Response to Opponent's Questions on the PhD thesis "Gait analysis and musculoskeletal modeling used in athletes recovery from Achilles tendon rupture"

Dear Dr. Gábor Katona

Thank you for your report, the questions offered by you were immensely helpful, and I appreciate your insightful questions on this thesis. I have included the questions immediately after this letter and responded to them individually, indicating exactly how I addressed each question and describing the answers have made.

Signature: Sun Dong

Ph.D. Candidate
SUN Dong
Doctoral School of Chemical Engineering and Material Sciences
Faculty of Engineering
University of Pannonia
Egyetem u. 10, 8200, Veszprém, Hungary.
Email: nbsundong@gmail.com
Mobil: +36 70 358 9723

Response to the Questions

Question:

1. My first question is how does the author select the three points in the plantar?

Answer:

The center of pressure line under the plantar is consists of pressure center points during the stance phase, the first point is the moment when the foot strikes the ground, the third point is the moment when toe-off. The middle point is when the foot flat the ground, the middle between the first and the third points. The selection of the three mark point in the center of pressure line is cited from two previous studies, please see below:

Mei, Q., Feng, N., Ren, X., Lake, M., & Gu, Y. (2015). Foot Loading patterns with different unstable soles structure. Journal of mechanics in medicine and biology, 15(01), 1550014.

Fu, F., Zhang, Y., Shao, S., Ren, J., Lake, M., & Gu, Y. (2016). Comparison of center of pressure trajectory characteristics in table tennis during topspin forehand loop between superior and intermediate players. International Journal of Sports Science & Coaching, 11(4), 559-565.

Question:

2. My second question is what is the implications of the distance differences between the injured and uninjured side?

Answer:

In the second thesis point, I found the rupture-repaired Achilles tendon will act as a compensator and it causes increased knee joint loading on the injured side. The increased knee adduction moment (walking: peak 27%, average difference 19%; jogging: peak 45%, average difference 26%; running: peak 24%, average difference 13%) accompanied with higher knee joint reaction forces (walking: peak 30%, average difference 14%; jogging: peak 34%, average difference 15%; running: peak 24%, average difference 3%) in the injured side will likely cause the accelerated onset of knee osteoarthritis2 due to the uneven (medially shifted) loading. The computational results are supported by experimentally obtained data, which shows that during different movements the trajectory of the center of pressure will laterally translate. In the third thesis point, I find the distance between the midpoint and the medial in the injured side is significantly longer than the uninjured side, thus it can be assumed that the injured foot is more inverted during the stance phase, which may increase the injury risk of the ankle lateral sprain.