**Author’s response to reviews**

**Title:** A Comparison of Lumbar Transverse Pedicle Angles between Ethnic Groups: A Retrospective Review

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**Version:** 1  **Date:** 06 Jan 2019

**Author’s response to reviews:**

Point by point response:

Reviewer reports:

Gagandeep Choudhary, MD, MBBS (Reviewer 1): General comments:

1. Well written manuscript.

2. Major revision is required in the "results" subsection (please see below). Minor revisions required in other subsections.

3. Please use the abbreviation for Transverse Pedicle Angles (TPA) consistently throughout the manuscript.

This has been corrected
4. Use the word 'gender' instead of 'sex'.

All instances of sex have been changed to gender

5. Same figures are listed multiple time in the manuscript. List each figure only once in the manuscript.

This has been corrected

Subsections:

Title: Appropriate

Abstract: Worth mentioning individual vertebral levels (i.e. L2 and L3) in the abstract which showed statistical significance, instead of "multiple individual levels".

This has been corrected

Background:

Please use the abbreviation for Transverse Pedicle Angles (TPA) consistently throughout the manuscript.

This has been corrected

Page 4, 2nd paragraph: Multiple studies are listed here: Citation 7 and 8: Please mention whether these studies were on cadavers or on imaging modality.

Regarding citation 7 the following has been added: “utilizing caliper measurements on dried osseous specimens from a Mexican population”

This information is already included for citation 8 (utilizing digital calipers on a population of American human cadavers)
Methods:
Page 6, 2nd paragraph: Do you mean 'figure' instead of 'image'? If so use word "figure" instead of "Image".
Yes, this has been corrected
Use: 'Parentheses' for figures and tables.
This has been corrected
Also: Figure and table should be listed properly, Example: see Page 6, 2nd paragraph: "mid-axis of the pedicle bilaterally as seen in Image 1", instead use "mid-axis of the pedicle bilaterally (Figure 1)".
This has been corrected

Results:
Use: 'Parentheses' for figures and tables.
This has been corrected

Page 7, 1st paragraph 2nd line: Description of Figure 1 in this paragraph doesn't match the provided Figure.
This has been corrected – reference to figure 1 has been removed

Page 7, 2nd paragraph: "However, when stratified_ _ _ at the L2 and L3 levels": These two line need to be rephrases (combine these two line into one line to avoid repetition).
These sentences have been combined to read: “However, when stratified by ethnicity, the TPA averages at individual vertebral levels were found to be statistically significant at the L2 and L3 levels (p<0.05).”

Page 7, 3rd paragraph and page 8: Use symbol "°" instead of 'Degree'.
This has been corrected
It is worth mentioning the other statistics related to gender, age, height and weight. At-least as a supplementary Data file.

Important to mention that "No statistical differences were seen in TPA at L1, L4 and L5 vertebral levels".

The following has been added; “No statistically significant findings were found at levels L1, L4, or L5.”

Discussion:

Page 8, last line: "These results can be visualized in Figures 1 and 2". Again the figure 1 description does not match the provided figure.

This has been removed

Consistently use "(p<0.05)" instead of "(p=.05)". See last paragraph on page 8.

This has been corrected

Need rephrasing: Page 9 first paragraph, line 4th: "When planning on instrumenting _ _ _ _ patient to undue radiation."

This has been changed to “When preparing for instrumentation of the lumbar spine, it is ideal to obtain a CT scan of the lumbar spine to evaluate for possible TPA variation. However, the utilization of CT imaging is not always undertaken in preoperative planning and may expose the patient to undue radiation.”

Conclusion: Appropriate
Tables:

It is worth mentioning the other statistics related to gender, age, height and weight. At-least as a supplementary Data file.

Abbreviations of "SD" and "SEM" should be described/listed in the figure legend.

The following has been added to list of abbreviations and figure legend: “Standard Deviation (SD) Standard Error of the Mean (SEM)”

If possible the significant P-value data should be listed in the table form.

P-values have been added to the results and discussion section where significant: “When multiple comparisons were made at L2, Asians were found to have significantly larger TPA-Avg angle by 3.11° (p<0.0001) when compared to Blacks. Additionally, at L2, the TPA-Avg angle of White individuals is 1.84° larger than black individuals, which was found to be significant (p=0.039). When multiple comparisons were made at L3, Asians were found to have a TPA-Avg of 1.94° (p=0.002) and 2.91° (p<0.0001) larger than Hispanics and Blacks respectively. ”

Table 2: has been added which includes all significant and insignificant p-values for completeness.

“Table 2. Multiple Comparisons

Post-Hoc Bonferroni analysis of multiple comparison for each ethnicity at each individual vertebral level was undergone to identify significance.”

Figures:

Figure and table should be listed properly, Example: see Page 6, 2nd paragraph: "mid-axis of the pedicle bilaterally as seen in Image 1", instead use "mid-axis of the pedicle bilaterally (Figure 1)". This has been corrected

Figure 1: Please describe/correct 'Fist' in the figure legend. (Also make sure figure is correctly described in the manuscript. Please see comments on methods and results).

