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Original Article

Ultrasonography for evaluation of hamstring tendon diameter: is it possible to predict the size of the graft?☆

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ABSTRACT

Objective: Perform the preoperative measurement of the hamstring tendons using ultrasound imaging, validating and correlating the measured value with that found during surgical reconstruction of the ligament.

Methods: A cross-sectional study was carried out with 24 patients who underwent ultrasonographic measurement of the semitendinosus and gracilis muscle tendons and were subsequently submitted to surgical reconstruction of the ACL, with ipsilateral semitendinosus and gracilis tendon grafting.

Results: The patients' ages ranged from 16 to 43 years, with a mean of 24.8 years (SD = 8.4 years), 79.2% were men, and the distribution by side was 41.7% right knees and 58.3% left knees. A non-significant correlation coefficient was found between the area calculated by ultrasound (2 × semitendinosus area + 2 × gracilis area) and the intraoperative measurement ($r = 0.16$; $p = 0.443$). No evidence of a difference between intraoperative measurements <8 mm and ≥8 mm was found for the area calculated by the ultrasound ($p = 0.746$). The difference observed between the groups was −0.01 (95% CI: −0.09 to 0.07).

Conclusion: Preoperative ultrasound imaging of the semitendinosus and gracilis tendons does not present a statistically significant correlation with the intraoperative measurement of the quadruple hamstring graft for ligament reconstruction.

☆ Study conducted at Universidade Federal de São Paulo, Escola Paulista de Medicina, Centro de Ortopedia e Traumatologia do Esporte (CETE), São Paulo, SP, Brazil.

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Ultrassonografia para avaliação do diâmetro dos tendões flexores do joelho: é possível predizer o tamanho do enxerto?

Palavras-chave:
Ligamento cruzado anterior
Traumatismos do joelho
Ultrassonografia

RESUMO

Objetivo: Fazer a mensuração pré-operatória dos tendões flexores do joelho com o uso do exame de ultrassonografia, validar e correlacionar o valor medido com aquele encontrado durante a reconstrução cirúrgica do ligamento.

Métodos: Estudo transversal com 24 pacientes submetidos a mensuração ultrassonográfica dos tendões dos músculos semitendíneo e grácil e posteriormente submetidos a reconstrução cirúrgica do LCA, com enxerto ipsilateral dos tendões semitendíneo e grácil do próprio paciente.

Resultados: A idade dos pacientes variou entre 16 e 43 anos, com média de 24,8 (DP = 8,4), 79,2% eram homens e a distribuição quanto ao lado foi de 41,7% joelhos direitos e 58,3% joelhos esquerdos. Foi encontrado coeficiente de correlação não significante entre a área calculada a partir do ultrassom (2 × área do semitendíneo + 2 × área do grácil) e a medida obtida intraoperatoriamente (r = 0,16, p = 0,443). Não foi encontrada evidência de diferença entre medidas intraoperatórias < 8 mm e ≥ 8 mm quanto à área calculada a partir do ultrassom (p = 0,746). A diferença observada entre os grupos foi de -0,01 (IC 95%: -0,09 a 0,07).

Conclusão: A mensuração pré-operatória por método de imagem ultrassonográfico dos tendões dos músculos semitendíneo e grácil não apresenta correlação estatisticamente significante com a mensuração intraoperatória do enxerto quádruplo de flexores para reconstrução ligamentar.

Introduction

Anterior cruciate ligament (ACL) reconstruction is one of the most performed surgeries worldwide, with more than 120,000 procedures per year in the United States.[1] In order to restore the ACL function on knee stability, graft reconstruction is currently considered the gold standard. This graft may be autologous or from a tissue bank (allograft).[2,3]

The choice of graft depends on the patient, the type of implant used, and the availability of a tissue bank.[3,4] The following grafts are most commonly used: tendons of the knee flexor muscles (hamstring), semitendinosus and gracilis, patellar tendon, and quadricipital tendon. In Brazil, knee flexor grafting is the option used by 82.3% of the knee specialists who participated in research at a national conference.[5] In addition to adequate technique, graft size is also extremely important for the success of the procedure.[4]

When using quadricipital or patellar grafts, it is possible to determine graft size.[4] However, when the graft option is the hamstrings (knee flexor tendons), the literature does not describe a well-recognized and accurate method for predicting graft size preoperatively. Previous studies have used different methods of preoperative measurement to adequately predict flexor graft size, such as anthropometric data[5–9] and imaging studies.[10–15]

The limitation in preoperative measurement in relation to flexor grafts is important, as there are reports in the literature that grafts smaller than 8 mm in diameter increase the chance of ACL reconstruction failure.[4,16–19]

The present study is aimed at performing the preoperative measurement of the knee flexor tendons with ultrasound imaging, and to validate and correlate the measured value with that found during the surgical reconstruction of the ligament.

Material and methods

This is a cross-sectional study submitted and approved by the Research Ethics Committee of the institution in which the study was conducted. The inclusion criteria were patients with clinical and radiological diagnosis of ACL injury who underwent surgical reconstruction of this ligament using an autograft from the semitendinosus and gracilis tendons of the ipsilateral limb, who agreed to participate in the study and signed the Informed Consent Form. The non-inclusion criteria were patients in whom flexor grafts were used for a previous surgical procedure and patients with rheumatologic diseases. The exclusion criteria were patients who for any reason, despite having been scheduled to receive a semitendinosus-gracilis graft, received grafts other than the flexor graft during surgery, and patients who chose not to participate in the study.

Ultrasound evaluation

The diameter of the semitendinosus and gracilis tendons was measured one week before the surgical procedure by a preoperative ultrasound evaluation of the knee. The same radiologist performed all the exams using a GE Healthcare Logic P6 device (GE Healthcare, Little Chalfont, UK) with a

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