The Function of the Ligamentum Teres in Limiting Hip Rotation: A Cadaveric Study

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- Study completed at Hip Preservation Center, Baylor University Medical Center, Dallas, TX
Financial Disclosures

• Hal D. Martin
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The function of the LT is controversial since XIX century

ON THE USE OF THE LIGAMENTUM TERES OF THE HIP-JOINT. By W. S. Savory, F.R.S., Surgeon and Lecturer on Surgery, St Bartholomew's Hospital, late Professor of Comp. Anat. & Physiol., R.C.S.E.

What is the function of the Ligamentum Teres? Many authors have described this structure, but the function and its significance remain unclear.

Savory, 1874

THE LIGAMENTUM TERES. By J. B. Sutton, Demonstrator of Anatomy, Middlesex Hospital. (Plate VIII.)

The round ligament of the coxo-femoral articulation has long been an anatomical puzzle, consequently many diverse notions exist concerning it.

Sutton, 1883
Ligamentum Teres publications

• Ligamentum teres: a functional description and potential clinical relevance. KSSTA, 2012

Ligamentum teres: a functional description and potential clinical relevance

Roy L. Martin · Ian Palmer · Hal D. Martin

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Abstract

Purpose The primary purpose of this study was to investigate the role the ligamentum teres has in providing hip stability using a biomechanical model. The second purpose was to review arthroscopic findings in those with a complete ligamentum teres rupture and question them regarding instability to determine how clinical findings related to the biomechanical model.

Methods A string model was created to examine ligamentum teres excursion during various hip positions. A retrospective review of 350 consecutive surgical patients identified 20 subjects with a complete ligamentum teres rupture that was not repaired at the time of surgery.

Results The model found the ligamentum teres to have the greatest excursion when the hip was externally rotated behind of the other (IR/EXT). These 5 subjects had osseous risk factors that compromised hip stability including inferior acetabular insufficiency.

Conclusions The ligamentum teres may contribute to hip stability when the hip is in ER/FLEX and IR/EXT. Individuals with osseous risk factors for instability, including inferior acetabular insufficiency, may have instability with squatting (ER/FLEX) and crossing one leg behind of the other (IR/EXT).

Level of evidence IV.

Keywords Ligamentum teres rupture · Instability · Inferior acetabular insufficiency
Ligamentum Teres publications

• Function of the ligamentum teres during multi-planar movement of the hip joint. KSSTA, 2012

Function of the ligamentum teres during multi-planar movement of the hip joint

Benjamin R. Kivlan · F. Richard Clemente · RobRoy L. Martin · Hal D. Martin

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Abstract
Purpose  The purpose of this study was to describe the orientation of the ligamentum teres and quantify the limb position when the ligamentum teres reached its endpoint during a simulated squat position in human cadavers.
Methods  Dissection of eight (4 male; 4 female) cadavers resulted in the complete removal of all soft tissue attachment of the femur to the acetabulum, leaving only the ligamentum teres intact. The limb was then moved into combined flexion and abduction of the hip joint to simulate ligamentum teres endpoint was obtained at a combined average position of 100.6° (range 94°–112°; SD 5.5°; 95% CI 96°–105°) and 20.0° (range 12°–32°; SD 7.0°; 95% CI 14°–26°) flexion and abduction angle.
Conclusions  The ligamentum teres formed a “sling-like” structure to support the femoral head inferiorly as the hip joint was moved into a combined position of flexion and abduction that resembled a squat position. The results help to define a possible role of the ligamentum teres in hip joint stability and possible mechanisms of injury.
Ligamentum Teres publications

• A cadaveric model for ligamentum teres function: a pilot study. KSSTA, 2013

A cadaveric model for ligamentum teres function: a pilot study

RobRoy L. Martin · Benjamin R. Kvitlan · F. Richard Clemente

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Abstract

Purpose Despite the prevalence and clinical consequences of ligamentum teres pathology, its function is poorly understood. The purpose of this study was to help define the role the ligamentum teres may have in hip joint stabilization and determine whether a ball and string model could be used to describe the function of the ligamentum teres.

Methods Eight embalmed cadavers were dissected to remove all soft tissue from around the hip, leaving only the ligamentum teres intact. Available hip abduction, adduction, medial rotation, and lateral rotation range of motion were measured for three repeated trials. The position of the endpoint position based on trial number for the three movements (n.s.).

Conclusion The ligamentum teres consistently tightened to limit hip abduction, medial rotation, and lateral rotation. These results support a ball and string model for the femoral head and ligamentum teres. This information could be important for those with hip instability and ligamentum teres pathology.

Keywords Ligamentum teres pathology · Stabilization · Instability · Hip arthroscopy
Methods

• 12 hips
• Capsule and ligamentum teres were preserved
• IR e ER assessed with the hip in 18 different positions combining:
  - 25° of abduction, neutral and 10° of adduction
  - 10° of extension, 0°, 30°, 60°, 90°, and 120° of flexion
Ligamentum teres was sectioned and IR and ER reassessed in all 18 hip positions
Ligamentum Teres and IR

Degrees of Internal Rotation

Hip Position

- Ext-10° Add
- Ext-0° Add
- Ext-25° Abd
- 0° Flex-10° Add
- 0° Flex-0° Add
- 0° Flex-25° Abd
- 30° Flex-10° Add
- 30° Flex-0° Add
- 30° Flex-25° Abd
- 60° Flex-10° Add
- 60° Flex-0° Add
- 60° Flex-25° Abd
- 90° Flex-10° Add
- 90° Flex-0° Add
- 90° Flex-25° Abd
- 120° Flex-10° Add
- 120° Flex-0° Add
- 120° Flex-25° Abd

Teres Intact
Teres Deficient
Ligamentum Teres and ER

[Graph showing degrees of external rotation vs hip position for different conditions, comparing intact and deficient states.]
Results

- Ligamentum teres influenced IR or ER in 8 out of 18 positions (p < 0.0014).

- Greatest Increases in IR or ER with the hip at 90° or 120° of flexion.
Conclusions

- The LT functions as an end range stabilizer to hip rotation dominantly at 90° or greater of hip flexion.

- The major function of the LT is controlling hip rotation, confirming its contribution to hip stability.
References