Author’s response to reviews

Title: The Correlation between 2D Femoral Notch Parameters and 3D Notch Volume: a Retrospective MRI Study

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Author’s response to reviews:

Dear Editors and Reviewers:

Thank you for your letter and for the reviewers’ comments concerning our manuscript entitled “The Correlation between 2D Femoral Notch Parameters and 3D Notch Volume: a Retrospective MRI Study” (ID: BMSD-D-19-00200). Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied comments carefully and have made correction which we hope meet with approval. Revised portion are marked in red in the paper. The point to point responds to the reviewer’s comments are listed as following:

Asbjørn Årøen, PhD,MD (Reviewer 1):
1. Previous research has stated that wider notch is associate with a larger ACL a presumably stronger one. A Japanese study has as conclusion that the finding might only be relevant to Japanese knees and this is problematic in the current study also as only one racial group is included. However, in the paragraph of limitations this is not listed.
Response: Thank you for your instructive suggestions. Yes, although many studies have concluded that the narrow notch is a risk factor for ACL injury, and even some previous researches suggested that stenotic notch was probably associated with a fragile ACL, due to the objective existence of anatomical differences in human races[1, 2], some of the research results may only apply to certain ethnic groups.
Whether the results are established in all human beings needs further verification. For example, Japanese scholars found that greater BMI and hip abductor muscle strength were independent risk factors for noncontact ACL injuries in female Japanese high school basketball players[3]. However, there is still a lack of relevant research in other races. And it is not certain whether it applies to other races.

In addition, we need to explain that Han Chinese account for more than 90% of the Chinese population and can represent most of China.

Based on your suggestion, we have supplemented the limitations of only a single racial group included in the paragraph of limitation as follow:

Third, our research only involved the Han Chinese, which account for more than 90% of the Chinese population. Since the anatomical differences of the human species exist objectively, whether the results are established in all human beings needs further verification. Due to the lack of large-scale epidemiological data of ACL injury on the Chinese population, our research is a supplement to Chinese data.

2. I am also missing some basic data as the risk of ACL injury in the Chinese population; this is of particular interest for the interpretation of these findings more general in ACL injury prevention.

Response: We are so sorry that the large-scale epidemiological data on ACL injury in China is still missing. But there are existing studies on the incidence of ACL injury in Chinese athletes (Chinese reports only, no English reports). The results of 6810 athletes showed that the rate of ACL injury in Chinese athletes was 0.47%[4], including 0.71% for females and 0.30% for males[5]. The difference of the rate between males and females was statistically significant.

In addition, there are some studies on the risk factors of ACL injury in Chinese people[6-10]. Currently we suggest that the small NW or NWI, the stenotic notch volume, and excessive PTS are risk factors.

3. Unfortunately, I am not able to find any reports on individuals with bilaterally injury. This might be the best group to study such predictors as notch dimensions.

Response: Thank you very much for your valuable and thoughtful comments.

Yes, the bilateral ACL injury group is indeed the best for studying risk factors and predictors. However, at present, the relevant literature I can find is very limited, only 2 articles[11, 12]. At the same time, unfortunately, our study was unable to include the group of patients with bilateral ACL injuries because the number of the patients with bilateral ACL injuries in our hospital was extremely small.

The reasons for the small number of patients with bilateral ACL injury include:

1. The probability of simultaneous bilateral ACL injury is very low, and the number of patients is very small originally.
2. For non-simultaneous bilateral ACL injuries, the number of Chinese patients is also very small. This may be related to the Chinese rehabilitation concept. The Chinese believe that sports should be avoided as much as possible after the injury. Most patients no longer exercise vigorously, so the probability of contralateral ACL injury is even lower.

Harukazu Tohyama, M.D., Ph.D. (Reviewer 2):

Abstract
Line 88: The "useful predictors of the risk of ACL injuries" is too subjective. The authors should change it to a more objective word, such as a "predictable parameters to the risk of ACL injuries".

Response: Thank you very much for detailed reading and instructive suggestion. We replace the word “useful” with the word “predictable” according to your opinion.

