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HEMANTH R. GADIKOTA, MS¹ • SHINSUKE KIKUTA, MD² • WEI QI, MD³ DAVID NOLAN, PT, DPT, MS, OCS, CSCS⁴ • THOMAS J. GILL, IV, MD¹ • GUOAN LI, PhD¹

Effect of Increased Iliotibial Band Load on Tibiofemoral Kinematics and Force Distributions: A Direct Measurement in Cadaveric Knees

atients diagnosed with knee osteoarthritis (OA) often report a variety of symptoms, including pain, stiffness, swelling, and tenderness.^{11,33} These debilitating symptoms may render daily activities difficult to perform and hence severely affect patients' quality of life.^{11,33} In the knee joint, OA is known to predominantly

• **STUDY DESIGN:** Controlled laboratory study using cadaveric knee specimens and a repeated-measures design.

• **OBJECTIVES:** To investigate the effect of increased iliotibial band load (assumed to represent increased tensor fascia latae and gluteus maximus strength) on tibiofemoral kinematics and force distribution on the tibiofemoral articulation.

BACKGROUND: Owing to the difficulty in measuring in vivo joint loading, there is limited evidence on the direct relationship between increased iliotibial band load and force distribution in the tibiofemoral articulation.

METHODS: Eight fresh-frozen cadaveric knee specimens were used in this study. A robotic testing system assessed tibiofemoral kinematics under 3 simulated loading conditions: (1) 300-N quadriceps load, 100-N hamstrings load, 0-N iliotibial band load; (2) 300-N quadriceps load, 100-N hamstrings load, 50-N iliotibial band load; and (3) 300-N quadriceps load, 100-N hamstrings load, 100-N iliotibial band load. The load distribution in the medial and lateral tibiofemoral articulation was also measured under these loading conditions by using piezoelectric pressure sensors. Data were collected and analyzed at full extension and at 5°, 10°, 15°, 20°, 25°, and 30° of knee flexion.

RESULTS: The loads transmitted through the medial tibiofemoral articulation significantly decreased when the load on the iliotibial band was increased, with a concomitant significant increase in lateral tibiofemoral articulation load. Greater iliotibial band load also increased anterior tibial translation and valgus tibial rotation, and decreased the amount of internal tibial rotation and medial tibial translation.

CONCLUSION: The present study demonstrated that an increase in iliotibial band load, when tested in a non-weight-bearing condition in a cadaveric model, can significantly decrease the loads transmitted through the medial tibiofemoral articulation. J Orthop Sports Phys Ther 2013;43(7):478-485. Epub 18 March 2013. doi:10.2519/jospt.2013.4506

• **KEY WORDS:** gluteus maximus, joint forces, knee osteoarthritis, robotic testing system, tensor fascia latae affect the medial compartment.²⁵ Although the pathogenesis of knee OA remains unclear, several risk factors that may accelerate the disease progression have been identified.^{2,10,28} One such factor is the redistribution of normal knee joint loads, resulting in excessive medial compartment loading.²⁸ Accordingly, the authors of several studies have reported a larger external knee adduction moment, which is widely used as an indirect indicator of medial compartment loading, in patients diagnosed with knee OA compared to healthy individuals.^{4,22,23}

Tibiofemoral joint loading is dependent not only on external loading but also on the activation level of the musculature used to stabilize the joint.26 Therefore, muscle-strengthening regimens are widely adopted as a treatment approach for knee OA to improve symptoms and to slow the disease progression by reducing the external knee adduction moment, hence potentially reducing the force transmitted through the medial compartment.^{5,9,15,25,27} While the majority of muscle-strengthening interventions have focused on strengthening the quadriceps and hamstrings, it has been theorized that the actions of these muscles in iso-

