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Partial Lateral Meniscectomy Affects Knee Stability Even in Anterior Cruciate Ligament-Intact Knees

João V. Novaretti, MD, BRAZIL
Jayson Lian, BA, UNITED STATES
Neel K. Patel, MD, UNITED STATES
Calvin K. Chan, MS, UNITED STATES
Moises Cohen, MD, PhD, Prof., BRAZIL
Volker Musahl, MD, UNITED STATES
Richard Debski, PhD, UNITED STATES

University of Pittsburgh
Pittsburgh, PA, UNITED STATES

Summary:
One-third partial lateral meniscectomy of the posterior horn already led to significant increase in medial translation of the tibia and to significant decrease in resultant forces in the lateral meniscus, comparable to that of a 2/3 partial lateral meniscectomy of the posterior horn in ACL-intact knees. These changes in joint motion and meniscus forces may predispose knees to further injury.

Abstract:

Background

Despite potential long-term consequences in young patients, partial meniscectomy remains the most commonly performed orthopaedic procedure in the U.S. Since the meniscus has an important role in knee stability and shock absorption, the effects of partial lateral meniscectomy on knee joint motion and knee force distribution are critical to understand.

Purpose

To quantify the effects of successive partial lateral meniscectomies of the posterior horn and total lateral meniscectomy on knee kinematics, resultant forces in the lateral meniscus, and in situ force in the ACL in ACL-intact knees.

Methods

Using a robotic testing system, loads (134-N anterior tibial load + 200-N axial compression, 5-N m internal tibial torque + 5-N m valgus torque, and 5-N m external tibial torque + 5-N m valgus torque) were independently and continuously applied during flexion to 10 fresh-frozen cadaveric knees (mean age 75). The resultant joint motion, forces in the lateral meniscus, and in situ force in the ACL were recorded for four knee states: intact, 1/3, and 2/3 partial lateral meniscectomies of the posterior horn, and total lateral meniscectomy. An ANOVA was used to compare variations in kinematics and forces at 0º, 30º, 60º and 90º of knee flexion. Significance was set at $P < 0.05$.

Results

An increase in medial translation of the tibia up to 166.7% was observed after 1/3 partial lateral meniscectomies of the posterior horn compared to the intact knee, in response to an anterior load at 0º, 30º, 60º and 90º of knee

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flexion ($P < .05$) and in response to an internal tibial torque at 0º, 30º, and 90º of knee flexion ($P < .05$). One-third partial lateral meniscectomies of the posterior horn decreased resultant forces in the lateral meniscus up to 61.3% compared to the intact knee at 0º, 30º, 60º and 90º of knee flexion in response to an anterior load ($P < .05$) and to an internal tibial torque ($P < .05$). Two-thirds partial lateral meniscectomies of the posterior horn had comparable results to one-third partial meniscectomies ($P > .05$), while total lateral meniscectomies further increased medial translation of the tibia up to 316.6% compared to the intact knee in response to an anterior load and to internal and external tibial torques ($P < .05$).

Discussion And Conclusion

The data from this study showed that 1/3 partial lateral meniscectomies of the posterior horn already led to significant increases in medial translation of the tibia and to significant decreases in resultant forces in the lateral meniscus, comparable to that of a 2/3 partial lateral meniscectomy of the posterior horn in ACL-intact knees. These changes in joint motion and meniscus forces may predispose knees to further injury and consequently to poor clinical outcome for patients. Surgeons should consider the consequences of partial meniscectomies on knee stability and force distribution, even in ACL-intact knees, when deciding the most appropriate treatment option for lateral meniscal injuries.