Should We Expect Changes in Spino Pelvic Alignment After Ais Posterior Surgery?

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Background

Spinal alignment involves a complex interaction between the pelvis and vertebral column. AIS is a 3D deformity often characterized by a regional flattening of the spine. The main consequences on global alignment are posterior sagittal malalignment and pelvic anteversion. Therefore, prediction of postoperative alignment can be challenging. The main goals of surgery are the correction of the regional deformity in all components (translation, rotation and hypokyphosis) with the shorter fusion. The challenge is to reharmonizes the global coronal and sagittal alignment by reciprocal changes. But what shall we except in terms of spinopelvic alignment as most of our patients present with sagittal malalignment?

Methods

We conducted a prospective radiographic study of AIS before and at least 2 years after spinal correction to determine spino pelvic parameters. This study included 80 AIS patients followed at least 2 years after surgery for whom a preoperative planification
and patient specific rods were manufactured. EOS full-length standing films were available for all subjects. Postoperative sagittal alignment was compared to preoperative alignment in terms of Roussouly morphotype.
Spinopelvic and spinal parameters modifiable through surgery (lumbar lordosis and thoracic kyphosis) were measured and compared.

Results

Mean preoperative Cobb 56° was corrected to 26°(mean 54%). Preoperatively, patients presented with a posteriorly imbalanced spine with a mean Barrey ratio -238% and pelvic anteversion (-8,8°). Only Barrey ratio was corrected (9%, $p<0.01$) while spinopelvic parameters slightly varied but no significant change was observed.

Moreover, patients did not modify their Roussouly morphotype postoperatively (91%

were type 3 or 4). The only spinal parameters that were affected were those modifiable by the construct: T4T12 (29 to 37°, $p<0,01$) and L1S1 (56° to 61°, $p<0.01$). The distribution of lordosis remained unchanged (L4S1 lordosis = 65% LL).

Conclusion

Surgical correction of AIS meant to correct regional malalignment (TK, LL) and to normalize the thoracolumbar junction which corrected. No significant impact was observed in the spinopelvic alignment at 2 years postoperatively, and most of all patients maintained their lumbopelvic shape despite these changes. Therefore, in surgical planning, no modification in pelvic orientation is to be expected and sagittal alignment modifications in the fused segments have to be decided according this shape.