¹Department of Orthopaedic Surgery, Massachusetts General Hospital and Harvard Medical School, Boston, MA. ²Department of Orthopaedic Surgery, School of Medicine, Nihon University, Tokyo, Japan. ³Department of Orthopaedic Surgery, Chinese PLA General Hospital, Beijing, China. ⁴Sports Physical Therapy Service, Massachusetts General Hospital, Boston, MA; Department of Physical Therapy, Northeastern University, Boston, MA. Partners HealthCare's Partners Human Research Committee (Institutional Review Board) approved this cadaveric study. The authors certify that they have no affiliations with or financial involvement in any organization or entity with a direct financial interest in the subject matter or materials discussed in the article. Address correspondence to Dr Guoan Li, Bioengineering Laboratory, Massachusetts General Hospital, 55 Fruit Street, GRJ 1215, Boston, MA 02114. E-mail: gli@partners.org
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FIGURE 1. The experimental setup of a cadaveric knee installed on the robotic testing system. The quadriceps, hamstrings, and iliotibial band are loaded using free weights.

lation are perhaps inadequate to control frontal plane knee kinematics and kinetics.³⁰ Accordingly, it has been suggested that strengthening the musculature that can support external adduction moments is critical to reduce medial compartment loading. The iliotibial tract and its associated muscles (tensor fascia latae and gluteus maximus) are known to provide coronal plane joint stability. Using an electromyography-driven model, Winby et al³² indicated that forces generated by the tensor fascia latae contribute up to 25% to the lateral compartment load of the knee during the late stance phase of gait. Therefore, stronger action of the tensor fascia latae, which has a large abduction moment arm at the knee, may induce tibial abduction and thereby relieve excessive medial compartment loading in patients with medial knee OA.

Although studies have related external knee adduction moments (calculated by inverse dynamic analysis) to

disease severity,^{3,29} disease progression,²² and pain,¹⁶ some authors have reported improved symptoms and function and pain relief following training programs for lower extremity muscle strengthening in patients with medial knee OA, without a significant alteration to medial knee loading as measured by knee external adduction moment.^{5,12,27} Due to the difficulty of measuring in vivo joint loading, there is limited evidence on the direct relationship between muscle strengthening and force distribution in the tibiofemoral compartments. The effect of loading the iliotibial band on tibiofemoral kinematics has been evaluated in cadaveric knee specimens.^{17,20} Further, Kwak et al¹⁷ quantified the alterations in tibiofemoral contact locations in the function of iliotibial band loading. They found that loading the iliotibial band increased tibial external and valgus rotation between full knee extension and 90° of knee flexion. However, the effect of muscle loading on tibiofemoral cartilage contact forces remains poorly understood.

Therefore, the objective of this study was to directly measure the force distribution in the tibiofemoral compartments, using pressure sensors in cadaveric knee specimens, under simulated muscle-loading conditions. It was hypothesized that an increase in iliotibial band load, used as a proxy for an increase in tensor fascia latae and gluteus maximus strength, would decrease the load transmitted through the medial tibiofemoral articulation by abducting the tibia.

METHODS

This STUDY USED 8 FRESH-FROZEN cadaveric knee specimens from donors with no prior history of lower extremity injury or surgery (4 male and 4 female; mean age, 42 years; age range, 36-50 years). All specimens were procured from a tissue bank (MedCure, Inc, Portland, OR) and stored at -20°C until 24 hours prior to the experiment. The Partners HealthCare's Partners Hu-

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man Research Committee (Institutional Review Board) approved this cadaveric study. Following the experiment, each specimen was examined for knee OA through an arthrotomy, and no evidence of OA was observed. The specimens were examined for knee OA because, compared to normal knees, those with knee OA may show differences in kinematics and magnitude of unloading when tested. There are several disadvantages to using knees with OA. First, knees with different OA grades can introduce interspecimen variability, thus reducing the power of the study. Second, the uneven articular surface of a knee with OA can lead to undesirable and faulty pressure sensor readings. Therefore, to avoid these complications and to perform a more controlled experiment, normal knee specimens were used in this study.

