Impact Of ACLR Graft Choice On Meniscal Repair Outcomes

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Disclosures

- David Flanigan, MD is a consultant for and receives research support from Vericel, Zimmer, and Smith & Nephew; is a consultant for ConMed-MTF and DePuy Mitek; and receives research support from MTF, Histogenics, Aesculap, Cartiheal, Anika Therapeutics, and Moximed
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Current Literature

- Meniscal degradation and removal is well associated with the onset of osteoarthritis[1,2]
- Failure rates of meniscal repairs continue to be significant, especially in the context of concomitant anterior cruciate ligament reconstruction (ACLR)[3-5]
- 2018 Study: Techniques that increased knee stability during concomitant ACLR and meniscal repair was associated with **improved** meniscal success rates[6]
- Minimal literature analyzing the impact ACL graft choice may have on meniscal repair success during concomitant repairs exists

Purpose

- To evaluate the relationship between anterior cruciate ligament reconstruction (ACLR) graft choice and meniscal repair outcomes during concomitant ACLR and meniscal repairs.

- We hypothesized that
  1. Patients who received a hamstring autograft will have a lower incidence of meniscal repair failure compared to those who received any allograft
  2. Patients who received a hamstring autograft will yield better patient-reported outcome measures (PROMs) compared to those who received any allograft

Materials and Methods

- Retrospective chart review identified 241 patients who underwent concomitant ACLR and meniscal repair during the study period
- Inclusion criteria:
  - Patients who received any allograft or hamstring autograft during the ACLR
  - Minimum of 1 year follow up

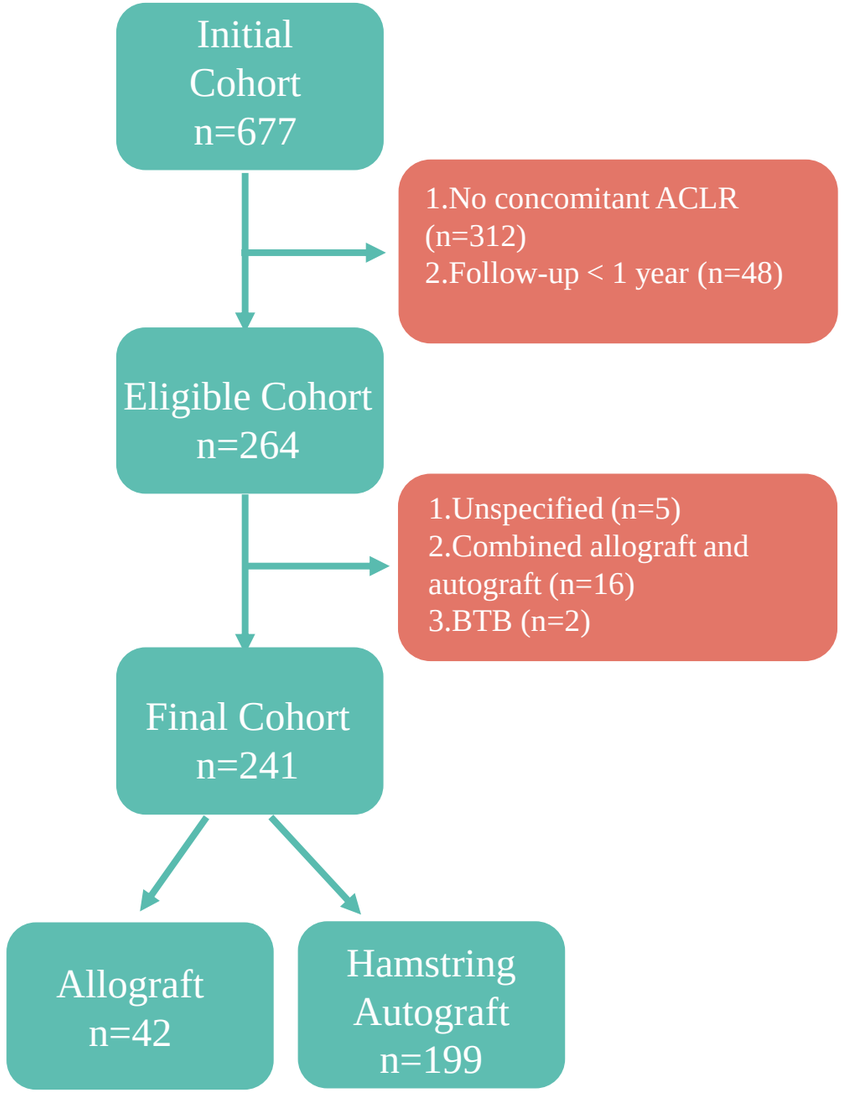

Table 1: Patient Demographics

	Allograft (N = 42)	Hamstring Autografts (N=199)	p-value
Age (Mean ± SD)	35.15 ± 11.92	25.86 ± 9.52	***<0.05**
BMI	30.32 ± 7.00	27.01 ± 5.43	***<0.05**
Missing	*0*	*15*	
Sex (n. %)			
Female	13	86	
Male	29	113	
Meniscal Repair Location			
Medial	32	127	
Lateral	4	44	
Both	6	27	
Smoker			
Never	30	152	
Former	5	12	
Current	7	24	
Missing		*11*	

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Table 2: Meniscal Repair Outcomes by ACL Graft Group

	Allograft (N = 42)	Hamstring (N=199)	p-value
Side of Repair			
Medial	32	128	
Lateral	1	44	
Both	6	27	
Failed (%)	7 (16.67)	54 (27.14)	0.221
Medial	7 (18.75)	41 (32.03)	
Lateral	0 (0)	10 (22.73)	
Both	0 (0)	3 (11.11)	
Follow Up Length	4.74 ± 3.35	5.03 ± 3.17	0.605
Time to Failure	1.63 ± 1.01	2.52 ± 2.36	0.19
Unknown	*3*	*5*	