Background
Line 116-: "Most studies[12-14], with the exception of one[9], have come to the conclusion that a
smaller notch volume indicates a higher risk of ACL injury." Should be "Most studies, with the exception of one [9], have come to the conclusion that a smaller notch volume indicates a higher risk of ACL injury [12-14]."

Response: Thank you for your careful reading of our manuscript. We exchanged the position of the digital superscript based on your opinion. The number of the references has changed (from [12-14] to [8, 10, 11, 15]) because we have added some new references.

Methods
Line 138-: "We recruited only adults aged 18-40 years old for the femoral intercondylar notch measurements in this study." How the authors selected 60 males and 60 females with ACL injuries among all patients who had undergone MRI examination in the authors' hospital from June 2015 to July 2016?
Response: Thank you for your valuable advice. In order to illustrate the process of patient selection more clearly, we have added a flow chart into the article (Figure 1).
We obtained 4012 knee MRIs for non-contact sport related injury in our hospital from June 2015 to July 2016, according to the enrollment criteria (full-thickness injured ACLs) and exclusion criteria (1. Age<18 or >40, 2. Knee injury over 1 year, 3. Multiple ligament injury, 4. Knee surgery history 5. Degenerative knee diseases, 6. Without arthroscopic confirmation, 7. Other ligamentous diseases), we obtained 896 MRI images of full-thickness injured ACLs, including 485 males and 411 females. In male ACL-injured group, 60 were randomly selected for study by the computer programming. The same was done in the female ACL-injured group.

Line 138-: "All participants were newly diagnosed in our hospital from June 2015 to July 2016." How many patients with a non-contact ACL injury underwent MRI examination in the authors' hospital from June 2015 to July 2016?
Response: Thank you for your careful reading of our manuscript. We have added a flow chart into the article (Figure 1) according to your opinion. Our hospital had a total of 4012 patients for non-contact sport related injury from June 2015 to July 2016.

Line 148-: "We obtained 120 case-control pairs of individuals (60 males and 60 females) who were matched for gender and age." How the authors selected
Response: Thank you very much. We have added a flow chart into the article (Figure 1) to show the process of patient selection based on your valuable suggestion. The selection was done by our computer programming.

Line 149-: "The demographic data (age, body height, and weight) were recorded. All of the ACL-injured patients suffered first-time, sport-related, non-contact ACL injuries within one year." Were there any patients with episodes of ACL injuries in bilateral knees in these patients?
Response: Thank you for your detailed reading of our manuscript. We reviewed the data of all the ACL-injured patients in the study, and there was no patients with bilateral ACL injury. And we have added a note to the article.

Results
Line 197-: "The demographic data (age, height and weight), NW, NWI and notch volumes of the participants are displayed in Table 1, which includes the statistical results for the overall data and the subgroup data of the ACL-injured males, ACL-intact males, ACL-injured females and ACL-intact females." Please add the information about the time of participation in physical and sports activities, if it is possible.
Response: Thank you very much for your valuable advice. We reviewed the clinical history of all the
patients in the study and calculated the time from ACL injury to MRI taken. The results are added in Table 1.

Discussion
Please briefly discuss advantages and disadvantages of femoral notch 2-D parameters and the 3D notch volume.
Response: Thank you for your valuable advice. We have add the advantages and disadvantages of femoral notch 2-D parameters and the 3D notch volume in the discussion part as follow:
Due to the convenience of measurement, 2D femoral notch parameters are the most widely used parameters. However, they only represent the size at one location of the notch and cannot adequately reflect the overall dimension [9], therefore, the measurement results may be biased. The 3D notch volume has advantages to describe the dimension of the femoral notch through 3D measurement. However, due to the higher technical threshold and the more tedious measurement, the application is limited.

Table 1: The authors should statistically compare these demographic data and notch data between ACL-injury and control subjects in overall participants as well as subgroups.
Response: Thank you for your detailed reading of our manuscript. We conducted further statistics on the data of the ACL-injury group and the control group, and the results were added in Table 1.

Reference