Reviewer's report

Title: Contributions of biarticular myogenic components to limitation of range of motion after immobilization of the rat knee joint

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Reviewer: Guy Trudel

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Summary:
This study immobilized in flexion 5 200g rat knees per group with 3 normal controls for durations of 1, 2, 4, 8 and 16 weeks using an external fixator at proximal tibia and mid-femur. Range of motion was measured with a 0.49Nm force with limbs intact, removing thigh muscles and removing thigh and leg muscles. N=4 experimental animal were assessed for muscle CSA. Their main conclusions are that posterior thigh muscles restrict motion more than posterior leg muscles and that hamstring muscle CSA is decreased after 16 weeks. But there is no relationship between the two.

However, the results are interesting especially the proportion of myogenic restriction from post thigh and post leg muscles. Paper is overall difficult to read, links are being made between unrelated topics which distracts from the main message and discussion is not focussed on the results of this investigation.

Major Compulsory Revisions:
Interesting question and proper study design. How do the authors explain that 80% of the contracture is myogenic within the first 4 weeks yet muscle CSA was maintained. What is the relationship between myogenic contractures and muscle CSA? That is the second objective of the study and not completely addressed. Maybe just admit that the two appear unrelated.

Gastrocnemius does not “consist almost entirely of fast-twitch fibers.”

Tension on the strings does not provide torque; was direction of pull changed as ROM progressed?

Always detaching the UL muscles first introduces a systematic bias to be mentioned in the limitations. Randomly detaching LL and UL would be a better study design.

P11 Line 11. Why is there a myogenic restriction in sham-operated? This is inconsistent with the authors own definitions P8 lines 3-4.

This claim is unfounded: “This means that the volumes and CSAs of the UL (including the hamstrings) were larger than those of the LL (including the gastrocnemius), suggesting that heavier muscles with larger myofiber CSAs are more susceptible to increases the arrangement of collagen fibers in their
connective tissues.”

This claim is speculative: “The different contributions of the UL and LL may also stem from their different lever arms, defined as the distance between the point at which a force is applied and the axis.”

This claim is speculative: “This suggests that we must consider the influences of changes not only in the muscle fascicle, myofibril CSAs, and collagen fiber content but also in the muscle-tendon complex on joint extensibility after contracture.”

The result in the abstract that: “The myofiber CSAs was significantly lower 16 weeks post-surgery than 1 week post-surgery only in the hamstrings.” is incorrect. Table 3 shows the CSA to increase from 2645 to 1921.

Minor Essential Revisions:
UL and LL is confusing; clinically refers to upper limb and lower limb and UL is incorrect because leg is from knee to ankle. Suggests post thigh and post leg.
Sample size calculation missing.
K-wire and cerclage does not prevent motion in flexion.
Details of ROM testing not available in this manuscript.
Multiple typos p11 line 2: title
Table 1: Arthrogenic
Table 3: date
Widespread grammatical and syntactic errors.
The meaning of some sentences is unclear: “Especially the hamstrings and gastrocnemius, which are often used as an object of approach to knee joint contracture [2,22-24].
Others are right out incorrect: “They consist almost entirely of fast-twitch fibers [25,26].
Figure 6 is incomprehensible: error bars missing, twice % sign in Y1 axis, knee CSA does not exist, only CSA of muscles exist.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Not suitable for publication unless extensively edited

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:
'I declare that I have no competing interests'