Kinetic and Kinematic Analysis of Male Collegiate Basketball Players with Patella Tendinosis

Dacia Heckendorf, SPT; Luke Hammer, SPT; Matthew Jeppson, SPT;
Nicole Jones, SPT; Katherine Porter, SPT

Introduction

Patellar tendinopathy (PT) occurs in approximately 40% of elite jumping athletes.[1] Players will typically play through the pain; however, if the condition is not successfully treated some are forced to retire from sport. Research has shown that there are no signs of chemical inflammation in the tendon, but rather the presence of a degenerative tendon with collagen disorientation and disorganization.[2]

Purpose

Purpose of this cross-sectional analysis was to categorize jumping and landing mechanics in male collegiate basketball players (mean age 20.02 ± 1.68 years) based on abnormal tendon findings.

Methods

Participants:

Ninety-five male collegiate basketball players (representing teams from the NCAA DII, NCAA DIII, NAIA, and community college levels) were recruited from the Portland, OR region. An athlete was excluded from the study if he was under the age of 18 or was restricted from full sport participation by the team's physician or athletic trainer.

Methods Continued.

Drop Vertical Jump (DVJ)

Each subject performed 3 DVJ from both a 12 inch (31cm) and 30 inch (76cm) platform.[3] Subjects dropped from the platform onto force plates followed by a vertical jump. Lower quadrant marker set was applied to subjects with 33 markers and tracked by eleven cameras.

Ultrasound:

Philips 50g ultrasound machine with 50mm array probe used to assess bilateral patellar tendons at a depth of 2.5cm. Three different images were taken in different planes: the distal pole of patella to insertion on tibia for the longitudinal view, transverse images at proximal and distal insertion points, and midpoint between these structures.

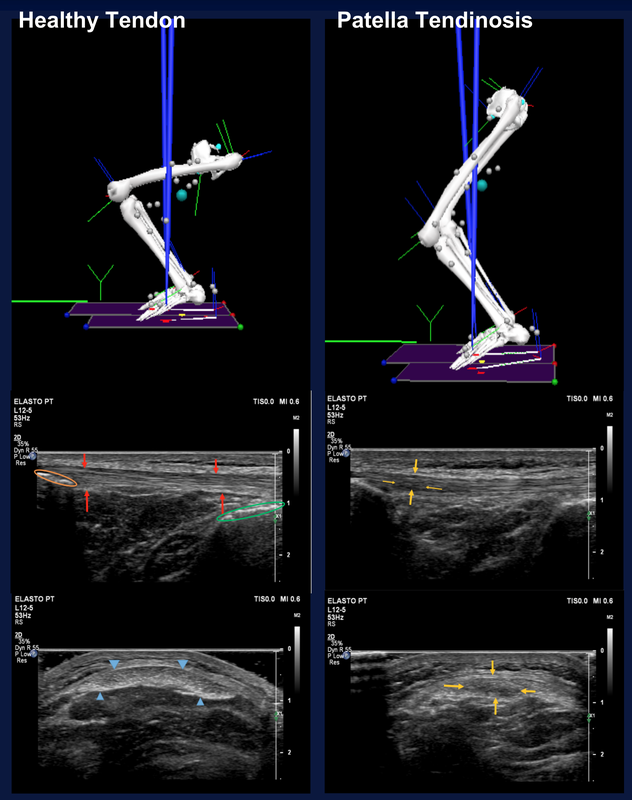

Figure 1. Max knee flexion and tendon US findings for healthy tendon and patella tendinosis. Borders of patellar tendon (red arrows & blue triangles), patella (orange circle) and tibia (green circle). Hypoechoic areas indicating patellar tendon degeneration (orange arrows)

Figure 2. Knee stiffness in athletes with PT and without PT

Results

Thirty three out of 95 (34%) of athletes presented with PT. A difference in knee stiffness was observed between those with PT and those with normal tendons (Figure 2).

Discussion

There appears to be a difference in knee stiffness between athletes with PT and those who do not have PT. However, because this is a cross-sectional study we are unable to attribute disease causality to landing mechanics. Future studies should investigate DVJ performance in a disease-free population of high school basketball players.

Literature Cited

1. Young, M. A. (2005). Eccentric decline squat protocol offers superior results at 12 months compared with traditional eccentric protocol for patellar tendinopathy in volleyball players. *British Journal of Sports Medicine, 39*(2), 102-105. doi:10.1136/bjsm.2003.010587
2. Stasinopoulos, D., Pantelis, M., & Kalliopi, S. (2012). Comparing the effects of eccentric training with eccentric training and static stretching exercises in the treatment of patellar tendinopathy. A controlled clinical trial. *Clinical Rehabilitation, 26*(5), 423-430. doi: 10.1177/0269215511411114
3. Hewett, T., Myer, G., Ford, K., & Slaughterbeck, J. (2006). Preparticipation physical examination using a box drop vertical jump test in young athletes: the effects of puberty and sex. *Clin J Sport Med,* 16(4) 298-304.

George Fox University