Author’s response to reviews

Title: Hip stability after total hip arthroplasty predicted by intraoperative stability test and range of motion: a cross-sectional study

Authors:

Hiromasa Tanino (tanino@asahikawa-med.ac.jp)
Tatsuya Sato (s-tatsu@zd5.so-net.ne.jp)
Yasuhiro Nishida (nishiday@asahikawa-med.ac.jp)
Ryo Mitsutake (mitutake@asahikawa-med.ac.jp)
Hiroshi Ito (itohiro@asahikawa-med.ac.jp)

Version: 3 Date: 23 Sep 2018

Author’s response to reviews:

Dear editor/reviewers

Many thanks for taking the time and suggest ways to improve our manuscript. The manuscript has been revised according to the editor and reviewers’ comments. A point-by-point reply is given below. The page and line numbers noted in the replies refer to the revised manuscript. In the following response, the editor and reviewers’ comments are shown in italics and our responses appear immediately below in normal type. We submit a clean version of revised manuscript without highlighting.

Authors' response to editor and reviewers' comments is attached as Supplementary Material, too.

Comment from Dr. Sebastian Mukka (Editor):

Q1: Reviewer nr 2 has a few queries that needs to be addressed before publications. Please follow the recommendations and make changes in the manuscript.
Reply: We thank the Editor for the kind comments. We have addressed all comments pointed by reviewers.

Comments from Dr. Volker Otten (Reviewer 2):

Q1: After the revision of the article it is now, in my opinion, ready for publication.

Reply: We thank reviewer 2 for the kind comments.

Comments from Dr. Arkan Sayed-Noor (Reviewer 3):

Q1: Is the study really prospective? If so, why considered for inclusion some patients who did not have intra-operative IR measurements.

Reply: Editor previously pointed out, ‘Please rewrite the manuscript according to the Strobe guidelines.’, as Editor’s comments to our first submission (submitted May 05). The Strobe guidelines recommend indicating the study’s design with a commonly used term in the title or the abstract. We added ‘a cross-sectional study’ in the title. According to the Strobe guidelines, investigators assess all individuals in a sample at the same point in time, often to examine the prevalence of exposure, risk factors or disease, in cross-sectional studies [1]. To clarify our study design, we added below sentence in Figure legend.

Page 15; Line 207:

‘Fig. 1 Flowchart depicting patient inclusion and exclusion in the cross-sectional study’
Q2: The study is apparently underpowered. According to Peduzzi et al 1996, each included covariate in the regression needs 10 dislocations, so the study needs many more dislocations.

Reply: Editor previously pointed out, ‘Statistics: highlighten your power calculation, include baseline data in the multivariate log reg calculation’, as Editor’s comments to our first submission (submitted May 05).

First reviewer previously pointed out, ‘Due to low risk of dislocation following THR, I have concerns for this study not being sufficiently powered. This is evident in particular when performing a logistic regression, trying to control for the difference between dislocators and non-dislocators.’, as Reviewer’s comments to our second submission (submitted July 09).

We have discussed the analyses with a statistician, and our previous reply to editor and first reviewer’s comments were below.

Jolles et al. reported a case control study to investigate the factors related with dislocation after total hip arthroplasty (THA) [2]. In their study, 21 patients with dislocation from 2023 primary THAs were matched with 21 patients without dislocation, who constituted the control group. The statistical analysis was twofold: First, a univariate analysis was performed comparing each variable in the two groups. Second, a multivariate analysis was performed using 6 variables.

In this reply, 10 patients with posterior dislocation were matched with 10 patients without dislocation trying to control for the difference between dislocators and non-dislocators, similar to Jolles et al. [2]. The patients were computer-matched by age and gender. Logistic regression analyses were performed using all eight variables; age, height, weight, gender, cerebral dysfunction, preoperative diagnosis, history of previous hip surgery, and IR angle, and using three variables (cerebral dysfunction, history of previous hip surgery, and IR angle) that were statistically significant in a chi-square test or a nonparametric Mann-Whitney U test. Any variables were not statistically significant in logistic regression analyses. We think this is due to a small number of patients included in the analyses (10 patients for each group).

We also performed logistic regression analyses with all patients except one anterior dislocation. In our previous manuscript (our first submission; submitted May 05), logistic regression was performed using the variables that were statistically significant in a chi-square test or a nonparametric Mann-Whitney U test. So, cerebral dysfunction, history of previous hip surgery,
and IR angles were used as the variables, and logistic regression analyses determined that significant risk factors were the presence of cerebral dysfunction, history of previous hip surgery, and IR angle. In the revised manuscript (from our second submission; submitted July 09 to this submission), logistic regression was performed using all eight variables; age, height, weight, gender, cerebral dysfunction, preoperative diagnosis, history of previous hip surgery, and IR angle. Logistic regression analyses determined that significant risk factors were the same as before: the presence of cerebral dysfunction, history of previous hip surgery, and IR angle. So, we think logistic regression analyses in this study are robust. And we used all eight variables and found three variables were statistically significant. So, we changed the sentence in the Results.

