

Outcomes After Operative and Non-operative Treatment of Anterior Cruciate Ligament Ruptures in Patients Aged 40 and Older: A 2:1 Propensity Score Matched Analysis

Madison Hayes-Lattin BS, Richard N Puzzitiello MD, Jack T Bragg MD, Stephen M Sylvia MD, Matthew J Salzler MD



Financial Disclosures

None



Objective

To compare the subjective outcomes and rates of subsequent operations for patients aged 40 and older with anterior cruciate ligament (ACL) ruptures treated nonoperatively or with a primary allograft ACL reconstruction (ACLR).



Introduction

- ACL injuries in patients over 40 are increasingly common without clinical guidelines for management
- Operative management is increasingly pursued with satisfactory outcomes in this patient population
- There is a lack of comparative studies investigating operative management vs. nonoperative management of ACL injuries in patients over 40



Methodology

- Retrospective review of ACL injuries in patients over 40 at a single institution
- Minimum 2 years of follow-up, excluded multi-ligament repair
- Propensity score matching based on age, sex, BMI, sports related mechanism of injury, meniscal tears, or outerbridge grade III/IV lesions in 2:1 nearest neighbor fashion



Propensity Score Matching

- Statistically reduces biases from confounding variables for retrospective studies to mimic the process of randomization
- Define variables that could serve as possible confounders and group patients according to these variables
 - Propensity score assigned based on these variables and then matched across patients of a different treatment (operative vs. non-operative)
- **Two assumptions:**
 - Treatment assignment is independent after accounting for covariates
 - There is an overlap of patient characteristics such that propensity scores will be nonzero
- Nearest neighbor matching: Patient from one group is matched to a patient from another based on the nearest propensity score distance



Results

- 201 patients underwent ACL reconstruction and 21 nonoperative management
 - After 2:1 propensity matching: 40 ACLR and 20 nonoperative patients
- **No significant differences in:**
 - Matching variables
 - IKDC Scores
 - MARX scores
 - Satisfaction rates
- 4 ACLR patients had revision surgery for graft re-rupture, 7 ACLR patients had subsequent ipsilateral knee surgery
- No patients in nonoperative group had complications



Table 1. Comparison of Patient Characteristics Between 2:1 Propensity Score Matched Groups

Parameter	ACLR n = 40	Non-op n = 20	P - value
Age (years)**	52.2 (5.4)	54.5 (7.7)	0.19
Sex**			
Female	24 (60)	14 (70)	0.45
Male	16 (40)	6 (30)	
BMI**	25.7 (4.2)	25.8 (4.4)	0.97
Sports related injury**	27 (67.5)	13 (65)	0.85
Cartilage Damage†**	9 (22.5)	4 (20)	0.83
Medial compartment	4 (11.4)	1 (5.9)	0.99
Lateral compartment	3 (8.1)	1 (5.9)	0.99
Patella	2 (6.1)	2 (11.8)	0.6
Trochlea	2 (7.7)	1 (7.1)	0.99
Meniscal tear			
Medial**	12 (30)	8 (40)	0.44
Lateral**	9 (22.5)	6 (30)	0.53
MCL Injury	7 (17.5)	8 (44.4)	0.03*
Additional Injury††	6 (15)	6 (30)	0.11

BMI, body mass index; ACLR, anterior cruciate ligament reconstruction; MCL, medial collateral ligament

*Statistically significant at P < 0.05

** Variables included in the propensity score matching

† Outerbridge grade III or IV

†† Posterior cruciate ligament, Posterolateral corner, patellar tendon, of lateral collateral ligament



Table 2. Comparison of Outcomes Between 2:1 Propensity Score Matched Groups

Parameter	ACLR n = 40	Non-op n = 20	<i>P</i> - value
IKDC score	81.9 (14.1)	84.3 (12.8)	0.53
Marx activity score	5.78 (4.8)	5.7 (5.1)	0.96
Satisfied	40 (100)	18 (90)	0.11
Subsequent Ipsilateral Knee Surgeries	7 (17.5)	0	0.08
TKA or UKA	2 (5)	0	0.55
Meniscectomy	4 (10)	0	0.29
Other Arthroscopic Procedure	3 (7.5)	0	0.99
Subsequent revision ACLR	4 (10)	N/A	N/A

ACLR: Anterior cruciate ligament reconstruction, IKDC: international knee documentation committee
TKA: total knee arthroplasty



Limitations

- Propensity matching may not adequately match groups
 - Patients electing non-operative management may be lower demand
- May be underpowered to detect a difference between groups



Conclusion

- Patients electing for nonoperative treatment had similar subjective outcomes compared to patients electing for operative allograft treatment
- Patients electing for operative allograft reconstruction had more subsequent knee surgeries than patients electing for operative treatment
- When counseling patients in this demographic, they should be informed that patient electing nonoperative management have the potential for satisfactory clinical outcomes



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