Author’s response to reviews

Title: Preoperative radiographic and clinical factors associated with postoperative floating of the lesser toes after resection arthroplasty for rheumatoid forefoot deformity

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Version: 2 Date: 07 Sep 2018

Author’s response to reviews:

Reviewer 1 Comments for the Author...

Makoto Hirao (Reviewer 1): Authors claimed in this paper that postoperative dislocation of lesser toes MTP joints are relies on great toe condition. That is thought to important point, however there are some issues that should be clearly addressed.

[Advice #1]

Table 1: I think this table is not required in the paper. That is completely same as reference 17. Please erase that.

[Reply to #1]

Thank you for your suggestion. We omitted Table 1 as the reviewer pointed out.

[Advice #2]

Great toe condition: This explanation includes many factors. How about the sesamoid dislocation? Hardy classification? How about the 1st MTP joint destruction? Larsen Grade? How about the postoperative (after arthrodesis) HV angle of 1st toe? These factors also should be discussed in the study.

[Reply to #2]
Thank you for your suggestion. We added information about preoperative sesamoid dislocation, Larsen grade and postoperative HVA. Additional data revealed that postoperative HVA was significantly worse in the recurrent-floating group than in the non-floating group in the medial column. This is an important finding that supports our consideration that hallux valgus deformity is a risk factor of recurrent-floating of the medial column. We added these results and this point into the results and discussion section (Line 130 – 134, 183-184, 216-219).

[Advice #3]

DISCUSSION: P9 Line 2176-219. Authors suggested the hypothesis for the relationship between RA disease activity and the severity of HV deformity. How about the association/correlation between preoperative and/or postoperative DAS28-scores and preoperative HV angle, Larsen grade of 1st MTP joint, and Hardy grade?

[Reply to #3]

Thank you for your comment. We added information about preoperative sesamoid dislocation, Larsen grade of the first MTP joint, and postoperative HVA. Regarding the postoperative DAS28-CRP score, we could not achieve most of them. The evaluation of preoperative DAS-CRP reflects disease activity; however, ideally it would be desirable to consider the evaluation of postoperative DAS-CRP as the reviewer pointed out. Relating to this point, we have added into the limitation section (Line 246-249). Additional data including sesamoid dislocation, Larsen grade, and postoperative HVA are added. We added this point into the discussion section (Line 130 – 134, 183-184, 216-219).

[Advice #4]

DISCUSSION: What is the strategy for the results against the instability of lesser toe MTP joint after the surgery? Preservation of metatarsal head by means of the mass effect of the metatarsal head? Some shrinkage methods for the loose soft tissue around the lesser toe MTP joint/capsule? Please explain that. It is very interesting.

[Reply to #4]

Thank you for your suggestion. The excision or prolongation of the extensor tendon was performed depending on their contracture; however, treatment of other soft tissues was never performed. We speculate that re-floating occurred because the amount of bone resection was relatively small compared to the soft tissue contracture. During surgery, the metatarsal heads of the lesser rays were resected at the anatomic neck of the involved metatarsal. Hence, we believe that in the future it is necessary to define the amount of bone shortening according to the degree of preoperative dislocation. We added this point into the discussion section (Line 212 – 215).

Kade L Paterson, PhD, BPod, BAppSci(Hons) (Reviewer 2): **Please note that I am submitting this reviewer's report on behalf of an external reviewer who requested to remain anonymous**
Comment to authors

BMSD-D-17-01347R1

The paper provides a lot of tables and statistics, but I found very little useful or novel information. Moreover, I found some leaps of logic. This made me to consider the manuscript unacceptable, and I will recommend to resubmit it after addressing the suggestions below.

The critical points to address are:

[Advice #1]

1) The authors concluded that pain is a risk factor for recurrent dislocation of the lesser toes. How could they derive this conclusion without providing any information about pain in results? The results they got was just the significant difference of JSSF hallux scale, which is not equal to the significant difference of pain scale.

[Reply to #1]

Thank you for your suggestion. As pointed out by the reviewer, JSSF hallux scale consists of pain (40 points), function (45 points), and alignment (15 points). Following the reviewer's comment, we added a function to the abstract and conclusion (Line 49 and Line 253).

[Advice #2]

2) The authors used the term "recurrent dislocation of the lesser toes"; however, I think it as misuse of words. As the authors referred in methods section, we cannot judge dislocation in the resected joints. The authors defined the dislocation of MTP joint as non-grounded toes while weight-bearing. This condition is a "floating toe" but not a dislocation. I will recommend to choose the right word.

