**Changes recommended by the JoVE Scientific Review Editor:**  
  
• Please take this opportunity to thoroughly proofread the manuscript to ensure that there are no spelling or grammatical errors.  
  
• Please include at least six keywords/phrases.

***Several keywords have now been added to meet the recommended number.***

• **Introduction:** Please expand your Introduction to include the following: The advantages over alternative techniques with applicable references to previous studies; Description of the context of the technique in the wider body of literature; Information that can help readers to determine if the method is appropriate for their application.

***Thank you for the helpful suggestion, the introduction has been accordingly revised to provide more context and background information to the reader***  
  
• **Protocol Language:** The JoVE protocol should be almost entirely composed of **numbered** **short steps** (2-3 related actions each) written in t**he imperative voice/tense** (as if you are telling someone how to do the technique, i.e. "Do this", "Measure that" etc.). Any text that cannot be written in the imperative tense may be added as a brief “Note” at the end of the step (please limit notes). Please re-write your **ENTIRE** protocol section accordingly. Descriptive sections of the protocol can be moved to Representative Results or Discussion. The JoVE protocol should be a set of instructions rather a report of a study. Any reporting should be moved into the representative results.

***The entire protocol has been revised to meet the standards that have been requested***

• **Protocol Detail:** Please note that your protocol will be used to generate the script for the video, and must contain everything that you would like shown in the video. There should be enough detail in each step to supplement the actions seen in the video so that viewers can easily replicate the protocol.  
  
• **Protocol Numbering:** Please add numbering to the protocol section to follow JoVE’s instructions for authors, 1. should be followed by 1.1. and then 1.1.1. if necessary and all steps should be lined up at the left margin with no indentations. There must also be a one-line space between each protocol step.

***The entire protocol has been revised to meet the standards that have been requested***  
  
• **Protocol Highlight:** After you have made all of the recommended changes to your protocol (listed above), please re-evaluate the length of your protocol section. There is a 10-page limit for the protocol text, and a 3- page limit for filmable content. If your protocol is longer than 3 pages, please highlight ~2.5 pages or less of text (which includes headings and spaces) in yellow, to identify which steps should be visualized to tell the most cohesive story of your protocol steps. Please see JoVE’s instructions for authors for more clarification. Remember that the non-highlighted protocol steps will remain in the manuscript and therefore will still be available to the reader.

***Thank you for the suggestion, the protocol length should be within the limits that have been suggested***  
  
• **Results:** We require at least some results (figures/tables) that demonstrate the success of your technique, this can be an application of your method to a specific study or general results that validate the technique. These must be fully discussed in the Representative results. The current results do not sufficiently support and validate the technique you present. **You reference Table 1 and 2 but no Tables have been provided. Please add the tables and appropriate legends.**

***Thank you for detecting this omission, we have now included the tables that were referenced. With respect to validation of our technique, there is currently limited data on how radiation exposure is reduced with use of CT-guided navigation. However, we do reference our results in comparison to historical results in our discussion.***

• **Discussion:** JoVE articles are focused on the methods and the protocol, thus the discussion should be similarly focused. Please ensure that the discussion covers the following in detail and in paragraph form: 1) modifications and troubleshooting, 2) limitations of the technique, 3) significance with respect to existing methods, 4) future applications and 5) critical steps within the protocol.

***Thank you for this comment. The discussion section has been revised***

• **Figures:** Please add scale bars.  
  
• **Table of Materials:** Please revise the table of the essential supplies, reagents, and equipment. The table should include the name, company, and catalog number of all relevant materials/software in separate columns in an xls/xlsx file. Please include items such as surgical tools, imagers, etc.  
  
• Please define all abbreviations at first use.

• Please use standard abbreviations and symbols for SI Units such as µL, mL, L, etc., and abbreviations for non-SI units such as h, min, s for time units. Please use a single space between the numerical value and unit.  
  
• If your figures and tables are original and not published previously or you have already obtained figure permissions, please ignore this comment. If you are re-using figures from a previous publication, you must obtain explicit permission to re-use the figure from the previous publisher (this can be in the form of a letter from an editor or a link to the editorial policies that allows you to re-publish the figure). Please upload the text of the re-print permission (may be copied and pasted from an email/website) as a Word document to the Editorial Manager site in the "Supplemental files (as requested by JoVE)" section. Please also cite the figure appropriately in the figure legend, i.e. "This figure has been modified from [citation]."

**Comments from Peer-Reviewers:**   
  
  
**Reviewer #1:**  
**Manuscript Summary:**  
The authors presented the method titled; Computed tomography-based image guidance for minimally invasive transforaminal interbody fusion.  
The manuscript is written in proper English and friendly format. However, several things need to be fixed before been considered for publication as a "Method".  
  