‘Adjusting with age, height, weight, gender, and preoperative diagnosis, we observed that significant risk factors were the presence of cerebral dysfunction (OR: 5.3 (95%CI 1.1-25.9); p=0.037), history of previous hip surgery (OR: 8.6 (95%CI 1.2-63.0); p=0.035), and IR angle (OR: 10.4 (95%CI 1.9-57.1); p=0.007).’

We also checked the number of patients and the number of the variables in other studies investigating the factors related with dislocation after THA using logistic regression analysis.

<table>
<thead>
<tr>
<th>Patients(n)</th>
<th>Hips with dislocation(n)</th>
<th>Variables in regression models(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woolson [3]</td>
<td>315(315 hips)</td>
<td>14</td>
</tr>
<tr>
<td>Jolles [2]</td>
<td>42(42 hips)</td>
<td>21</td>
</tr>
<tr>
<td>Sierra [5]</td>
<td>142(150 hips)</td>
<td>8</td>
</tr>
<tr>
<td>Krenzel [6]</td>
<td>2948(3379 hips)</td>
<td>94</td>
</tr>
<tr>
<td>Peter [7]</td>
<td>2341(2734 hips)</td>
<td>50</td>
</tr>
<tr>
<td>Fujishiro [8]</td>
<td>1294(1555 hips)</td>
<td>50</td>
</tr>
<tr>
<td>Danoff [9]</td>
<td>- (1289 hips)</td>
<td>42</td>
</tr>
<tr>
<td>Yoshimoto [10]</td>
<td>162(178 hips)</td>
<td>16</td>
</tr>
</tbody>
</table>
Although several studies included large number of patients, the number of patients with dislocation and without dislocation, and the number of variables in our study seem to be similar to several studies.

From above consideration, we thought our analyses and manuscript revised according to editor and reviewer’s comments were reasonable.

We think reviewer’s comment ‘According to Peduzzi et al 1996, each included covariate in the regression needs 10 dislocations, so the study needs many more dislocations.’ is important. In this revised manuscript, we added below sentences as a limitation in the Discussion.

Page 14; Line 182-187:

‘The fourth limitation is related to the number of dislocations and the number of the variables in this study. Peduzzi et al. reported the validity of the logistic model became problematic when the ratio of the numbers of events per variable analysed became small [26]. We performed logistic regression using three variables that were statistically significant in a chi-square test or a nonparametric Mann-Whitney U test, and using all eight variables. Logistic regression analyses determined that significant risk factors were same in both analyses; the presence of cerebral dysfunction, history of previous hip surgery, and IR angle. So, we think logistic regression analyses in this study are robust.’

Q3: The authors need to mention how they chose the covariates included in the regression, e.g. as priori selection or another method.

Reply: In our manuscript except in our first submission, all variables were used in logistic regression. Details are described in reply to Q2.

Q4: The authors should remove their statement about the intraobserver reproducibility (3 patients !!!).
Reply: Second reviewer previously pointed out, ‘At first the measurement of internal rotation itself. In the M&M section it is stated that internal rotation was measured "similar to Sultan et al" and even in the article that the text is referring to the description of the measurement is relatively vague. Measurement of internal rotation as described can be challenging. Did the authors perform any double examination of the measurements to determine the repeatability of this test or any accuracy test? If so for this study or in any earlier study, this should be mentioned otherwise this should be discussed in the discussion section.’, as Reviewer’s comments to our second submission (submitted July 09). Our previous reply to second reviewer’s comment was below.

We investigated the repeatability of IR angle measurements. During surgery, we measured the IR angle three times in three patients.

<table>
<thead>
<tr>
<th>Patient</th>
<th>IR angle (degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First</td>
</tr>
<tr>
<td>1</td>
<td>65</td>
</tr>
<tr>
<td>2</td>
<td>71</td>
</tr>
<tr>
<td>3</td>
<td>63</td>
</tr>
</tbody>
</table>

The intraobserver reproducibility was calculated using interclass correlation coefficient (ICC). Because the measurements of IR angle in this study were done by the single surgeon and the same assistant surgeon, the interobserver reliability was not investigated. The intraobserver reproducibility was excellent with 0.975 (95%CI 0.822-0.999). We added below sentences in the Discussion.

‘To investigate the repeatability of IR angle measurements, the IR angle was measured three times in three patients during surgery. The intraobserver reproducibility was calculated using interclass correlation coefficient. The intraobserver reproducibility was excellent with 1.0 (95%CI 0.8-1.0). Because the measurements of IR angle in this study were done by the single surgeon and the same assistant surgeon, the interobserver reliability was not investigated.’

In this revised manuscript, we added below sentence in the Discussion to clarify the statement.
‘And the repeatability of IR angle measurements and accuracy test have not been reported.’

Q5: Mixing different diagnoses e.g. FNF, osteonecrosis, RA beside the major group of primary OA limits the validity of the study results.

Reply: As reviewer pointed out, preoperative diagnosis might affect the dislocation rate and the ROM. In this study, there was no significant relationship between the class of diagnosis and the rate of dislocation (p=0.419). And mean IR angles were similar for hips with osteoarthritis and hips with osteonecrosis of the femoral head, rheumatoid arthritis, and femoral neck fracture (69.2° vs 68.3°: p=0.704).

References:


