

Prediction of length and diameter of hamstring tendon autografts for knee ligament surgery in Caucasians

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BACKGROUND

Prediction of length and diameter of hamstring tendon autografts is clinically useful. It may reduce the need for expensive allografts in complex knee ligament surgery. Autografts enhance the quality of reconstructions with regard to graft rupture and knee stability compared to allografts.

Furthermore, prediction of hamstring autograft tendon dimension is beneficiary for complex knee ligament reconstructions in countries where allografts are not available.

OBJECTIVES

The aim of this study was to analyse whether length and diameter of hamstring tendon autografts can be predicted preoperatively with anthropometric parameters and patient characteristics.

MATERIALS & METHODS

In this observational study, 725 consecutive Caucasian patients scheduled for ACL reconstruction were included. Preoperatively gender, age, height and weight were recorded. After harvest, tendon lengths of both gracilis- and semitendinosus tendons were measured. Diameter of the final 4-strand hamstring autograft was recorded. Relationship between length and diameter of tendon grafts and different anthropometric parameters were assessed by linear and logistic regression analyses.

Table 1 Patient characteristics

	Total (n = 725)
Age (year)	28.7 (±10.6)
Gender [% female (n)]	35.4 (257)
Weight (kg)	76.5 (±13.4)
Height (cm)	177.3 (±9)
BMI (kg/m ²)	24.3 (±3.5)

Data are presented as mean (standard deviation), unless otherwise indicated
n number, *BMI* body mass index

Table 2 Predictors of tendon length

	Univariate			Multivariate		
	Regr. co.	(95% CI)	P value	Regr. co.	(95% CI)	P value
Gracilis						
Age	-0.01	(-0.03; 0.01)	n.s.	-	-	-
Gender (female)	-1.9	(-2.3; -1.4)	< 0.001	0.06	(-0.49; 0.62)	n.s.
Weight	0.06	(0.04; 0.07)	< 0.001	-0.005	(-0.02; 0.01)	n.s.
Height	0.15	(0.13; 0.17)	< 0.001	0.16	(0.13; 0.19)	< 0.001
Semitendinosus						
Age	-0.01	(-0.03; 0.01)	n.s.	-	-	-
Gender (female)	-2.4	(-2.8; -1.9)	< 0.001	-0.03	(-0.55; 0.49)	n.s.
Weight	0.07	(0.06; 0.09)	< 0.001	-0.01	(-0.02; 0.01)	n.s.
Height	0.19	(0.17; 0.21)	< 0.001	0.20	(0.17; 0.23)	< 0.001

Regr. co. regression coefficients, 95% CI 95% confidence interval, n.s. non-significant

Table 3 Predictors of diameter graft < 8 mm

	Univariate			Multivariate		
	OR	(95% CI)	P value	OR	(95% CI)	P value
Age	0.98	(0.95; 1.01)	n.s.	-	-	-
Gender (female)	4.5	(2.3; 8.7)	< 0.001	4.5	(1.9; 11.0)	0.001
Weight	0.95	(0.93; 0.98)	0.001	0.97	(0.93; 1.01)	n.s.
Height	0.96	(0.93; 0.99)	0.019	1.04	(0.99; 1.10)	n.s.

OR odds ratios, 95% CI 95% confidence interval, n.s. non-significant

Table 4 Gender related to diameter graft

	< 8 mm [% (n)]	8 mm [% (n)]	> 8 mm [% (n)]
Male (n = 467)	2.8 (13)	36.8 (172)	60.4 (282)
Female (n = 256)	11.3 (29)	73.1 (187)	15.6 (40)
Total (n = 723)	5.8 (42)	49.7 (359)	44.5 (322)

Two missing values graft diameter, *n* number



RESULTS

Baseline characteristics of the study population are shown in Table 1. Eighteen patients had missing data (respectively height, weight, gracilis length, semitendinosus length, and graft diameter in 8, 11, 4, 2, and 2 patients). Some patients had more than one missing value.

Mean lengths of the semitendinosus and gracilis tendon autograft were 28.9 ± 3.1 standard deviation (SD) cm and 27.7 ± 3.0 cm SD respectively. Two patients (0.3%) had a semitendinosus tendon length shorter than 21 cm. Twelve patients (1.7%) had gracilis tendons shorter than 21 cm. A total of 42 patients (5.8%) had graft diameters ≤ 7 mm, 359 patients (49.7%) had graft diameters of 8 mm, and 322 patients (44.5%) diameters ≥ 9 mm.

Length of both the gracilis and semitendinosus tendon was correlated to patient height (Table 2). A regression coefficient of 0.16 signifies that an increase of 1 cm of patient height is correlated with an increase of 0.16 cm of gracilis length.

Because of the limited number of patients with tendon autografts < 21 cm, assessment of the relationship between this cut-off point and anthropometric parameters and patient characteristics was not performed. With regard to tendon lengths < 28 cm, shorter patients more frequently had gracilis and semitendinosus tendon autografts < 28 cm.

A correlation was found between gender and graft diameter < 8 mm (Table 3). Table 4 shows that women more often had a graft diameter < 8 mm in comparison with men.

CONCLUSIONS

Hamstring autograft length and size can be predicted in Caucasians. Length of the gracilis and semitendinosus tendons was related to patient height. Smaller graft diameter was related to female gender.

REFERENCES

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Rob P.A. Janssen et al. (2015) **Prediction of length and diameter of hamstring tendon autografts for knee ligament surgery in Caucasians.** Knee Surg Sports Traumatol Arthrosc Jun 28 [Epub ahead of print]

Art: Gracias by Rhea Strik



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