[Reply to #2]

Thank you for your suggestion. “Dislocation” seems to confuse the reader, as the reviewer pointed out. We replace the word “recurrent dislocation” to “recurrent floating” and “non-dislocation” to “non-floating”.

[Advice #3]

3) Line 183-184: How did the authors can lead the conclusion that the recurrent dislocation group had more severe "deformity" preoperatively than non-dislocated group? The significant difference in JSSF hallux scale is not equal to the significant difference of "deformity", isn't it?
Thank you for your suggestion. We changed this sentence as below (Line 186-188),

In the lateral lesser toes, preoperative JSSF hallux scale scores in the recurrent floating group was significantly lower than that in the non-floating group (31.7 vs. 44.2, p < 0.04)

4) Line 189-190: In this part, the authors lead the conclusion of the significant difference of "pain" from the significant difference in JSSF hallux scale in contradiction to Line 183-184. I will suggest to provide the breakdown of the each subscale of the JSSF scale.

Thank you for your suggestion. As pointed out by the reviewer, we concluded that the difference in deformity cannot be discussed only in relation to the difference of JSSF hallux scores. On the other hand, the JSSF scale consists mainly of pain, function, and deformity and there is no significant difference in deformity (HVA). Hence, we concluded that the difference in pain and function was involved with the risk of recurrent-floating on the lateral toes. Regarding the subscale, since cases in which only the total score was recorded and included in this study, it is considered inappropriate to describe accurate values.

5) Line 210-211: How could the authors conclude that adequate bone resection is required to avoid recurrent MTP joint dislocation from the result of no significant correlation between bone resection length and recurrent MTP dislocation? More careful logic flow is required.

Thank you for your suggestion. In the present study, there was no significant difference in the amount of osteotomy; whereas the severity of dislocation of the preoperative MTP joint was the risk factor. We speculate that it may be caused by determining the bone cutting amount, without considering the preoperative severity of dislocation of the MTP joint or contracture of the soft tissue. Hence, additional bone resection according to the soft tissue condition or the plantar soft tissue release is required to avoid recurrent floating toes in patients with severe preoperative dislocation of lesser MTP joints. We added this point into the discussion section (Line 212 – 215).
6) Line 223-224: The authors did not provide any information about the range of motion of first MTP joint before surgery in the result section; therefore, this part is not acceptable as discussion.

[Reply to #6]

Thank you for calling this to our attention. Although we provided the preoperative total arc of first MTP joint in table 1 (23.9 vs 26.3 p=0.35), we overlooked the need to describe it in the result section. Hence, we have now added it thereto. (Line 167-170).

[Advice #7]

7) Line 228-231: Why is it reasonable to suppose that preoperative hallux pain result in shifting the center of pressure laterally in the postoperative status? Did not pain go away after arthrodesis? It is partially acceptable if you could provide the correlation between postoperative hallux pain scale and recurrent dislocation of the lateral lesser toes, but too much gap in logic to accept as it now stands.

[Reply to #7]

Thank you for your comment. As pointed out by the reviewer, since the pain in the first MTP joint decreased after surgery, the center of pressure should be medialized. However, based on our results, we speculated that the preoperative gait which is the external load possibly due to the pain or dysfunction in the great toe has exacerbated the degree of dislocation of the lateral MTP joints, which in turn causes recurrent-floating. We added this point into the discussion section (Line 236 to 239)

Additional Questions or comments:

[Advice #8]

1) The authors should add the information of MTP arthrodesis of the great toe in the title of the manuscript and abstract, otherwise the readers will mistakenly perceive this manuscript as one regarding resection arthroplasty of all 5 metatarsal heads

[Reply to #8]

Thank you for your suggestion. As noted by the reviewer, our description may cause misunderstandings to readers. Accordingly, the description of the title and the abstract was corrected (Line 2 and line32-33).
2) Statistics: Which statistical method was used for analysis of patients' demographics? Mann-Whitney U test or unpaired t-test?

[Reply to #9]

Thank you for your comment. Our description seems to be difficult to understand as the reviewer has pointed out. For continuous variables we firstly tested normality and then used the Unpaired t-test or the Mann-Whitney U test. We simplified the statistic statement as follows (Line 160–163).

Differences between non-floating and recurrent-floating were analyzed by applying the unpaired t-test or the Mann-Whitney U test for continuous variables. The chi-square test or Fisher’s exact probability test for categorical variables were considered significant for values of p < 0.05.

[Advice #10]

3) Statistics: Unpaired t-test is not appropriate for analysis of ordered scale such as preoperative dislocation grade.

[Reply to #10]

Thank you for your comment. Regarding preoperative dislocation grade, we have divided that into two groups (grade 0-2 and grade 3) and then the chi-square test has been used for this categorical variable.