ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

GÖTEBORGS UNIVERSITET

Greater Hamstrings Autograft Size After ACL Reconstruction Is Associated With Lower Odds For Graft Failure: Systematic Review and Meta-Analysis

Rebecca Hamrin Senorski, PT, MSc, Presenter, Sweden
Kevin Teow, MD, Sweden
Johan Högberg PT, MSc, Sweden
Janina Kaarre, MD, USA
Anna Nordenholm, PT, PhD, Åland
Thorkell Snaebjörnsson, MD, PhD, Iceland
Volker Musahl, MD, USA
Kristian Samuelsson, MD, PhD, Sweden
Eric Hamrin Senorski, PT, PhD, Sweden

Faculty Disclosure Information

- Nothing to disclose in relation to this eposter

- My disclosure(s) is/are
  - Kristian Samuelsson is a member of board at Getinge AB
  - Volker Musahl reports a relationship with
    - Smith and Nephew Inc that includes: consulting or advisory, funding grants, and speaking and lecture fees.
    - Arthrex Inc that includes: funding grants.
    - International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS) that includes: board membership.
    - Has patent #9,949,684 issued to U.S. Patent.
    - Deputy editor-in-chief of Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA).
- Eric Hamrin Senorski is the associate editor of Journal of Orthopeadic and Sports Physical Therapy.

ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

GÖTEBORGS UNIVERSITET

Background

Graft selection for ACL reconstruction (ACLR) should be individualized depending on patient history (e.g. number of ruptures), characteristics (e.g. knee laxity), type of sports played (e.g. hamstring or quadriceps dominant), and surgeons experience (1). Graft diameter/width (collectively graft size) has been suggested as a predictor for graft failure, where hamstring tendon (HT) autograft diameters <8 millimeters (mm) has been reported to increased risk for graft failure compared to ≥8 mm (2-4). However, there is conflicting evidence on the graft size's impact on graft failure, thus a systematic review and meta-analysis is warranted.

Purpose

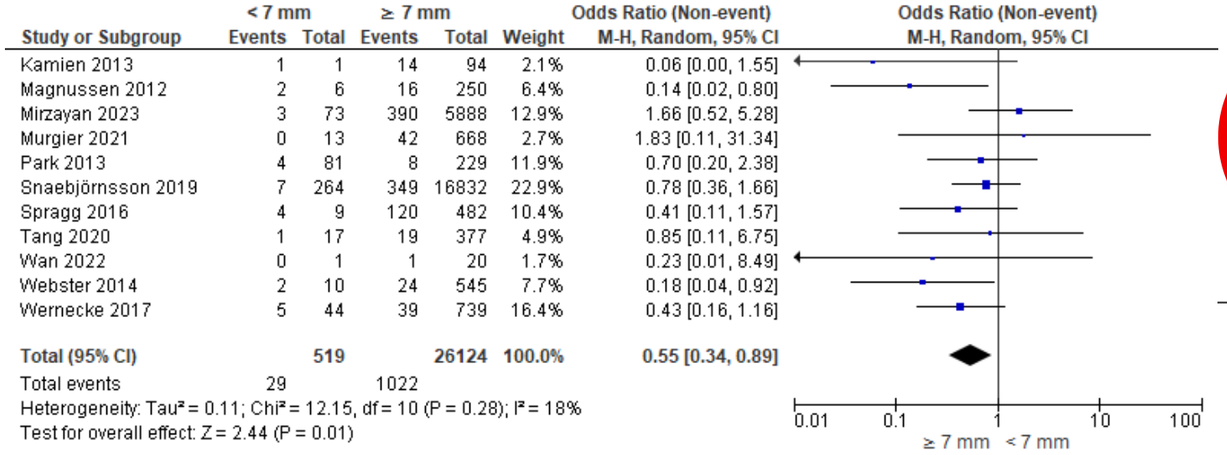
The objective of this systematic review and meta-analysis was to investigate the association between graft size and graft failure for HT, and patellar tendon (PT) autografts.

Metod

Medline, PubMed, Cochrane Library, Embase, Amed, and Web of Science were searched at three separate time points. Eligible studies had included patients who had undergone primary ACLR, which reported a specified graft size for graft failures and without (survivals) graft failure after ACLR. Standardized mean differences were calculated for continuous variables, and odds ratios expressed with 95% confidence interval for the dichotomous variables of graft size for survivals versus graft failures. Risk of bias was assessed with RoBANS 2. Certainty of evidence was assessed with GRADE.