The femur and tibia of each specimen were truncated approximately 25 cm from the knee joint line, leaving all the soft tissues intact. A bone screw was used to firmly secure the fibula to the tibia in its anatomical position. To facilitate the fixation of the femur and tibia to the robotic testing system, approximately 10 cm of musculature from the proximal end of the femur and from the distal end of the tibia were released from the diaphyses. Care was taken not to disrupt the normal state of the soft tissues surrounding the joint line. After clearing the soft tissues attached to the diaphyses of the tibia and femur, they were potted in hollow, cylindrical cardboard tubes using bone cement. The cardboard tubes were removed after the bone cement solidified, and these constructs were then secured in thick-walled aluminum cylinders that were attached to the robotic testing system (FIGURE 1). To allow application of loads for the quadriceps, medial hamstrings, lateral hamstrings, and the iliotibial band, each structure was firmly attached to separate ropes via sutures. These ropes were then passed through a system of pulleys mounted on the femoral clamp, and loading was achieved by



significant differences were found between the 50-N and 100-N ITB loading conditions. Bars and error bars represent means and standard deviations. *Statistically significant difference compared to the unloaded ITB condition (*P*<.05). Abbreviation: ITB, iliotibial band.

attaching weights at the free end of the ropes (**FIGURE 1**).

A robotic testing system was used to determine tibiofemoral kinematics under simulated muscle loads. The operation of the robotic system to evaluate the tibiofemoral kinematics under simulated muscle loads has been previously reported.13,18 In this study, tibiofemoral kinematics were determined from full knee extension to 30° of knee flexion, in 1º increments, under 3 different simulated muscle loading conditions: (1) 300-N quadriceps load, 100-N hamstrings load, unloaded iliotibial band; (2) 300-N quadriceps load, 100-N hamstrings load, 50-N iliotibial band load; and (3) 300-N quadriceps load, 100-N hamstrings load, 100-N iliotibial band load. The increment in the iliotibial band load was assumed to represent an increase in tensor fascia latae and gluteus maximus strength. Under each of these loading conditions, forces and moments at the knee center were minimized (less than

5.0 N and less than 0.5 Nm, respectively) at each flexion angle by manipulating the tibia in 5 degrees of freedom (fixed flexion angle) by the robotic testing system. The resultant tibial position, at which the forces and moments at the knee center were minimal, was recorded as the kinematic response of the tibia to external loading.

Currently, there is a lack of data on in vivo forces in the iliotibial band during ambulation and other daily activities. In previously published cadaveric studies, the forces used to simulate iliotibial band function ranged from 30 N to 90 N.^{17,19-21} Markolf and colleagues¹⁹ reported that, on average, an iliotibial band force of 29.0 ± 5.6 N (range, 19.9-37.3 N) was required to produce a pivot shift in anterior cruciate ligament-deficient knees. These findings are in agreement with data published by Bull and colleagues.8 Therefore, iliotibial band forces between 30 N and 40 N are considered to be within the physiological range.^{20,21} Other





investigators estimated the iliotibial band forces based on the physiological crosssectional area of the muscles and used an iliotibial band-to-quadriceps load ratio of 17% (89-N load on the iliotibial band and 534-N load on the quadriceps).17 The loads used in our study are based on these previous estimates.

Following the determination of knee kinematics under the 3 loading conditions, load distribution on the medial and lateral tibial plateaus was measured using piezoelectric pressure sensors (model 4011; Tekscan, Inc, Boston, MA). Each sensor was conditioned, equilibrated, and calibrated prior to the measurement of loads within the joint.7 To facilitate positioning of the sensors within the joint, both medial and lateral menisci were completely removed. After the insertion of the sensors into the knee joint over the medial and lateral tibial plateaus, they were secured by suturing the sensor tabs (areas without pressure-sensing elements) to the joint

capsule. Once the sensors were in position, previously recorded kinematics for all 3 loading conditions were replayed to measure the loads transmitted through the tibiofemoral articulation at full knee extension and at 5°, 10°, 15°, 20°, 25°, and 30° of knee flexion.

