

Preventing ACL Injuries in Young Female Athletes

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Clinical Scenario:

A 17 year old female athlete presents to the clinic with left knee pain and limited range of motion. The patient experienced a sudden onset of pain after landing from a jump during basketball. Initial physical examination showed swelling, limited range of motion of flexion and extension and a positive anterior draw test. MRI results showed torn ALC and patient was scheduled for surgery.

Clinical Question:

In young female athletes, is there a decrease in the incidence of ACL injuries between athletes that participate in a preventative neuromuscular training program compared to those that did not participate in a preventative neuromuscular training program?

Articles:

Filipa, A., Byrnes, R., Paterno, M.V., Myer, G.D., & Hewett, T.E. (2010). Neuromuscular

Training improves performance on star excursion balance test in young female athletes.

Journal of Orthopedic and Sports Physical Therapy, 40(9), 551-558.

Klugman, M.F., Brent, J.L., Myer, G.D., Ford, K.R., & Hewett, T.E. (2011). Does an in-season

only neuromuscular training protocol reduce deficits quantified by the tuck jump

assessment?. *Clinics in Sports Medicine, 30, 825-840.* doi: 10.1016/j.csm.2011.07.001

Summary and Appraisal of Key Evidence:

Study 1:

In order to determine if a neuromuscular training program (NMTP) would increase star excursion balance test (SEBT) by focusing on core stability and lower extremity strength, Filipa, Byrnes, Paterno, Myer, and Hewett (2010) piloted a controlled cohort repeated measurement research study, providing a Level 2, Grade B level of evidence. SEBT is an assessment tool to that necessitates lower extremity coordination, balance, flexibility, and strength. It is used to assess dynamic stability, identify athletes at high risk for injuries to their lower extremities, observe rehabilitation progress for injured athletes, and evaluate for possible deficits following injury. This study involved 20 uninjured female soccer players, with an experimental group of 13 and a control group of 7, that were submitted to the SEBT test prior to completing, or not completing, eight weeks of a NMTP. The experimental group demonstrated a substantial improvement of the SEBT with an overall increase in scores greater than 103%, while the control group should no improvement of the SEBT scores. These results showed that NMTP improved the performance of the SEBT by focusing on core stability and lower extremity strength and such programs may assist in diminishing the prevalence of ACL injuries in female soccer players (Filipa et al., 2010).

Limitations of this study included the small number of athletes that participated in the study, providing a limited interpretation of available data, and a small study population of

adolescent female soccer players, which decreases the applicability of other populations (Filipa et al., 2010).

Study 2:

Klugman, Brent, Myer, Ford, and Hewett (2011) conducted a study to determine whether an in-season NMTP would increase the Tuck Jump Assessment (TJA) scores of young female soccer players providing a Level 2, Grade B level of evidence. The TJA is a tool that is used to score deficits that are seen in young female athletes during a sequence of jumping and landing. Such deficits include knee and thigh motion, foot position during landing, and plyometric technique. For this study, 49 high school female soccer players, 15 in the training group and 34 in the control group, had their TJA scores measured before and after the soccer season. The control group then went on with their regular in-season routine, receiving no intervention from the researchers. The training group, on the other hand, participated in a five week NMTP that consisted of exercises focused on increasing lower extremity strength, core stability, balance and flexibility. At the completion of the soccer season, both groups TJA scores were measured again and it was found that all athletes in both groups decreased their TJA scores. Both groups also showed a reduction in their landing and jumping deficits from 5.4 points to 4.9 points in the training group and from 5.8 to 5.0 in the controlled group. Researchers concluded that while there was a reduction in TJA scores during in-season training and in-season training may be more cost effective, the current results do not support the use of an in-season NMTP for ACL injury prevention. They feel that a pre-season NMTP in addition to an in-season program would significantly reduce ACL injuries in young female athletes, but more research is necessary (Klugman et al., 2011).

Clinical Bottom Line:

According to these studies, there is a decrease in the incidence of ACL injuries in young female athletes that participate in a preventative neuromuscular training program. Further research does need to be conducted to determine the cause and effect of NMTP and the long-term effects that can have on reducing the incidence of ACL injuries. Studies to define when the most appropriate time is to implement such programs are also necessary, whether pre-season, during season, or both. These studies are relevant today because ACL injuries are the most commonly seen injury of the lower extremity and often result in devastating short term and long term consequences. As these studies indicate, neuromuscular training programs can prevent such injuries by focusing on increasing power through plyometrics, muscular strength with resistance training, and coordination of muscle involvement and firing through stabilization and balance training.

Implications for Practice:

Young female athletes at both the high school and college levels are at an amplified risk for sustaining an ACL injury as compared to males due to the differences in anatomy, hormones, and neuromuscular function. Due to these increased risks and the high incidence of ACL injuries in young female athletes; I would recommend the implementation of a pre-season neuromuscular training program for all female athletes at the high school and college levels that focuses on strength, stability, coordination, and balance.

Reference

- Filipa, A., Byrnes, R., Paterno, M.V., Myer, G.D., & Hewett, T.E. (2010). Neuromuscular Training improves performance on star excursion balance test in young female athletes. *Journal of Orthopedic and Sports Physical Therapy, 40*(9), 551-558.
- Klugman, M.F., Brent, J.L., Myer, G.D., Ford, K.R., & Hewett, T.E. (2011). Does an in-season only neuromuscular training protocol reduce deficits quantified by the tuck jump assessment?. *Clinics in Sports Medicine, 30*, 825-840. doi: 10.1016/j.csm.2011.07.001