Results

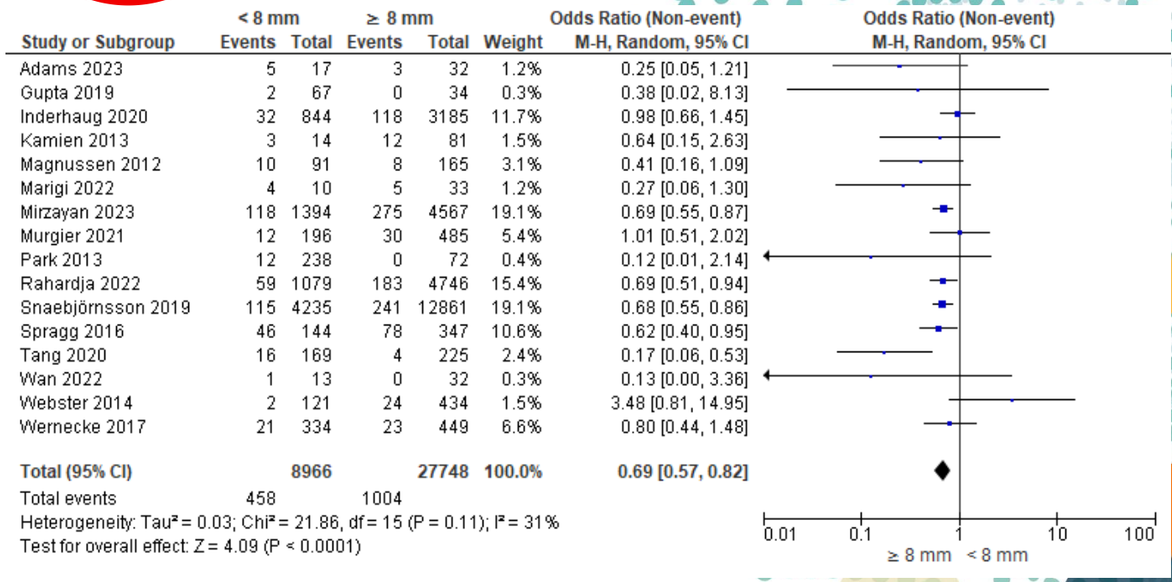
A total of 45,572 patients of which 43,261 HT autografts, 2,311 PT autografts were covered in the included 31 articles. An HT autograft size of ≥7 mm had 45% lower odds for a graft failure compared to <7 mm (p = 0.01, figure 1), ≥8 mm HT autograft size had 26% lower odds for a graft failure compared to <8 mm (p=0.0002, figure 2).



Study or Subgroup	< 7 mm Events	Total	≥ 7 mm Events	Total	Weight	Odds Ratio (Non-event) M-H, Random, 95% CI
Kamien 2013	1	1	14	94	2.1%	0.06 [0.00, 1.55]
Magnussen 2012	2	6	16	250	6.4%	0.14 [0.02, 0.80]
Mirzayan 2023	3	73	390	5888	12.9%	1.66 [0.52, 5.28]
Murgier 2021	0	13	42	668	2.7%	1.83 [0.11, 31.34]
Park 2013	4	81	8	229	11.9%	0.70 [0.20, 2.38]
Snaebjörnsson 2019	7	264	349	16832	22.9%	0.78 [0.36, 1.66]
Spragg 2016	4	9	120	482	10.4%	0.41 [0.11, 1.57]
Tang 2020	1	17	19	377	4.9%	0.85 [0.11, 6.75]
Wan 2022	0	1	1	20	1.7%	0.23 [0.01, 8.49]
Webster 2014	2	10	24	545	7.7%	0.18 [0.04, 0.92]
Wernecke 2017	5	44	39	739	16.4%	0.43 [0.16, 1.16]
Total (95% CI)		**519**		**26124**	**100.0%**	**0.55 [0.34, 0.89]**
Total events	29		1022			

Heterogeneity: Tau² = 0.11; Chi² = 12.15, df = 10 (P = 0.28); I² = 18%
Test for overall effect: Z = 2.44 (P = 0.01)

Figure 1. Survivals versus graft failure for hamstrings tendon autograft ≥7 millimeters versus <7 millimeters.