Tibiofemoral kinematics (medial/lateral and anterior/posterior translations; internal/external and varus/valgus rotations) and loads transmitted through the medial and lateral tibial plateaus were statistically analyzed using a 2-way, repeated-measures analysis of variance. If the analysis of variance was found to be significant, post hoc comparisons between the 3 loading conditions at full knee extension and at 5°, 10°, 15°, 20°, 25°, and 30° of knee flexion were made using the Tukey honestly significant difference test. All statistical analyses were performed using STATISTICA 8.0 (StatSoft, Inc, Tulsa, OK). A P value less than .05 was considered statistically significant.

RESULTS

Medial Compartment Loads

HE LOADS TRANSMITTED THROUGH the medial tibiofemoral articulation significantly decreased between 5° and 30° of knee flexion, when the load on the iliotibial band was increased from 0 N to 50 N (FIGURE 2) (P<.05). The percentage decrease in loads ranged from 10% in full knee extension to 35% in 25° of knee flexion. When the load on the iliotibial band was increased from 0 N to 100 N, the loads transmitted through the medial tibiofemoral articulation significantly decreased at all knee flexion angles (FIGURE **2**) (P<.05). The percentage decrease in loads ranged from 25% in full knee extension to 43% at 20° of knee flexion. No significant differences in the loads transmitted through the medial tibiofemoral articulation were observed between the iliotibial band loading conditions of 50 N and 100 N.

Lateral Compartment Loads

The loads transmitted through the lateral tibiofemoral articulation significantly increased at all flexion angles when the iliotibial band was loaded with 50 N or 100 N, compared to the unloaded iliotibial band condition (FIGURE 3) (P<.05). Percentage increase in the load transmitted through the lateral tibiofemoral articulation ranged from 63% at 30° of knee flexion to 202% in full knee extension when the iliotibial band load was increased from 0 N to 50 N. Percentage increase in load transmitted through the lateral tibiofemoral articulation, when comparing the 100-N load to the unloaded condition, ranged from 105% at 30° of knee flexion to 403% in full knee extension. When the iliotibial band load was increased from 50 N to 100 N, the percentage increase in the lateral tibiofemoral articulation ranged from 26% at 30° of knee flexion to 66% in full extension. These increases in loads were statistically significant at all flexion angles (FIGURE 3) (P<.05).

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TABLE 1

TIBIAL TRANSLATIONS UNDER 3 DIFFERENT LOADING CONDITIONS AT SELECTED KNEE FLEXION ANGLES*

	Medial Tibial Translation			Anterior Tibial Translation		
Flexion Angle	Unloaded ITB	50-N ITB	100-N ITB	Unloaded ITB	50-N ITB	100-N ITB
Full extension	0.3 ± 0.7	0.3 ± 0.7	0.3 ± 0.8	2.0 ± 0.6	2.2 ± 0.7	$2.3\pm0.7^{\dagger}$
5°	0.8 ± 0.8	0.8 ± 0.8	0.8 ± 0.8	3.1 ± 0.6	$3.4\pm0.6^{\dagger}$	$3.5\pm0.6^{\dagger}$
10°	1.4 ± 0.9	1.4 ± 0.8	1.3 ± 0.9	4.0 ± 0.7	$4.3\pm0.7^{\dagger}$	$4.5\pm0.7^{\dagger\ddagger}$
15°	1.9 ± 1.0	1.9 ± 1.0	1.8 ± 0.9	4.7 ± 1.0	$5.0\pm0.9^{\dagger}$	$5.2\pm0.9^{\dagger\dagger}$
20°	2.3 ± 1.1	2.2 ± 1.1	$2.1\pm1.1^{\mathrm{t}\pm}$	5.3 ± 1.1	$5.5\pm1.1^{\circ}$	$5.7\pm1.1^{\rm tt}$
25°	2.7 ± 1.2	$2.5\pm1.2^{\dagger}$	$2.3\pm1.2^{\dagger\ddagger}$	5.6 ± 1.3	$6.0\pm1.2^{\dagger}$	$6.1\pm1.2^{\dagger}$
30°	3.0 ± 1.2	$2.8\pm1.2^{\dagger}$	$2.6\pm1.2^{\dagger\ddagger}$	5.9 ± 1.4	$6.2\pm1.3^{\dagger}$	$6.3\pm1.3^{\dagger}$

Abbreviation: ITB, iliotibial band.

