Original Article

Oblique popliteal ligament – an anatomical study

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ABSTRACT

Objective: To study the anatomy of the oblique popliteal ligament, as regards its dimensions, expansion and anatomical relationships.

Methods: Eleven cadaver knees were dissected in order to study the anatomy and take measurements of anatomical structures and relationships of the oblique popliteal ligament. The dissection was for posterior access to the proper exposure of the oblique popliteal ligament, the semimembranosus muscle and its expansions. For measurement of dimensions, 40 × 12 needles were used for marking the specific points and a caliper. The angles were calculated using the software ImagePro Plus®.

Results: The distance from the origin of the oblique popliteal ligament to the tibial plateau was 7.4 mm, the thickness at its origin was 7.3 mm, length was 33.6 mm and the tibial plateau angle 34.8°. The length of the expansion of the proximal oblique popliteal ligament was 39.2 mm, thickness 7.8 mm and angle of the oblique popliteal ligament with its expansion 32.2°.

Conclusion: The oblique popliteal ligament is thick, rises in the semimembranosus and protrudes proximally forming an acute angle with the joint interline, crossing the popliteal fossa. In some cases it has a proximal expansion.

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Introduction

The oblique popliteal ligament (OPL) is one of the five insertions of the semimembranosus muscle and forms part of the posterior anatomy of the knee.\(^1\)\(^-\)\(^3\) This ligament crosses the popliteal fossa from medial to lateral and is considered to be primary limiter of genu recurvatum and thus avoid hyperextension of the knee.\(^4\)

The posterior anatomy of the knee consists of a network of structures and has uniquely complex biomechanics. Controlling knee hyperextension due to soft-tissue genu recurvatum is one of the functions of the posterior structures, especially the OPL. Hyperextension may alter gait and may lead to difficulty in walking across uneven ground.

Despite the great importance of the posterior structures of the knee, including the OPL, few studies in the literature have given emphasis to these structures, because no techniques for reconstructing them have been described.

The aim of this study was to examine the anatomy of the OPL with regard to its dimensions, expansions and anatomical relationships.

Materials and methods

This study was conducted in the Department of Anatomy of the Biological Sciences Sector of the Federal University of Paraná, in April and May 2011. Eleven knees from cadavers were dissected with the aims of studying their anatomy and making measurements on the structures and on the anatomical relationships of the OPL.

The inclusion criteria specified that only knees from cadavers with undamaged posterior structures, including the joint capsule, without previous arthroscopy, should be used. Eleven knees fulfilled the criteria. The dissection was performed by means of posterior access and was done such that sufficient exposure of the semimembranosus muscle, the OPL and their expansions was obtained. All the knees were conserved in 10% formal.

To make the measurements, 40 × 12 needles and metal calipers (Aero Space – 150 mm) were used to mark out specific points.\(^5\) Measurements were made of the distance from the origin of the OPL to the tibial plateau (O-P), the thickness of the OPL at its origin (Th-O), the length of the OPL (L), the thickness of the semimembranosus muscled at the point where the OPL arises (Th-S), the thickness of the OPL at the origin of its proximal expansion (Th-OPL-Exp), and the thickness of the proximal expansion of the OPL (Th-Exp) and the length of the proximal expansion of the OPL (L-Exp).

The angles of the OPL with the tibial plateau (A-P) and of the OPL with its expansion (A-Exp) were calculated with the aid of the ImagePro Plus\textsuperscript® software, version 4.5 for Windows (Media Cybernetics, Inc., USA) (Fig. 1).

Results

The mean and standard deviation results from the measurements made are presented in Table 1.

Proximal expansion of the OPL, with a mean length of 39 ± 7 mm (L-Exp), was observed in four of the eleven cases. It was found to be absent in the other seven anatomical specimens (Fig. 1).

Discussion

Unlike studies on the medial, lateral and central pivot structures of the knee, anatomical and biomechanical studies on the OPL are rare. This lack of interest probably comes from the
The semimembranosus muscle acts as an important structure of the knee. Studies have shown that it possesses a distal expansion with the tibial plateau (Fig. 404). This expansion is vital for the stability of the knee joint and plays a crucial role in the function of the knee. It is important to understand the anatomy of the oblique popliteal ligament (OPL) as it relates to the semimembranosus muscle.

### Table 1 – Means and standard deviations for the anatomical structures of the oblique popliteal ligament.

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<tbody>
<tr>
<td>Mean</td>
<td>7.4</td>
<td>7.4</td>
<td>33.6</td>
<td>34.8</td>
<td>11.4</td>
<td>5.2</td>
<td>7.8</td>
<td>39.2</td>
<td>32.2</td>
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<tr>
<td>Standard deviation</td>
<td>2.0</td>
<td>2.0</td>
<td>4.8</td>
<td>8.0</td>
<td>2.0</td>
<td>2.5</td>
<td>3.3</td>
<td>7.2</td>
<td>6.6</td>
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</table>

O-P, distance from the origin of the OPL to the tibial plateau; Th-O, thickness of the OPL at its origin; L, length of the OPL; A-P, angle of the OPL with the tibial plateau; Th-S, thickness of the semimembranosus at the point at which the OPL arises from it; Th-OPL-Exp, thickness of the OPL at the origin of its proximal expansion; Th-Exp, thickness of the proximal expansion of the OPL; L-Exp, length of the proximal expansion of the OPL; A-Exp, angle of the OPL with its expansion; SD, standard deviation.

In the present study, it was observed that the OPL is a structure that originates together with the tendon of the semimembranosus muscle, and that its insertion in the posterior capsule of the knee is together with the lateral condyle, thereby forming an angle of 34.8° with the medial plateau, with a path from distally medial to proximally lateral.

In a descriptive anatomical study on the posterior structures of the knee by means of magnetic resonance analysis, it was found that the OPL had a mean thickness of 7.4 mm. On the other hand, LaPrade et al. found slightly higher numbers (9.5 mm). Moreover, in evaluating the length of the ligament and the thickness of its lateral insertion, there was greater discordance. In the present study, it was observed that the length of the OPL was approximately 33.6 mm, while in the study by LaPrade this number reached 48 mm. One possible explanation for this is that LaPrade made this measurement on the proximal expansion whereas it was on the...
distal expansion in the present study. The thickness of the proximal expansion was also divergent. A mean value of 7.8 mm was found in the present study, while LaPrade et al. found a value of 4.5 mm.

The thickness of the semimembranosus in its portion from which the tendon of the OPL originates presented very similar values. In the present study, this was 11.4 mm and in the study by LaPrade et al., 12 mm. This similarity possibly occurred because this measurement is extremely simple to make and there is little margin for variation between examiners.

**Conclusion**

The OPL is a thick ligament that arises in the semimembranosus, at 7.4 mm from the tibial plateau, projects proximally, forms an angle of 34.4 degrees with the joint interline and crosses the popliteal fossa. In some cases, it presents proximal expansion.

**Conflicts of interest**

The authors declare no conflicts of interest.

**REFERENCES**