Study or Subgroup	< 8 mm Events	Total	≥ 8 mm Events	Total	Weight	Odds Ratio (Non-event) M-H, Random, 95% CI
Adams 2023	5	17	3	32	1.2%	0.25 [0.05, 1.21]
Gupta 2019	2	67	0	34	0.3%	0.38 [0.02, 8.13]
Inderhaug 2020	32	844	118	3185	11.7%	0.98 [0.66, 1.45]
Kamien 2013	3	14	12	81	1.5%	0.64 [0.15, 2.63]
Magnussen 2012	10	91	8	165	3.1%	0.41 [0.16, 1.09]
Marigi 2022	4	10	5	33	1.2%	0.27 [0.06, 1.30]
Mirzayan 2023	118	1394	275	4567	19.1%	0.69 [0.55, 0.87]
Murgier 2021	12	196	30	485	5.4%	1.01 [0.51, 2.02]
Park 2013	12	238	0	72	0.4%	0.12 [0.01, 2.14]
Rahardja 2022	59	1079	183	4746	15.4%	0.69 [0.51, 0.94]
Snaebjörnsson 2019	115	4235	241	12861	19.1%	0.68 [0.55, 0.86]
Spragg 2016	46	144	78	347	10.6%	0.62 [0.40, 0.95]
Tang 2020	16	169	4	225	2.4%	0.17 [0.06, 0.53]
Wan 2022	1	13	0	32	0.3%	0.13 [0.00, 3.36]
Webster 2014	2	121	24	434	1.5%	3.48 [0.81, 14.95]
Wernecke 2017	21	334	23	449	6.6%	0.80 [0.44, 1.48]
Total (95% CI)		**8966**		**27748**	**100.0%**	**0.69 [0.57, 0.82]**
Total events	458		1004			

Heterogeneity: Tau² = 0.03; Chi² = 21.86, df = 15 (P = 0.11); I² = 31%
Test for overall effect: Z = 4.09 (P < 0.0001)

Figure 2. Survivals versus graft failure for hamstrings tendon autograft ≥8 millimeters versus <8 millimeters.

ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11 | GÖTEBORGS UNIVERSITET

Results

An ≥9 mm HT autograft size had 23% lower odds for a graft failure compared to <9 mm (p=0.0008, figure 3) and, ≥10 mm HT autograft size had 31% lower odds for a graft failure compared to <10 mm (p=0.03, figure 4). No significant odds for a graft failure were observed for patients with >10 mm compared to ≤10 mm or for patients with PT autograft.

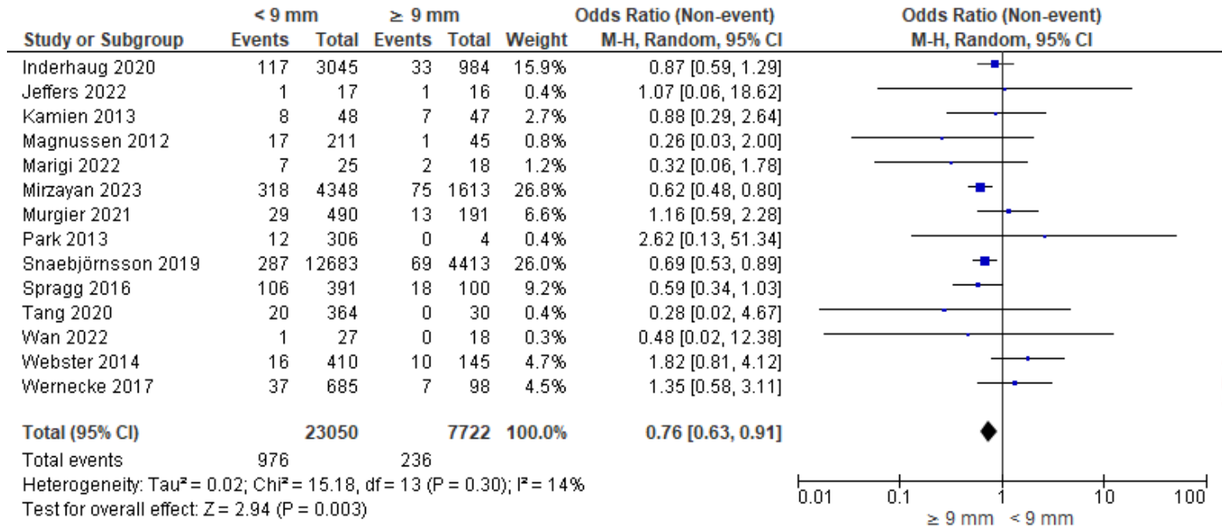


Figure 3. Survivals versus graft failure for hamstrings tendon autograft ≥9 millimeters versus<9 millimeters

