Učinki ponavljajočega se pasivnega posteroanteriornega obremenjevanja kolena na anteriorno laksnost kolenskega sklepa

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Uvod: Ob poškodbi sprednje križne vezi se poveča anteriorna laksnost kolenskega sklepa. Povečana anteriorna laksnost kolena lahko povzroči kolensko disfunkcijo. Trenutno strokovno prepričanje je, da se lahko povečana laksnost kolenskega sklepa popravi le s kirurškim posegom. Zadnje raziskave (Barcellona et al., 2014; Morrissey et al., 2009) kažejo, da se povečana laksnost kolena lahko zmanjša z ustreznim obremenjevanjem kolena, zato je namen raziskave ugotoviti, ali ponavljajoče se pasivno posteroanteriorno obremenjevanje nepoškodovanega kolena lahko zmanjša njegovo laksnost. **Metode:** V randomizirani raziskavi je sodelovalo 22 mladih, nepoškodovanih preiskovank. Preiskovanke so bile razvrščene v dve skupini: skupina z visoko in skupina z nizko obremenitvijo. Vadba je potekala 12 tednov in se je izvajala le na enem kolenu, ki je bilo izbrano naključno, medtem ko je drugo koleno služilo kot kontrolno. Fizioterapevtke so manualno izvajale obremenitev v smeri anteriorne translacije golenice, pri fleksiji kolena 20°. Obremenitev je bila aplicirana s pomočjo ročnega dinamometra (NexGen Ergonomics Inc, Pointe Claire, Quebec, Canada), pripetega na usnjeno pasjo ovratnico okoli proksimalnega dela golenice. Obe skupini sta prejeli 4 sete po 10 ponovitev anteriorne translacije golenice, pri čemer je bila za skupino z nizko obremenitvijo uporabljena sila 10 kg, za skupino z visoko obremenitvijo pa 17 kg. Pred trimesečnim pasivnim obremenjevanjem kolena, med in po njem so bile izvedene meritve anteriorne laksnosti kolena z GeNouRoB (GNRB®) kolenskim artrometrom (GENOUROB SAS, Monenay, Francija). **Rezultati:** Pasivno obremenjevanje kolena ni pomembno vplivalo na anteriorno laksnost kolenskega sklepa ($p = 0.48$ pri sili 134N in 0.78 pri sili 250N). 95% interval zaupanja je bil [−1.09, 0.51] pri sili 134N in [−1.13, 0.85] pri sili 250N. Med skupinama ni bilo statistično pomembnih razlik pri začetnem testiranju ($p = 0.50$ in 0.76), a se je anteriorna laksnost kolena statistično značilno povečala pri obeh silah ($p = 0.001$ pri sili 134N in $p = 0.006$ pri sili 250N). V povprečju se je anteriorna laksnost povečala za približno 1 mm pri obeh silah (95% IZ [0.40, 1.54] pri sili 134N in [0.32, 1.73] pri sili 250N). Razlika ni klinično pomembna (Vauhnik et al., 20013). **Zaključki:** Pasivno obremenjevanje kolena ni pomembno vplivalo na anteriorno laksnost kolenskega sklepa. Potrebne so dodatne raziskave, da bi ugotovili, ali ima pasivno obremenjevanje kolena vpliv na anteriorno laksnost kolenskega sklepa, ob upoštevanju intenzivnosti in trajanja obremenjevanja.

Ključne besede: sprednja križna vez, sila, artrometer, manualna terapija.

Effect of repeated knee posteroanterior passive loading on knee anterior laxity

Background: Increased knee anterior laxity results when the anterior cruciate ligament is injured. This increased laxity can cause knee dysfunction. Until recently this laxity was believed to be only diminished through surgery, but recent findings (Barcellona et al., 2014; Morrissey et al., 2009) indicate that knee anterior laxity may be decreased with proper, repeated loading of the knee. The purpose of this study was to test the hypothesis that regular passive loading of the uninjured knee would enhance its stiffness. **Study design:** Randomized controlled trial. **Methods:** Twenty two subjects were recruited for this study and attended the pre-training test. Only females with no prior history of knee injury were included. Subjects were randomly assigned to one of two groups: high or low load groups. Only one knee was treated with the other acting as a control and the leg chosen for treatment was randomly determined. Physiotherapists manually applied anterior directed loads to the proximal tibia while using the other hand to stabilize the femur in a fashion similar to the Lachman test with the knee flexed to approximately 20°. These loads were applied via a hand-held dynamometer (NexGen Ergonomics Inc, Pointe Claire, Quebec, Canada) attached to a leather dog collar secured around the proximal tibia. Both groups received 4 sets of 10 repetitions of loading in each treatment session with the loads used either 10 kg (low load group) or 17 kg (high load group). Knee anterior laxity was tested using a GeNouRoB (GNRB®) knee arthrometer (GENOUROB SAS, Monenay, Francija) before, during and after a 3-month of training period. **Results:** The passive anterior loading of the knee does not seem to have any effect on knee anterior laxity ($p = 0.48$ and 0.78 for forces 134N and 250N, respectively). The 95% confidence interval for the effect of passive anterior loading is [−1.09, 0.51] and [−1.13, 0.85] for forces 134N and 250N, respectively. There was no difference between the randomized groups at baseline ($p = 0.50$ and 0.76), but the knee anterior laxity did significantly increase in time in all cases ($p = 0.001$ and $p = 0.006$, for forces 134N and 250N, respectively). On average the knee anterior laxity increased for approximately 1 mm in both analyses considered (95% CI [0.40, 1.54] and [0.32, 1.73] for forces 134N and 250N, respectively). However, the increase is not clinical important (Vauhnik et al., 2013). **Conclusions:** Knee anterior laxity was not affected by the load training. Additional research is required to evaluate this treatment further with future work modified in terms of training intensity and duration.

Key words: anterior cruciate ligament, force, arthrometry, manual therapy.

Literatura/References:

1. Barcellona MG, Morrissey MC, Milligan P, Johnson M, Amis AA (2014). The effect of knee extensor open kinetic chain resistance training in the ACL-injured knee. Knee Surg Sports Traum Arthrosc; Jun 17 (Epub ahead of print).
2. Morrissey MC, Perry MC, King JB (2009). Is knee laxity change after anterior cruciate ligament injury and surgery related to knee extensor training load? Am J Phys Med Rehabil 88: 369–75.
3. Vauhnik R, Pohar Perme M, Barcellona MG, Rugelj D, Morrissey MC, Sevšek F (2013). Robotic knee laxity testing: Reliability and normative data. Knee; 20: 250–5.