**Major Concerns:**  
I will try to respond to the requirements stated by the Journal and their relationship with the findings in this manuscript.  
Are the title and abstract appropriate for this methods article?  
" No, This suggestion is more adequate: "Cone Beam Intraoperative Computed tomography-based image guidance for minimally invasive transforaminal interbody fusion"

***Thank you for this suggestion, we have revised the title accordingly.***

Are there any other potential applications for the method/protocol the authors could discuss?  
" No, or at least NO to perform a MIS-TLIF in combination with a cone beam iCT (o-Arm) + Fluoroscopy. Without using navigated instruments

Are all the materials and equipment needed listed in the table? (Please note that any basic lab materials or equipment do not need to be listed, e.g. pipettes.)  
" NO, there are no tables in this manuscript  
" The tables are referenced inside the text but they are not available for peer review

***We apologize for this omission, the tables have now been included in the final manuscript.***

" Do you think the steps listed in the procedure would lead to the described outcome?  
" No, the steps are not listed. It's all running text.  
" If you are using the different pictures inside Figure 1 as steps then the following example should be stated E.g. Step 1. TEXT (Figure 1A)  
Are the steps listed in the procedure clearly explained?  
" No, the overall procedure is explained but the text needs to be split in "Steps"  
Are any important steps missing from the procedure?  
" Yes,  
" What is the type of cage used  
" What type of graft is used, if it is bone marrow then clarify.  
" What screw system is used

***The cage is a PEEK cage and the graft is a combination of allograft and autograft (bone marrow). Both are now in the body of the text. The screw system used is the RELINE MAS percutaneous screw; however, as this is vendor-specific, we have left it out of the text***

Are appropriate controls suggested?  
" NA

Are all the critical steps highlighted?  
" NO

***Thank you for this comment, we have revised our discussion section so the critical steps are more apparent.***

Is there any additional information that would be useful to include?  
" A brief conclusion

***We have addended our manuscript to include a brief conclusion.***

Are the anticipated results reasonable, and if so, are they useful to readers?  
" Yes,

***Thank you for this comment, we appreciate your time and thoughtful feedback.***

Are any important references missing and are the included references useful?  
" Yes, that this method does not rely on "Navigated Instruments[1]  
" This method is an intermediate step on the ladder while shifting towards a "Total Navigation" modality [2][3] and because of the previous 2 reasons fluoroscopy is still necessary.  
  
1. Shin, B.J., et al., Navigated guide tube for the placement of mini-open pedicle screws using stereotactic 3D navigation without the use of K-wires: technical note. J Neurosurg Spine, 2013. 18(2): p. 178-83.  
2. Lian, X., et al., Total 3D Airo(R) Navigation for Minimally Invasive Transforaminal Lumbar Interbody Fusion. Biomed Res Int, 2016. 2016: p. 5027340.  
3. Navarro-Ramirez, R., et al.,. World Neurosurg, 2017.

***Thank you for this comment, we have included this point and the references in the conclusion section***

Minor Concerns:  
Step wise format  
Tables missing but described on the text  
  
**Reviewer #2:**  
Manuscript Summary:  
The authors submit a retrospective case series (level IV study) of 50 patients who all underwent the same surgical procedure (MIS TLIF) using CT-based (O-arm) navigation at 1 to 3 levels in the lumbar spine. They describe process measures, including EBL, surgical time and hospital stay, as well as radiation exposure (in mGy) and radiation time (in seconds). Although navigation was used mainly for pedicle screw placement, the authors also describe using navigated probes and dilators to help with retractor placement and guiding extent of decompression to avoid damaging the pedicles.  
A strength of the paper is the very well-described surgical technique / protocol, which gives the reader a very clear idea of how the surgeries were actually performed.  
  
Major Concerns:  
A major limitation of the paper is the lack of outcomes and follow-up. Specifically, there was no mention of complications; no patient-reported outcome measures of any kind (ODI, Pain scores, etc); no radiographic alignment measures; and no assessment of fusion status. While the authors are not required to come up with all these, I would recommend adding at least one of these to their paper.

***Thank you for this comment. We appreciate that long-term follow-up and outcomes data is an important component to explaining the benefits of our technique. However, as you have also noted, that data is unavailable at this current time. Our study does include preliminary results, and we plan to follow up this technique manuscript with a future study focusing on complications. We note this as a limitation in our discussion section.***

Minor Concerns:  
- Abstract, line 31: "without any additional radiation exposure to the patient or operating room staff". Even after reading the Discussion in their paper, it would seem to me that there is only good evidence to state that using CT/O-arm based navigation leads to decreased radiation exposure to the surgical team/OR staff, because they could step away from the field/room at the time of image acquisition, but the evidence regarding the patient is still conflicting/debatable.

***This is an excellent point. However, our data showed that the overall radiation dose and fluoroscopic exposure was smaller when compared to historical reports. Thus, while the radiation exposure is not an absolute minimum, it can reasonably be concluded that exposure is reduced compared to purely fluoroscopic techniques.***

- Protocol, line 61: "A navigated high-speed drill..." I believe it is actually the drill guide that is navigated; the drill itself is not.

***We have addended the line as suggested.***

- Results, lines 99-101: May I ask the authors to explain in more detail how they acquired the radiation exposure measurements? I understand that exposure is different from radiation dose, and that the latter is harder to measure because it depends on many factors including body distance from the source, tissue thickness, etc. I am questioning the "5.2 seconds from intraoperative CT scan", as the O-arm takes 13 to 26 seconds of continuous fluoro to perform one 3D spin (depending on whether one is using low or high def mode). I believe the 5.2 seconds only represents the radiation time from the 2D (e.g. AP and lateral) images taken with the O-arm; if one wishes to add the time used on 3D spins, then one has to multiply the number of spins taken by 13 or 26 seconds.

- Lastly, it was not clear whether this was a single surgeon series, or how many surgeons were doing the cases. Please clarify.

***Thank you for this comment, it was a single-surgeon experience (senior author AC). We have included this comment in our text***