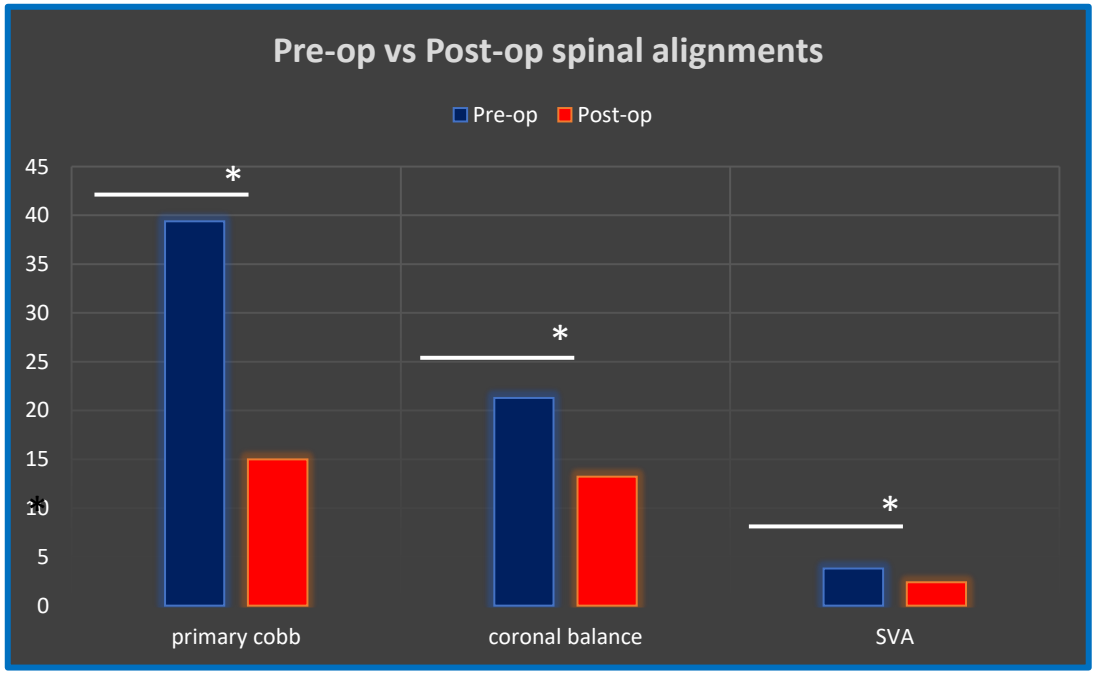
Methods:

- Patients > 18 years-old with either adult idiopathic or adult degenerative scoliosis who received posterior instrumented fusion from a single surgeon at a single institution were reviewed.
- Post-operative versus pre-operative primary Cobb angle were compared
- Post-operative sagittal parameters versus pre- and planned alignment goals were compared.
- Factors impacting restoration of primary coronal Cobb angle were evaluated in a multivariable regression model, including scoliosis type, PCOs through the primary curve apex, and final sagittal alignment deviation from the plan.

Pre, Post, and Plan Sagittal and Coronal Alignment

	Pre-Op Standing	Pre-Op Plan	Post-Op Standing
LL,	-48.1 ± 16.0	-55.7 ± 11.4	-51.1 ± 12.7§
SS,	34.4 ± 10.4	36.2 ± 9.9	33.0 ± 10.0§
PT,	21.6 ± 9.5	16.6 ± 17.2	21.5 ± 7.4†
SVA, cm	3.8 ±5.2	10.9 ± 15.1	2.4 ± 3.6§
T5-T12 TK,	33.3 ± 17.0	37.8 ± 13.2	40.3 ± 13.4†
Coronal Balance, mm	21.3 ± 16.3		13.2 ± 9.7†
Primary Cobb	39.4 ± 12.0		15.0 ± 9.7†
Fractional Curve	17.5 ± 11.9		7.5 ± 6.9†

§ $p < 0.05$ compared to Plan; †$p < 0.05$ compared to Pre-Op.
LL = lumbar lordosis; SS = sacral slope; PT = pelvic tilt; TK = thoracic kyphosis



Results:

- 33 patients met inclusion criteria. The average age was 61.1 ± 16.7; 25 were female (25/33, 75.8.%)
- The most frequent primary Cobb angle was thoracolumbar (38.1 ± 10.5°, 30/33, 90.9%)
- The average pre-op PI, LL, and PT were 56.0 ± 13.7°, -48.1 ± 16.0°, and 21.6 ± 9.5°, respectively.
- T5-T12 kyphosis was 33.3 ± 17.0°. The last measured post-operative Primary Cobb angle was 15.0 ± 9.7°, 58.8± 27.7% reduction from starting angle.
- Final LL was less than planned (mean 4.3°, 95% CI[.91 - 7.7], p = 0.01).
- PT and T5-T12 kyphosis were similar to the plan (mean 4.9°, 95% CI[-.95 -10.7], p = 0.9; mean 2.5°, 95% CI[-1.0-6.0], p = 0.16).
- Primary Cobb angle change was correlated with starting Cobb magnitude (p = .01).
- PCO location/number and nearness of final sagittal parameters to goal were not significant (overall model r^2 = .48, p = .01).

Conclusions:

- Significant primary coronal Cobb restoration from PSRs is achieved in tandem with sagittal realignment.

References:

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