ISAKOS

International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine

11th Biennial ISAKOS Congress • June 4-8, 2017 • Shanghai, China

Paper #75

Biomechanical Consequences of Excessive Patellar Distalization

Justin Shu Yang, MD, UNITED STATES
John P. Fulkerson, MD, UNITED STATES
Elifho Obopilwe, UNITED STATES
Andreas Voss, MD, GERMANY
Jessica Divenere, BS, UNITED STATES
Augustus D. Mazzocca, MS, MD, UNITED STATES
Cory M. Edgar, MD, PhD, UNITED STATES

University of Connecticut
Farmington, CT, UNITED STATES

Summary:
Our results suggest that patellar baja, as a result of excessive patellar distalization, can cause increased patellofemoral contact pressures during early flexion.

Abstract:
Background: Iatrogenic patellar baja can be a result of excessive tibial tubercle distalization or overtightented patellar tendon repair. Tubercle distalization is increasing in popularity for the treatment of recurrent patella instability. Clinically, patellar baja can present as a debilitating problem with motion loss, increased pain, and arthrosis progression. However, previous biomechanical studies have not shown an increase in patellofemoral joint contact pressures. The purpose of this study is to examine the patellofemoral contact pressure after a tibial tubercle distalization osteotomy.

Methods: Ten matched pair fresh-frozen cadaveric knees were studied. Average Blackburne-Peel ratio of the native knees was 0.91. The knees were placed on a testing rig, with a fixed femur and tibia mobile through 90° of flexion. Individual quadriceps heads and the iliotibial band were separated and loaded with 205 N in anatomic directions using a weighted pulley system. A straight tubercle distalization osteotomy of 1 cm was performed and fixed with screws, with and without a lateral release. Patellofemoral contact pressures were measured at 0°, 10°, 20°, 30°, 45°, 60°, and 90° of flexion using pressure-sensitive films on the medial and lateral trochlea. The contact force, area and pressure were measured at the following states: (1) native knee, (2) with distalization and (3) distalization with lateral release.

Results: Average Blackburne-Peel ratio after distalization was 0.64. Tibial tubercle distalization resulted in a six fold increase in mean contact pressures at 0° (0.15 versus 0.90 MPa, $p<0.001$), and a 55% increase at 10° of flexion (0.70 versus 1.09 MPa, $p=0.02$). After distalization, total contact area was significantly higher at 0° of flexion (17.7 mm2 versus 58.4 mm2, $p=0.02$). Lateral release after distalization did not significantly change contact pressure ($p>0.21$).

Conclusion: Our results suggest that patellar baja, as a result of excessive patellar distalization, can cause increased patellofemoral contact pressures during early flexion.