*Values are mean \pm SD mm.

[†]Statistically significant difference compared to unloaded ITB condition (P<.05). [‡]Statistically significant difference compared to 50-N ITB condition (P<.05).

TABLE 2

TIBIAL ROTATIONS UNDER 3 DIFFERENT LOADING CONDITIONS AT SELECTED KNEE FLEXION ANGLES*

	Internal Tibial Rotation			Valgus Tibial Rotation		
Flexion Angle	Unloaded ITB	50-N ITB	100-N ITB	Unloaded ITB	50-N ITB	100-N ITB
Full extension	2.4 ± 2.6	2.4 ± 2.8	2.3 ± 2.7	0.5 ± 0.6	$0.8\pm0.7^{\dagger}$	$1.1\pm0.8^{\dagger\ddagger}$
5°	5.0 ± 3.7	5.2 ± 4.1	4.8 ± 4.2	0.6 ± 1.0	$1.0\pm1.0^{\dagger}$	$1.3\pm1.1^{ m tc}$
10°	7.7 ± 4.9	7.6 ± 5.1	6.9 ± 5.1	$\textbf{0.8} \pm \textbf{1.8}$	$1.2\pm1.8^{\dagger}$	$1.5\pm1.9^{\dagger\ddagger}$
15°	10.0 ± 5.8	9.5 ± 6.0	$8.4\pm6.4^{\ddagger}$	1.0 ± 2.6	$1.4\pm2.7^{\dagger}$	$1.8\pm2.7^{\dagger\ddagger}$
20°	11.9 ± 6.6	$10.8\pm7.1^{\circ}$	$9.1\pm7.4^{ m tc}$	1.2 ± 3.5	$1.6\pm3.5^{\dagger}$	$1.9\pm3.6^{\dagger\ddagger}$
25°	13.2 ± 7.3	$11.4\pm7.8^{\dagger}$	$9.5\pm8.2^{ m tc}$	1.4± 4.3	$1.8\pm4.4^{\dagger}$	$2.0\pm4.4^{\dagger}$
30°	13.9 ± 7.8	$11.6\pm8.5^{\dagger}$	$9.4\pm8.7^{ m tc}$	1.6 ± 5.0	$1.9\pm5.1^{\dagger}$	$2.0\pm5.1^{\dagger}$

Abbreviation: ITB, iliotibial band.

*Values are mean \pm SD deg.

 $^{+}Statistically significant difference compared to unloaded ITB condition (P<.05).$

 $^{\circ}Statistically significant difference compared to 50-N ITB condition (P<.05).$

Kinematics

An increase in iliotibial band load to 50 N or 100 N did not significantly alter the medial/lateral tibial translations between full knee extension and 15° of knee flexion (*P*>.05) (**TABLE 1**). Statistically significant decreases in medial tibial translations were observed at 25° and 30° and between 20° and 30° of knee flexion when iliotibial band load was increased to 50 N and 100 N, respectively (**TABLE 1**) (*P*<.05). A maximum mean decrease of 0.4 mm was observed at 30° of knee flexion when comparing the unloaded and the 100-N iliotibial band loading conditions.

