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Letter related to the manscript: Ochtman AEA, Kruyt MC, Jacobs WCH, et al. Surgical Restoration of Sagittal Alignment of the Spine: Correlation with Improved Patient-Reported Outcomes: A Systematic Review and Meta-Analysis. JBJS Rev. 2020;8(8):e1900100. doi:10.2106/JBJS.RVW.19.00100".

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I read with great interest this very opportune work.

Authors adequately stated that "Spinal surgeons were initially mainly focused on local treatment of spinal pathology and many spinal surgeons have adopted the assumption that restoration of alignment would lead to a better clinical outcome". In recent times, some studies have also changed the treatment of primarily spinal diseases for treatment of imbalance diseases (1).

Authors also pointed that "there is little direct evidence that surgical restoration of spinal sagittal alignment improves patient-reported outcomes".

The enormous variability of the spinopelvic parameters' values in asymptomatic subjects would suggest that there would be little correlation between these parameters and PROS (2).

Great part of relationship between spinal balance parameters and Outcomes are based on Correlation tests. But, systematically, majority of correlations have been proved to be low or negligible (3,4). A referral table for interpretation of Correlation scores is on table 1.

In correlation, the p-value tests the hypothesis that the correlation coefficient is not zero. In other words, a significant p-value means only that "some relationship exists" in the evaluated sample.

R-squared represents the real correlation explained by variables relationship, excluding a correlation randomly obtained. R-squared has been described rarely in spine research.

For example, one R-squared correlation between Pelvic tilt with ODI (obtained in a regression model) was

only 0.14 (4).

Another potential problem studying sagittal balance in regression models is Multicollinearity. Independent variables should be, in fact, independent. Spino-pelvic parameters are not independent but correlated among them. Multicollinearity may change p-values and Coefficients.

The synthesis of Ochtman's work was based on a random-effects meta-analysis (meta-regression). Primary included outcomes were spinopelvic radiographic parameters and PROMs. From all five Spino-pelvic variables analyzed, only Pelvic-tilt was significantly related to ODI and VAS, but not related to SF-36 and SRS-30. All other outcomes such as SVA and LL-PI mismatch did not reach significant correlations.

Only one significant correlation, PT- ODI/VAS, would be real, or a random effect association?

To understand the strength of this relationship, were searched (among selected studies entered in this work and described on table 5) those studies that correlated PT and ODI. Two works described correlations between pre and postoperative changes of PT and ODI.

In the same way used in this paper (pooled results after Fisher z transformation of the correlation coefficient, calculated standard error and back transformed correlations and their confidence intervals, under random effect model) a summary effect of Correlation between PT and ODI was produced. The resultant effect is described in the Figure 1. The pooled effect was, under random effect, not significant.

The study of Zhou et al. and Massie et al. produced a correlation of 0,21(-0.03-;0.43) and 0.61(0.39;0.77), respectively. Under random effects model, the calculated summary correlation was 0.42(–0.04;0.74). The software used in this analysis was R (R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/).

I would like to argue that even the relationship between PT and ODI may have been caused by influence of other associated covariates (in this meta-regression. It is supposed that none of spino-pelvic variables have any relation with PROMs outcomes.

The tested correlations and regressions in several spine sagittal balance studies have insisted to pursue linear relations among variables. It seems that these types of relations are not linear but may be associated to other relationship models.

The work of Ochtman et al. synthesizes the analysis of several works correlating results of surgeries for spinal imbalances and clinical results. It is possible that the strength of value of attributed to spino-pelvic variables in the decision making of spine diseases should be re-evaluated, until more information came to clarify our lack of knowledge.

I congratulate Drs. Ochtman et al, for their important work.

References

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Conflict of Interest: None Declared