Table 3: Patient Reported Outcomes by ACL Graft Group

	Allograft (N = 42)	Hamstring (N=199)	p-value
KOOS			
Pain	85.83 ± 16.87	88.78 ± 11.67	0.460
Symptoms	83.42 ± 18.15	82.55 ± 15.79	0.843
ADL	88.01 ± 18.98	93.71 ± 9.941	0.204
Sport	68.75 ± 32.72	76.83 ± 25.53	0.305
QOL	61.01 ± 25.66	67.18 ± 25.70	0.33
Missing	*22*	*87*	
Marx Activity	4.70 ± 4.27	7.79 ± 5.06	***0.007**
Missing	*22*	*87*	
IKDC	73.28 ± 19.44	79.6 ± 16.11	0.187
Missing	*22*	*87*	

Discussion and Conclusions

- ACLR graft choice does not appear to influence the rate of meniscal repair failures
  - These results contraindicate a 2019 study that showed allografts had a 2.34 odds ratio of meniscal repair failure compared to soft tissue autografts and bone-patellar-tendon-bone autografts[7]

- Patients who received Hamstring Autografts reported superior PROM scores after meniscal repair, although not statistically significant
  - Previous studies demonstrating significantly better PROMs among hamstring autografts after ACLR and ACLR revision surgeries support this observed trend[8,9]

Limitations

- Large difference in sample size between groups led to reduced power
  - Hamstring Autografts = 199, Allograft = 42
- Poor response to follow-up led to missing PROMs in each group
  - Hamstring Autografts = 87 missing, Allograft = 22 missing
- Statistically significant differences between groups may have led to confounding results
  - Age, BMI

Future Directions

- Larger sample size to:
  - Control for potential confounding variables
  - Increase the power of the study

- Examine meniscal repair outcomes and PROM's within different follow-up windows to determine the long-term association between ACLR graft choice and surgical outcomes

References

1. Aït Si Selmi, T., Fithian, D., & Neyret, P. (2006). The evolution of osteoarthritis in 103 patients with ACL reconstruction at 17 years follow-up. *The Knee*, *13*(5), 353–358.
2. Ruano, J. S., Sitler, M. R., & Driban, J. B. (2017). Prevalence of Radiographic Knee Osteoarthritis After Anterior Cruciate Ligament Reconstruction, With or Without Meniscectomy: An Evidence-Based Practice Article. *Journal of athletic training*, *52*(6), 606–609.
3. Nepple, J. J., Dunn, W. R., & Wright, R. W. (2012). Meniscal repair outcomes at greater than five years: a systematic literature review and meta-analysis. *The Journal of bone and joint surgery. American volume*, *94*(24), 2222–2227.
4. MARS Group, Wright, R. W., Huston, L. J., Haas, A. K., Nwosu, S. K., Allen, C. R., Anderson, A. F., Cooper, D. E., DeBerardino, T. M., Dunn, W. R., Lantz, B., Mann, B., Spindler, K. P., Stuart, M. J., Pennings, J. S., Albright, J. P., Amendola, A. N., Andrish, J. T., Annunziata, C. C., Arciero, R. A., … York, J. J. (2020). Meniscal Repair in the Setting of Revision Anterior Cruciate Ligament Reconstruction: Results From the MARS Cohort. *The American journal of sports medicine*, *48*(12), 2978–2985.
5. Paxton, E. S., Stock, M. V., & Brophy, R. H. (2011). Meniscal repair versus partial meniscectomy: a systematic review comparing reoperation rates and clinical outcomes. *Arthroscopy : the journal of arthroscopic & related surgery : official publication of the Arthroscopy Association of North America and the International Arthroscopy Association*, *27*(9), 1275–1288. https://doi.org/10.1016/j.arthro.2011.03.088
6. Sonnery-Cottet, B., Saithna, A., Blakeney, W. G., Ouanezar, H., Borade, A., Daggett, M., Thaunat, M., Fayard, J. M., & Delaloye, J. R. (2018). Anterolateral Ligament Reconstruction Protects the Repaired Medial Meniscus: A Comparative Study of 383 Anterior Cruciate Ligament Reconstructions From the SANTI Study Group With a Minimum Follow-up of 2 Years. *The American journal of sports medicine*, *46*(8), 1819–1826.
7. Sarraj, Mohamed, Ryan P. Coughlin, Max Solow, Seper Ekhtiari, Nicole Simunovic, Aaron J. Krych, Peter MacDonald, and Olufemi R. Ayeni. "Anterior Cruciate Ligament Reconstruction with Concomitant Meniscal Surgery: A Systematic Review and Meta-Analysis of Outcomes." *Knee Surgery, Sports Traumatology, Arthroscopy: Official Journal of the ESSKA* 27, no. 11 (November 2019): 3441–52.
8. Wang, H. D., Zhang, H., Wang, T. R., Zhang, W. F., Wang, F. S., & Zhang, Y. Z. (2018). Comparison of clinical outcomes after anterior cruciate ligament reconstruction with hamstring tendon autograft versus soft-tissue allograft: A meta-analysis of randomised controlled trials. *International journal of surgery (London, England)*, *56*, 174–183. https://doi.org/10.1016/j.ijsu.2018.06.030
9. MARS Group, & MARS Group (2014). Effect of graft choice on the outcome of revision anterior cruciate ligament reconstruction in the Multicenter ACL Revision Study (MARS) Cohort. *The American journal of sports medicine*, *42*(10), 2301–2310. https://doi.org/10.1177/0363546514549005