Reviewer’s report

Title: Sagittal Spinopelvic Malalignment in Degenerative Scoliosis Patients: Isolated Correction of Symptomatic Levels and Clinical Decision-Making

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Reviewer: Raphael Adobor

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Respect for the sagittal plane has been broadly published and accessible for all surgeons. Yet, suboptimal outcomes and revision cases remain highly prevalent. Iatrogenic causes remain an important contributor to the prevalence of adult spinal deformity. One reason for the increased incidence of iatrogenic deformity relates to the lack of understanding of the basic concepts of spinopelvic alignment and the preservation of sagittal alignment when addressing focal or regional degenerative conditions. In addition to decompression and stabilization, maintenance of lumbar lordosis is crucial in avoiding the creation of flatback deformities. An attempt by the authors to address the issue of isolated correction and short fusion is commended. The manuscript has merits but some revisions are suggested that might help to improve the quality of the manuscript.

Abstract

Page 3 lines 16-18: Of patients who achieved PI-LL mismatch within 10o on their pre-operative extension lateral lumbar radiographs, 63% were able to achieve a PI-LL mismatch within 10o on their initial postoperative films.

Comment: Sentence confusing. Suggest revising to: Of patients who achieved PI-LL mismatch within 17 10o on their pre-operative extension lateral lumbar radiographs, 63% were able to maintain a PI-LL mismatch within 10o on their initial postoperative films.

Page 4, lines 14-18: Loss of LL is commonly observed in patients with symptomatic DS. A critical distinction for the surgeon to make with regards to which levels to fuse revolves around the etiology of the loss of LL and resulting positive sagittal imbalance commonly observed in these patients. The surgeon must decide whether this loss of LL is largely structural or whether it is more positional in nature given that stenosis is usually present in this setting.

Comment: The etiology of Adult Spinal Deformity including degenerative scoliosis has not been completely elucidated. If it is postulate that DS is caused by degeneration of the intervertebral discs and facet joints, and the process of degeneration follows the predicted loss of disc hydration and disc space height, followed by increased loads on the facets leading to facet degeneration, then degeneration of these elements may cause instability in the spinal column leading to rotation, lateralolisthesis, spondylolisthesis, eventually loss of lumbar lordosis and kyphosis. Axial, coronal, and sagittal deformities then follow the asymmetric degenerative
processes. It could be argued that the loss of LL is a late stage phenomenon in the degenerative process, and as such patients who are younger and have flexible spines are still able to maintain a reasonable PI-LL difference and are able to maintain the PI-LL mismatch at least in the short term period after short fusion surgery. Authors should discuss their findings taking into consideration, the etiology of the disease, patient ages and symptomatology.

Methods

Page 5, lines 13-15: Inclusion criteria entailed patients who failed conservative treatment for DS, presented with a loss of normal LL (positive sagittal imbalance) as observed on preoperative radiographs

Comment: Positive sagittal imbalance does not automatically mean loss of lumbar lordosis. Loss of LL should be given in degrees or given as appropriate for age adjusted PI-LL mismatch values.

Page 5, lines 11-13: Regardless, the goal of the procedure should be to achieve an adequate decompression of the neurologically symptomatic levels and to correct the LL to within 10o of the PI for improved health-related quality of life scores postoperatively.


Page 10, lines 12-17: Notably, this was accomplished without having to take into account the overall spinal deformity, avoiding longer fusions, interbody cages, and / or osteotomies (mean post-operative LL and PI-LL of 44o and 10o, respectively). These results indicate that the hypo-lordosis and positive sagittal balance commonly observed preoperatively in DS patients is not always entirely structural but rather positional and compensatory for the concomitant spinal stenosis.

Comment: For non-fixed deformities with flexible curves, maintenance of LL, and age adjusted PI-LL mismatch, there is no need for long fusions, interbody cages or osteotomies for preserving sagittal alignment and balance postoperatively.

Page 10, lines 19-21, and Page 1-2: Moreover, when compared to the LL on routine standing spinal radiographs (taken in the position of comfort), the LL on pre-operative standing lumbar extension radiographs and supine MRIs were found to be significantly greater with mean values of 15o and 9°, respectively. These findings further support the notion that the hypo-lordosis often seen in DS patients can be largely positional and not necessarily structural in nature.
Comment: Generally, structural components of spinal deformities can change according to position. Structural deformities like scoliosis and kyphosis normally reduce in magnitude from standing radiographs to supine or bending radiographs both in adolescents and adults. Therefore increase of LL from standing radiographs to extension and MRI supine do not necessary mean that LL changes are just positional and not structural.

Table 2: Measured radiographic parameters

Pelvic Tilt

Pre-Op 23.9 ± 9.5 [2.2 - 45.7]

Immediately Post-op 27.0 ± 9.5 [10.2 - 46.6] 0.073

Comment: Pelvic Tilt increased post op in your study. It will be useful to discuss, this as one of the goals of surgical correction is to decrease PT in addition to reducing PI-LL mismatch.

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Quality of written English
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