

Endurance performance of the Swiss ice hockey national team from 2004 - 2009: a longitudinal comparison

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Introduction: The Swiss ice hockey national team performed tests on cycle ergometer to establish the development of the endurance capacity of the players. The tests were performed from 2004 to 2009 on June (A: start of the practice period) and on October (B: start of the competition period). **Methods:** A total of 86 ice hockey players performed a stage test on cycle ergometer according to the Swiss Olympic protocol. The maximal relative power output in watt per kilogram bodyweight (W/kg) of the players was analyzed. **Results:** The results reveal an annual improvement of the maximal relative power output from June to October. In 2004 (A: 3.6 ± 0.3 W/kg; B: 3.9 ± 0.3 W/kg), 2005 (A: 3.8 ± 0.4 W/kg; B: 4.1 ± 0.3 W/kg) and 2006 (A: 3.8 ± 0.4 W/kg; B: 4.0 ± 0.4 W/kg) the differences between point of time A and B were highly significant ($p < 0.001$). In 2008 (A: 3.6 ± 0.2 W/kg; B: 3.9 ± 0.4 W/kg) the differences between point of time A and B was significant ($p < 0.05$). In 2007 (A: 3.9 ± 0.3 W/kg; B: 4.0 ± 0.4 W/kg) and 2009 (A: 3.7 ± 0.3 W/kg; B: 3.8 ± 0.5 W/kg) we could also observe a difference between point of time A and B, but without significance. Further, regression analysis of point of time A ($r = 0.72$) from 2004 to 2009 showed a trend of endurance capacity improvement. On the other hand, regression analysis of point of time B ($r = 0.56$) from 2004 to 2009 showed a greater scattering of the endurance performance with no apparent improvement.

Conclusion: The annual improvement of maximal relative power output from June to October enables us to conclude that the endurance workouts of the players were successful. Further, the present results demonstrate also a clear improvement of the endurance capacities of the players from 2004 to 2009 at the start of the practice period (A) but not at the beginning of the competition period (B). This might be due to the fact that the physiological capacities of the players were higher at the start of a season which makes it more difficult to achieve an additional improvement.

References: 1) Ecker M. et al. Schweiz Z Sportmed Sporttraumatol 2007; 55 (3): 112.

2) Gschwend M. et al. Schweiz Z Sportmed Sporttraumatol 2007; 55 (3): 112.

3) Leicht C. et al. Schweiz Z Sportmed Sporttraumatol 2007; 55 (3): 112.

4) Montgomery DL et al. Appl Physiol Nutr Metab. 2006 Jun;31(3):181-5.

Outcomes of Extracorporeal Shock Wave Therapy (ESWT) treatment on patients with chronic plantar fasciitis

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Introduction: Chronic plantar fasciitis is a frequent and painful pathology of the heel. Predominantly, anatomic and biomechanical factors are responsible for the development of chronic plantar fasciitis. The treatment is often frustrating though several treatment options are available, demonstrating different levels of efficacy. The present article investigates in the effect of extracorporeal shock wave therapy (ESWT) as a therapy method on patients with chronic plantar fasciitis.

Methods: 67 (35 female) successional patients with chronic plantar fasciitis and several former treatments (Physiotherapy, Insoles, NSAR Medication, Cortisol-Injection) obtained an ESWT treatment. Patients were evaluated retrospectively on the basis of the numeric rating scale (NRS, range: 0 = no pain, 10 = maximum pain) measured prior the therapy start (time A), after the last therapy session (time B) and 6 weeks after the last therapy session (time C). Age, gender, bilateral symmetry, previous cortisol therapy and duration of symptoms were assessed as additional factors to measure their influence on the outcome of the ESWT.

Results: The main result demonstrates significant improvement of NRS pain scores between points of time A, B and C (A= 6.48 B= 3.97 C= 2.81; $p < 0.001$). Younger patients were significantly more affected with bilateral chronic plantar fasciitis, whereas older patients suffered more often on either the left or right heel ($p < 0.05$). Further, the analysis reveals that individuals with one-sided plantar fasciitis have better outcome regarding to the NRS scores than individuals with bilaterally plantar fasciitis ($p < 0.05$). In line with the results of Chuckpaiwong B. et al. (2009), the present study could not find any influence of cortisol therapy, duration of symptoms and gender on NRS outcome. A linear regression analysis revealed that the NRS scores from point of time B significantly predicted NRS scores of point of time C ($p < 0.001$).

Conclusion:

ESWT is a successful therapy method for treatment of plantar fasciitis. Moreover the present study demonstrates the possibility to predict the outcome of ESWT after 6 weeks already after the last therapy session.

References: 1) Chuckpaiwong B et al. J Foot Ankl. Surg. 2009; 48(2):148-55.

2) Metzner G et al. Foot Ankle Int.2010; 31(9):790-6.

3) Cole C et al. Plantar Am Fam Physician. 2005; 72(11):2237-42.

4) Glatzer JL et al. An Phys Sportsmed. 2009 Jun;37(2):74-9.