This has been corrected
References: Appropriate

Anil Kumar (Reviewer 2): Article overall is ok but needs some major revisions.

TITLE
I think the title should mention 'LUMBAR transverse pedicle angles'.
Title has been changed to: “A Comparison of Lumbar Transverse Pedicle Angles between Ethnic Groups: A Retrospective Review”

ABSTRACT- Results
Statistical p value is <0.05- please correct it here and other places in the manuscript.
This has been corrected

KEYWORDS
Include CT
This has been added

BACKGROUND
last line in first paragraph here- 'with the increasing commonality... of spinal surgery'- please reframe the sentence, for eg. 'commonality' can be replaced by 'use' and 'patient variation' by 'patient variables'.
This has been changed to: “With the increasing use of posterior lumbar fusion, further elucidation of patient specific variables in relation to vertebral morphometric variation may assist orthopedic surgeons in planning and performance of spinal surgery.”

In second paragraph here, while describing the TPA angle, please add (figure 1) at the end of sentence. Last line of this paragraph (page 4)- 'Thus, it is of maximal.... that of transverse pedicel angle' can be removed, as I think this is repetitive.
Reference to figure 1 has been added.

The sentence mentioned has been removed.

There is a study published in 2012 that studied ethnic differences in pedicle dimension of cervical spine. I think this should be mentioned here.

'Ethnic differences in pedicle and bony spinal canal dimensions calculated from computed tomography of the cervical spine: a review of the English-language literature.'


The following has been added to the background information: “A meta-analysis study regarding CT analysis of the osseous morphology in the cervical spine undertaken by Marumo, et al15, claims that although there is variation due to ethnicity, there may be a lack of significance.”

I also found a dissertation submitted to University of Johannesburg in 2018 that describes the morphology of thoracic and lumbar pedicles in different ethnic groups. Please mention it in the discussion and references.

'The morphometric description of the thoracic and lumbar vertebral pedicles in European, African and Mixed populations of South Africa.'

http://wiredspace.wits.ac.za/bitstream/handle/10539/25258/Final%20corrections%20%20%283%29%20%20%281%29.pdf?sequence=1&isAllowed=y

The following has been added to the background: “A more recent study undertaken in South Africa has attempted to identify ethnic variation in osseous morphology utilizing 174 dried lumbar vertebral specimens with caliper and goniometer measurements, Sani15.”

METHODS-

'TPA data was obtained by single observer and verified by 2 more senior physicians'- please explain this better- how was this done?. How was interobserver variability calculated and interpreted?

Our goal was not to determine interobserver variation (though that could certainly be a follow up study), we wanted to ensure that no measurement was made erroneously. Thus, rather than averaging three measurements, the initial observer (orthopedic resident) measurement was confirmed by two senior orthopedic physicians utilizing the same measurement methodology. If
a the measurement was not correct, the senior physician would make a new measurement that was then cross-confirmed by the other senior physician and initial observer.

Height and weight- as reported by patient ? what was the age range of these patients?

Height and weight were gathered from patients’ medical chart via direct measurement. The following has been added; “Height and weight were directly measured and reported in patient charts.”

The following sentence has been added in regard to age: “Inclusion criteria for age was 18 through 99 years.” The oldest patient was 97 and the youngest 22.

RESULTS

Page 7- first paragraph- ‘increase in the TPA was appreciated with……in figure 1.’ Please correct figure 1 to figure 2.

This has been corrected

Please mention the exact p values found at L2 and L3 levels. Also, please provide a table or figure that includes data and p values found at all levels.

P-values have been added to the results and discussion section where significant: “When multiple comparisons were made at L2, Asians were found to have significantly larger TPA-Avg angle by 3.11o (p<0.0001) when compared to Blacks. Additionally, at L2, the TPA-Avg angle of White individuals is 1.84o larger than black individuals, which was found to be significant (p=0.039). When multiple comparisons were made at L3, Asians were found to have a TPA-Avg of 1.94o (p=0.002) and 2.91o (p<0.0001) larger than Hispanics and Blacks respectively. ”

Table 2: has been added which includes all significant and insignificant p-values for completeness.

“Table 2. Multiple Comparisons

Post-Hoc Bonferroni analysis of multiple comparison for each ethnicity at each individual vertebral level was undergone to identify significance.”
DISCUSSION

Please correct the p values to <0.05.

This has been corrected

Another limitation of the study I think is that there are only 12 white patients, which probably is significantly lower than others.

The following has been included in the discussion section last paragraph: “Finally, for White ethnicity, only 12 patients were included which may be unrepresentative of this population. Future work may be designed to address these limitations.”

LIST of ABBREVIATIONS

Include SD and SEM

This has been corrected

FIGURE LEGEND

Table 1 description can be removed from here, as it has been described earlier.

This has been corrected