

# THE EFFECTS OF POSTERIOR TIBIAL MOBILIZATION ON MENISCAL MOVEMENT: AN IN-SITU INVESTIGATION

Susan Lilly, PT, ScD<sup>1</sup>

Gesine H. Seeber, PT, MS<sup>2,3</sup>

Michael P. Smith, ATC, PhD<sup>4</sup>

Janna M. McGaugh, PT, ScD<sup>5</sup>

C. Roger James, PhD<sup>6</sup>

Jean-Michel Brismée, PT, ScD<sup>2</sup>

Phillip S. Sizer, PT, PhD<sup>2\*</sup>

## ABSTRACT

**Background:** Anterior knee pain during knee extension may be related to a meniscal movement restriction and increased meniscal load during function. One method of treatment involves the use of manual posterior mobilization of the tibia to specifically target the meniscotibial interface of the knee joint.

**Purpose:** The purpose of this study was to measure motion at a cadaveric medial meniscus anterior horn during a posterior tibial mobilization.

**Study Design:** Prospective, multifactorial, repeated-measures laboratory study.

**Methods:** Eight unembalmed cadaveric knee specimens were mounted in a custom apparatus and markers were placed in the medial meniscus, tibia and femur. The tibia was posteriorly mobilized in two randomized knee positions (0 degrees and 25 degrees) using three randomly assigned loads (44.48N, 88.96N, and 177.93N). Markers were photographed and digitally measured and analyzed.

**Results:** All load x position conditions produced anterior displacement of the meniscus on the tibia, where the displacement was significant [ $t(7) = -3.299; p = 0.013$ ] at 0 degrees loaded with 177.93N (mean  $0.41 \pm 0.35$  mm). The results of 2(position) x 3(load) repeated measures ANOVA for meniscotibial displacement produced no significant main effects for load [ $F(2,14) = 2.542; p = 0.114$ ] or position [ $F(1,7) = 0.324, p = 0.587$ ]. All load x position conditions produced significant posterior tibial and meniscal displacement on the femur. The 2(position) x 3(load) repeated measures ANOVA revealed a significant main effect for load for both femoral marker displacement relative to the tibial axis [ $F(2,14) = 77.994; p < 0.001$ ] and meniscal marker displacement relative to the femoral marker [ $F(2,14) = 83.620; p < 0.001$ ].

**Conclusion:** Use of a mobilization technique to target the meniscotibial interface appears to move the meniscus anteriorly on the tibia. It appears that this technique may be most effective at the end range position.

**Level of Evidence:** 2 (laboratory study)

**Keywords:** Anterior knee pain, Knee, Meniscus

<sup>1</sup> MD Anderson Cancer Center, Houston, TX, USA.

<sup>2</sup> Center for Rehabilitation Research, Texas Tech University Health Sciences Center, Lubbock, TX, USA.

<sup>3</sup> University Hospital of Orthopaedics and Trauma Surgery Pius-Hospital, Medical Campus University of Oldenburg, Oldenburg, Germany.

<sup>4</sup> Department of Biology, The Sages College, Troy, NY, USA.

<sup>5</sup> School of Health Professions, Department of Physical Therapy, University of Texas Medical Branch, Galveston, TX, USA.

<sup>6</sup> Texas Tech University Health Sciences Center, Lubbock, TX, USA.

Financial Disclosure and Conflict of Interest: We affirm that we have no financial affiliation (including research funding) or involvement with any commercial organization that has a direct financial interest in any matter included in this manuscript.

## CORRESPONDING AUTHOR

Phillip S. Sizer Jr. PT, PhD, OCS, FAAOMPT  
Professor & Program Director, ScD Program  
in PT

Director, Clinical Musculoskeletal Research  
Lab, Center for Rehabilitation Research  
Faculty, PhD Program in Rehabilitation  
Sciences, SOAHS

Faculty, Medical Pain Fellowship Program, SOM  
Texas Tech University Health Sciences Center  
Lubbock, TX, USA

E-mail: phil.sizer@ttushc.edu