Peer Review File

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Comment 1:

The authors mention XR taken within six weeks. Was this the only time point at which post-operative images were measured. The literature suggests that there can be significant variability in alignment overtime. If only 6 week post-operative images were used, this makes it more difficult to interpret. I would suggest including more long-term follow-up images to evaluate if the alignment is maintained, lost, or improves over time.

Reply 1:

Post-operative x-rays within six weeks were the only timepoint in which post-operative images were measured within our cohort. This timepoint was selected as 100% follow-up occurred at this stage, allowing for accurate and uniform interpretation of the operative results. Although delayed imaging was performed, it was sporadic and at inconsistent intervals. We made early efforts to collate these however unfortunately there was insufficient data to allow for analysis, one of the clear limitations of a retrospective review. We acknowledge that alignment can change over time and, although the long-term outcomes were not a focus of our paper, we have recognised this within the limitations section of our manuscript. Despite this, we feel that the early analysis of radiographic parameters as presented here provides invaluable data to assist with surgical decision making and is of value to the spine surgery community.

Comment 2:

While this manuscript looks at LLIF's ability to correct spinopelvic measures, it is very limited in that only 8 degree cages were utilized. This is significantly problematic, as higher degree lordotic cages are available and used. The authors do show increased anterior and decreased posterior disc height, as well as mention an increase in segmental lordosis of 2.49 degrees per level, but do not further stratify. Was there any singular level at which lordosis correction was greater or lesser?

Reply 2:

We aim to present data on restoring spinopelvic harmony using a standard LLIF approach, in this case 8 degree cages. Although higher degrees are available, we feel our practice is in keeping with many institutions who have published their work similarly using 0-10 degree lordotic cages (1-4). Interestingly, in several series where 10 degree cages have been used there was still no statistically significant correction of global lumbar lordosis (4, 5). Furthermore, a recent study by Otsuki et al (6) found that there were no significant differences in segmental lordosis when comparing 6 to 10 degree lordotic cages directly during LLIF surgery. To the best of our knowledge only the study by Manwaring et al (5), where anterior column release allowed them to insert 30 degree lordotic cages, showed a clear radiological benefit of higher degree cages. Whether an extra 2-4 degrees would make a significant difference remains to be seen. We acknowledge that our study is unable to address this question directly given our uniform operative approach, however we have elaborated on this excellent point within our manuscript discussion.

As suggested, we have stratified the segmental lordosis at each treated level and represented it in table 3. The greatest correction was achieved at L2/3 and interestingly the least at L4/5. We have discussed this further in our results and our discussion sections of our manuscript and compared this to the available literature.

Comment 3:
The literature is now suggesting restoration of more harmonious curves (With ~2/3 of lordosis from L4-S1). Was this correction seen in these cases? In keeping with the above mentioned segmental lordosis, the absolute values would be worth reporting. If L4-5 lordosis starts at 5 degrees and corrects 7.5 degrees, this is more clinically significant that perhaps L3-4 at 7 and achieving 9.5.

Reply 3:
Please find that we have further explored the relationship of lordosis from L4-S1 following LLIF surgery and reported on the absolute values, given that as you correctly point out 2/3^{rds} of lumbar lordosis comes from these levels. Interestingly, the lumbar lordosis from L4-S1 reduced post-operatively from 32.3 degrees to 29.9 degrees ($p=0.01$), which improved slightly when L4/5 +/- L5/S1 was treated. It is therefore

possible that the benefit obtained from treating higher levels can be offset by reduced lordosis at lower levels, and this could certainly contribute to the lack of overall effect of LLIF on lumbar lordosis in our cohort. We have elaborated on this excellent point within our manuscript.

As above, we have also have included a separate table (Table 3) giving absolute values of the mean segmental lordosis at each treated level and the improvement in each level post LLIF. The benefit of treating L4/5 was less, possibly due to the difficulties obtained with access associated with this level. We have elaborated on this further within our manuscript.

Comment 4:
For the 16.7% of cases in which alignment was lost, what were the values for this, how were they worsened in terms of alignment parameters? As these were more often the longer constructs, is there a correlation with which levels were more likely to lose or achieve less lordosis than expected.

Reply 4:
Spinopelvic harmony was lost in 5/30 patients (16.7%). The operative and radiological raw data at baseline (T0) and post-operatively (T1) are listed below. We analysed these patients and could find no consistent pattern with their results that could have explained the outcome. All of these had a post-operative PI-LL mismatch that was just above what would be considered in harmony and thus, given
the low numbers, the results were felt to be due to chance rather than more than a meaningful cause. We have elaborated on this within our results section but have refrained from including a detailed analysis as we didn't feel it added much to the overall paper given how low the numbers were and the lack of a consistent pattern.

Key: T0 – pre-operative, T1- post-operative, SL – segmental lordosis, PI – pelvic incidence, LL- lumbar lordosis

Comment 5:

While the authors hint at the fact that no corrective osteotomies were performed, it is not outlined whether any posterior bony work was done (inferior facetectomies or

Pt	Levels	T0 SL L1/2	T1 SL L1/2	T0 SL L2/3	T1 SL L2/3	T0 SL L3/4	T1 SL L3/4	T0 SL L4/5	T1 SL L4/5	T0 PI	T1 PI	T0 LL	T1 LL	T0 PI-LL	T1 PI-LL
1	L1-S1	1.4	3	4	8.6	0.9	2.7	2.9	4.8	38.3	40.1	40.5	53.4	2.2	13.3
2	L2-5			3.4	3.8	3.7	4.4	2.8	3.2	43.4	42.5	37.2	30.4	6.2	12.1
3	L3-5					2.8	7.9	3.6	5.5	51.3	50.5	42.3	34.5	9	16
4	L1-4	1	7.6	4.5	7.4	4.6	8.5			49.1	47.5	53.6	58	4.5	10.5
5	L2-S1			2	4.2	1.8	4.2	9.2	9.5	52.9	52.3	49.8	40.7	3.1	11.6
Average		1.2	5.3	3.475	6	2.76	5.54	4.625	5.75	47	46.58	44.68	43.4	5	12.7

otherwise.) This should be implicitly noted in the manuscript, as this may change the surgical outcome.

Reply 5:

No posterior bony work was performed during the posterior approach. We have now implicitly specified this within our methodology section of our manuscript.

References

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