

Response to Letter to the Editor on "Critical Analysis of Radiographic and Patient-Reported Outcome Following Anterior/Posterior Staged *Versus* Same Day Surgery in Patients Undergoing Identical Corrective Surgery for Adult Spinal Deformity"

To the Editor:

We thank Dr Morimoto for his letter regarding our investigation into outcomes following staged *versus* same-day surgery in patients undergoing corrective surgery for adult spinal deformity (ASD).¹ We appreciate these readers' valuable insights and thoughtful considerations regarding our findings, and we would like to address the points that they have raised.

The findings from our study revealed that patients who reached the 75th percentile interval of five days in between staged anterior/posterior fusion to correct ASD showed greater improvements in Scoliosis Research Society Outcomes Questionnaire (SRS-22) Pain and Total scores postoperatively, as well as SRS-Activity, Pain, Satisfaction, and Total at one year; compared with patients staged in lower quartiles.¹ A study conducted by Hassanzadeh *et al.*² looked at outcomes for combined anterior/posterior fusions for spinal deformity correction in patients staged <21 days apart *versus* those staged 21 or more days apart. They found that staging the procedure 21 or more days apart was associated with significantly superior improvements in the SRS-22 subscores of pain, appearance, activity, mental, and satisfaction.² However, the aforementioned study showed greater im-

provements in SRS-Activity, Pain, and Appearance subscores postoperatively at final follow-up when compared with the two-year postoperative patient-reported SRS scores obtained in our study.^{1,2} This may suggest that patients with longer intervals of staging in between procedures may experience a greater improvement in SRS outcomes and further research may be warranted to examine this trend. Furthermore, while staged patients experienced a significantly lower incidence of neurological complications relative to same-day surgery patients, there was no statistically significant difference in rate of complications between the various intervals of staging.¹ Complication results from the Hassanzadeh *et al.*² study concurred with our results, showing no significant differences in complications between the two staging groups. This seems to suggest that staging by an interval greater than five days may not significantly reduce complications when compared with those at lower intervals.

Our study also identified that staged patients did not experience a significantly longer hospital length of stay when compared with same-day surgery patients. When considering the significant radiographic improvement of staged patients, lower incidence of neurological complications, reduced ICU admissions, and improved patient-reported outcomes, this may be another reason to support staged surgery over same-day surgery; patients will likely benefit from superior outcomes without experiencing drawbacks such as increased hospital length of stay and increased rate of reoperation.¹

With respect to complications, staged patients experienced significant reductions in postoperative neurological complications relative to same-day fusion patients.¹ Neurological complications stemming from spinal surgery can be attributed to various factors including compression and traction of neural structures, osteotomy-related injuries, hypotension, and spinal cord ischemia.^{3,4} Surgery to correct lumbar ASD has been

associated with a neurological complication rate ranging between 0.5% and 17%.⁵ A large retrospective study by Dinizo *et al.*⁶ investigated 949 patients undergoing ASD correction and found the neurological complication to be 18.9%, with 54.2% achieving full or partial resolution at final follow-up. The incidence of these neurological complications are influenced by numerous variables including surgical approach, the number of fusion levels involved, and the complexity of the case, among others.^{5,7} Staging spinal surgery can help mitigate perioperative insults, exposing the body to smaller amounts of stress and trauma.⁸ Staging spinal surgery generally reduces the complexity of cases and minimizes trauma to the body which can potentially explain the decrease in occurrence of neurological complications in staged patients; as demonstrated by our study and others investigating the same concepts.^{1,8}

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The authors thank the readers' for their meaningful contributions in broadening the scope of this discussion. The reader's insights have helped shed light on the numerous advantages that staged spinal surgery offers over same-day anterior/posterior fusion in terms of improved outcomes and reduced neurological complications.

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