When the iliotibial band load was increased to 50 N, anterior tibial translations significantly increased between 5° and 30° of knee flexion (**TABLE 1**) (P<.05). Similarly, a load of 100 N on the iliotibial band significantly increased anterior tibial translations between full knee extension and 30° of knee flexion compared to the unloaded iliotibial band condition (**TABLE 1**) (P<.05). A maximum mean increase of 0.5 mm in anterior tibial translation was observed when the load on the iliotibial band was increased from 0 N to 100 N at 15° of flexion. On average, increasing the iliotibial band load from

50 N to 100 N increased anterior tibial translations at all flexion angles, but statistical significance was observed only at 10° , 15° , and 20° of knee flexion.

Increasing the iliotibial band load to 50 N or 100 N did not significantly alter internal/external tibial rotations in full knee extension and at 5° and 10° of knee flexion (TABLE 2) (P>.05). Between 20° and 30° of knee flexion, internal tibial rotation significantly decreased by increasing the iliotibial band load to 50 N (TABLE 2) (P<.05). A maximum mean decrease of 2.3° in internal tibial rotation between the unloaded and 50-N iliotibial band loading conditions was observed at 30° of knee flexion. Significant decreases in internal tibial rotation, compared to the unloaded condition, were also observed when the iliotibial band was loaded with 100 N between 15° and 30° of knee flexion (TABLE 2) (P<.05), with a maximum mean decrease of 4.5° observed at 30° of knee flexion. An increase in iliotibial band load from 50 N to 100 N significantly decreased internal tibial rotation between 15° and 30° of knee flexion (P<.05), but no significant difference in internal tibial rotation was observed between full extension and 10° of knee flexion (P>.05).

Significant increases in valgus tibial rotation were observed when iliotibial band load was increased to either 50 N or 100 N at all knee flexion angles, compared to the unloaded iliotibial band condition (**TABLE 2**) (P<.05). An increase in iliotibial band load from 50 N to 100 N also significantly increased valgus tibial rotation between full knee extension and 20° of knee flexion (**TABLE 2**) (P<.05). The maximum mean increases in valgus tibial rotation from the unloaded condition to 50 N and 100 N of iliotibial band loads were 0.4° at 20° of knee flexion, respectively.

DISCUSSION

Bransmitted through the tibiofemoral articulation, this study demonstrated that an increase in iliotibial band load, which in this study served as a proxy for an increase in tensor fascia latae and gluteus maximus strength, can significantly decrease the loading on the medial compartment of the tibiofemoral articulation. The decrease in the medial compartment loading was accompanied by an increase in loading of the lateral compartment. Further, an increase in iliotibial band load, on average, increased anterior tibial translation and valgus tibial rotation and decreased the amount of medial tibial translation and internal tibial rotation.

As an alternative to surgical and pharmacological interventions, various muscle-strengthening exercise regimens have been investigated as an intervention for medial knee OA.25 In the majority of these studies, the efficacy of muscle strengthening in managing medial knee OA has been primarily evaluated by measuring external knee adduction moment, which is believed to be related to the magnitude of medial compartment loading. However, the external knee adduction moment derived from inverse dynamic analyses cannot accurately predict the internal tibiofemoral contact forces. due to the difficulty of measuring forces generated by active muscles³¹ crossing the joint. Accurate measurement of in vivo medial and lateral compartment load distribution is essential to establishing the efficacy of muscle strengthening programs for patients with knee OA. However, in light of the invasive nature of measuring knee joint contact loads and muscle forces in vivo, few studies have directly measured the load distributions in the knee joint.^{1,24,31}

Using an electromyography-driven model, Winby et al³² demonstrated that the tensor fascia latae contributed up to 25% to the tibiofemoral lateral compartment loading during late stance. In the current biomechanical cadaveric study, the lateral tibiofemoral articulation load significantly increased with an increase in the iliotibial band load. This increase was accompanied by significant medial compartment unloading. Such unloading can theoretically improve function, decrease pain, and slow disease progression in patients with medial knee OA. Recent advances in imaging technology have enabled noninvasive, in vivo measurements of tibiofemoral cartilage contact characteristics during dynamic knee motions.^{6,14} Such methods should be adopted in identifying the most appropriate chondroprotective and disease-modifying interventions.