Cross-comparison of endurance parameters on treadmill ergocycle and laddermill on two different groups of elite athletes.

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Introduction: The purpose of the present study is to investigate how endurance parameters like maximal oxygen consumption (VO_{2max}), maximal heart rate (Hf_{max}), maximal lactate production ($lactate_{max}$), and Borg scale are changing on treadmill, ergocycle and laddermill through two different groups of subjects.

Methods: 16 male athletes (8 cyclists and 8 runners) at amateur and elite level were recruited to complete 3 tests to complete exhaustion on treadmill, ergocycle and laddermill in appliance of the Swiss Olympic guidelines.

Results: In the whole collective, the differences concerning VO_{2max} between the ergocycle, treadmill and laddermill were not significant ($P = 0.889$). The cyclists reached on the ergocycle a considerable higher VO_{2max} - value (67.1 ml/kg/min) than on the treadmill or laddermill (62.5 ml/kg/min respectively 62.3 ml/kg/min) with significant difference between tests ($P = 0.039$). The runners reached a higher VO_{2max} -value on the treadmill (69.3 ml/kg/min) than on the ergocycle (63.7 ml/kg/min) or laddermill (68.1 ml/kg/min) with a significant difference between tests ($P = 0.010$). Concerning the Hf_{max} the results showed in the hole collective as well as for cyclists and runners independently higher values on the treadmill, whereas only in the whole collective and for runners independently with significant difference between tests ($P = 0.009$ respectively $P = 0.010$). The $lactate_{max}$ - values were in the whole collective as well as for cyclists and runners independently higher on the ergocycle, though only in the whole collective and for cyclists independently with significant difference between tests ($P = 0.001$ respectively $P < 0.001$).

Conclusion: These results demonstrate that the VO_{2max} is more affected by the physical premises of the athletes than of the different types of workloads. On the other hand Hf_{max} and $lactate_{max}$ are more constant regarding the physical premises of the athletes but appear to be more changeable through the different types of workloads.

References:

1. Astrand, P. O., and B. Saltin. Maximal oxigen Uptake and heart rate in various types of muscular activity. *J. Appl. Physiol.* 16: 977-981, 1961.
2. Basset, F. A., and M. R. Boulay. Specificity of treadmill and cycle ergometer tests in triathletes, runners and cyclists. *Eur. J. Appl. Physiol.* 81, 214-221, 2000
3. Kamon, E. Cardiopulmonary response of male and female subjects to submaximal work on laddermill and cycle ergometer. *Ergonomics.* 15:1, 25-32, 1972

Influence of anterior cruciate ligament reconstruction using Quadriceps tendon and patellar ligament on isokinetic peak force of knee extension

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Introduction: One of the most common knee injuries is the anterior cruciate ligament (ACL) sprain or tear. Surgery of the ACL is usually required among athletes because the ACL is needed in order to perform sharp movements safely and with stability. The purpose of the present investigation is to compare the isokinetic force development of knee extension after anterior cruciate ligament (ACL) reconstruction by using either patellar or quadriceps tendon.

Methods: 24 patients who underwent arthroscopic ACL reconstruction using patellar tendon (PT; n = 12) or quadriceps tendon (QT; n = 12) were evaluated on their isokinetic force development of knee extension in Newton meters (Nm) with 60 degrees angular velocity one week before surgery (point in time A), four month after surgery (point in time B) and seven month after surgery (point in time C).

Results: The comparison of the points in time A, B and C between the PT- group and the QT- group showed no significant difference ($p > 0.05$) on the injured knee. The reduction of force development in knee extension between point in time A and B in the PT- group (A = 174.4Nm B = 129.5Nm) and the QT- group (A = 193.0Nm B = 116.3Nm) were significant ($p < 0.001$) in both cases with an apparent higher decrease of the isokinetic force in the QT- group (39.7%) than PT- group (25.7%) on the injured side. Furthermore the following increase of the force on injured knee between point in time B and C in the PT- group (B = 129.5Nm C = 171.1Nm) and the QT- group (B = 116.3Nm C = 171.6Nm) is also significant ($p < 0.001$) in both cases with higher regain of the isokinetic force in the QT- group (32.2%) than PT- group (24.3%). Comparison of isokinetic force on injured knee between point in time A and C in the PT- group (A = 174.4Nm C = 171.1Nm) and the QT- group (A = 193.0Nm C = 171.6Nm) were not significant ($p > 0.05$). The development of isokinetic force development on the healthy knee showed no significant difference ($p > 0.05$) in all comparisons.

Conclusion: In the present study both reconstruction techniques seemed to be equal relating to the isokinetic force development of knee extension. There is an observed higher decrease and regain of isokinetic force on point in time B and C after ACL reconstruction with quadriceps tendon.

References: 1) Pigozzi F. et al. *J. Sports Med Phys Fitness*. 2004 Sep;44(3):288-93.
2) Stäubli HU. et al. *Sports Med. Arthros. Rev.* 1997;5:59-67
3) Wipfler B. et al. *Arthroscopy*. 2011 May;27(5):653-65.