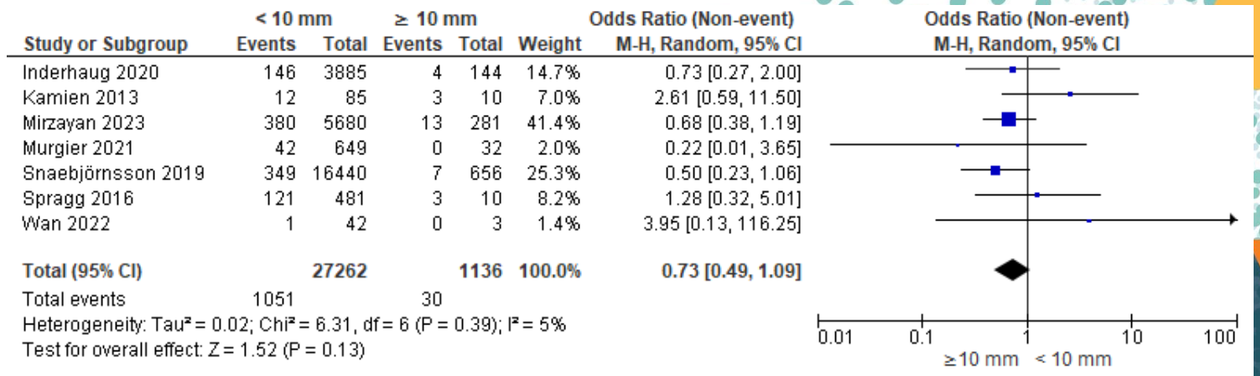
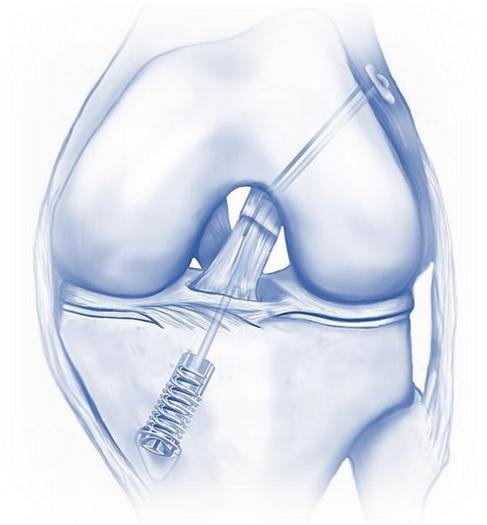


Figure 4. Survivals versus graft failure for hamstrings tendon autograft ≥10 millimeters versus <10 millimeters

ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11 | GÖTEBORGS UNIVERSITET

Conclusion

Patients treated with a greater HT autograft size have reduced odds for a graft failure compared to patients with a smaller autograft size. There was no association between graft size for patients treated with PT autograft and graft failure. Surgeons may consider the graft size at the time of ACLR as the size of HT autograft influences the risk for a graft failure.



ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

GÖTEBORGS UNIVERSITET

Want to know more?

Name: Rebecca Hamrin Senorski

E-mail: rebecca.hamrin.senorski@gu.se

References

1. Kim HS, Seon JK, Jo AR. Current trends in anterior cruciate ligament reconstruction. Knee Surg Relat Res. Dec 2013;25(4):165-73. doi:10.5792/ksrr.2013.25.4.165

2. Spragg L, Chen J, Mirzayan R, Love R, Maletis G. The Effect of Autologous Hamstring Graft Diameter on the Likelihood for Revision of Anterior Cruciate Ligament Reconstruction. *The American Journal of Sports Medicine*. 2016/06/01 2016;44(6):1475-1481. doi:10.1177/0363546516634011

3. Snaebjörnsson T, Hamrin-Senorski E, Svantesson E, et al. Graft Diameter and Graft Type as Predictors of Anterior Cruciate Ligament Revision: A Cohort Study Including 18,425 Patients from the Swedish and Norwegian National Knee Ligament Registries. *J Bone Joint Surg Am*. Oct 16 2019;101(20):1812-1820. doi:10.2106/jbjs.18.01467

4. Alkhalaf FNA, Hanna S, Alkhaldi MSH, Alenezi F, Khaja A. Autograft diameter in ACL reconstruction: size does matter. *SICOT J*. 2021;7:16-16. doi:10.1051/sicotj/2021018

ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11 | GÖTEBORGS UNIVERSITET