In addition to the decrease in medial compartment loading observed in this study, an increased iliotibial band load also altered tibiofemoral kinematics. Due to the anterolateral attachment of the iliotibial band on the tibia at the Gerdy tubercle, an increase in iliotibial band load resulted in an increase in anterior tibial translation and valgus tibial rotation and a reduction in the amount of internal tibial rotation and medial tibial translation. Although many of the kinematic changes observed in this study, due to an increase in iliotibial band load, were statistically significant, we cannot speculate on the clinical consequences of these small changes. The increase in valgus tibial rotation and decrease in the amount of internal tibial rotation found in the current study are consistent with the observations reported by Kwak et al,¹⁷ who used quadriceps, hamstrings, and iliotibial band loading of 534 N, 257 N, and 89 N, respectively. In another study, Merican and Amis²⁰ also found an increase in external tibial rotation when the iliotibial band load was increased while maintaining a constant 175-N quadriceps load. However, in contrast to the findings of Kwak et al¹⁷ and the current study, Merican and Amis²⁰ found increased varus tibial rotation when the iliotibial band was loaded. The cause of this discrepancy in varus/valgus tibial rotation is not easily discernible, due to the differences in the loading conditions and testing systems used in these studies.

The following limitations must be carefully considered when interpreting the findings of the current study. Physiological loads on the iliotibial band are

unknown; therefore, we chose to use a previously reported quadriceps-toiliotibial band load ratio of 17% (300-N quadriceps load and 50-N iliotibial band load).17 Further, we did not know what the magnitude of change in iliotibial band load would be in response to an increase in strength and activation of the tensor fascia latae and gluteus maximus, and how much of this potential increase in iliotibial band load would be transmitted to the tibia. Although we found that an increase in iliotibial band load can alter the load distributions in the tibiofemoral articulation, these results need to be corroborated using a more comprehensive iliotibial band loading profile that is representative of physiological conditions.

This cadaveric study simulated physiological loading conditions by applying muscle loads. Although these loads did not simulate weight-bearing conditions, the exvivo setting facilitated the measurement of joint mechanics under repeatable, controlled conditions that are often difficult to achieve in an in vivo setting. It could be speculated that lower amounts of medial compartment unloading may be observed in an in vivo weight-bearing condition, where the joint is potentially more stable. Further, the unloading of the medial compartment under weight-bearing conditions could be due to the correction of frontal plane contralateral pelvic drop, which could not be observed in this cadaveric study. Clearly, due to the differences in these conditions, the findings of this ex vivo study cannot be extrapolated to an in vivo weight-bearing setting.

Finally, load distributions on the menisci were not measured in this study. Future studies are needed to investigate meniscal loading in response to increased iliotibial band load to quantify load redistribution on the menisci. Nonetheless, this study quantified the tibiofemoral articulation loads by using an experimental system with a high degree of accuracy and repeatability, providing important insights into the biomechanics of the knee joint and the biomechanical rationale for future research.

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CONCLUSION

INDINGS OF THIS STUDY INDICATE that an increase in the iliotibial band load, assumed to represent an increase in tensor fascia latae and gluteus maximus strength, can significantly redistribute the tibiofemoral articular load by increasing lateral compartment loading and decreasing medial compartment loading. Clinical studies are needed to corroborate these findings by measuring the in vivo tibiofemoral cartilage contact characteristics before and after the intervention.

KEY POINTS

FINDINGS: In this non-weight-bearing cadaveric model, medial tibiofemoral articulation loads were decreased as a result of increased iliotibial band load. A concomitant increase in lateral tibiofemoral articulation loading and kinematics alterations were also observed. **IMPLICATIONS:** Chondroprotective and disease-modifying effects can potentially be achieved by increasing iliotibial band load in patients with medial knee OA. CAUTION: This was a controlled laboratory study that used cadaveric knee specimens and was performed without simulation of forces that are typically present during weight-bearing activities.

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