



Decreased time between injury and surgery and increased injury severity predict motion loss after multi-ligament knee injury, but are only part of the picture

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Disclosures



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Background

- Postoperative motion loss is the most common complication following multiple ligament knee injuries (MLKIs)
- MLKIs are often associated with concomitant musculoskeletal and neurovascular injuries and complex surgical treatment; however, factors that increase the risk of postoperative motion loss remain largely unknown



Purpose & Hypothesis



- The purpose of this retrospective study was to identify predictors of motion loss following MLKI
- We hypothesized that injury classification (Knee Dislocation [KD] grade), and shorter time between injury and surgery would be independent predictors of postoperative motion loss

Methods



- This was a multicenter retrospective review of 773 MLKIs that occurred between 2011 and 2015
 - MLKI was defined as a complete tear (grade III tear) of 2 or more ligaments where at least 1 ligament was repaired or constructed
- Cases with loss of motion were identified from review of follow-up documentation or the need for subsequent manipulation under anesthesia and/or lysis of adhesions
- A multivariable logistic regression with forward variable entry ($p < 0.05$) was performed to determine if any of the following variables were predictive of motion loss after MLKI:
 - Biological sex, Knee Dislocation (KD) grade, number of days between injury and surgery, graft type, use of external fixation, if staged procedures were performed, and associated vascular, nerve or tendon injury

Results



- Of the 773 patients identified, 562 (72.7%) had complete data for inclusion in the current analyses with 65 (11.6%) having postoperative motion loss
 - Of the 562 patients (76.0% male, age=30.7±12.9 y, BMI=29±6.8 kg/m²), the median number of days between injury and surgery was 59 days (IQR=22-192 days).
- KD I injuries were the most common (59.6%) with 3.6% having KD II, 14.4% KD III-M, 13.9% KD III-L, 5.3% KD IV, and 3.2% KD V injuries
- External fixation was used in 8.2%, and 6.8% underwent staged procedures
- Associated nerve injuries occurred in 19.8%, tendon injuries in 15.8%, and vascular injuries in 4.1%
- Multiple graft combinations were used:
 - All allograft = 37.5%
 - All autograft = 11.4%
 - Combination = 48.9%
 - All repairs = 2.1%

Results



		Loss of Motion N = 65 (11.6%)	No Loss of Motion N = 497 (88.4%)
Age	Mean (SD)	27.4 (SD 10.5)	31.2 (13.2)
	Missing (n)	11	104
Biological Sex	Male	44 (67.7%)	383 (77.1%)
	Female	21 (32.3%)	114 (22.9%)
BMI	Mean (SD)	26.9 (SD 5.4)	29.3 (SD 7.0)
	Missing (n)	5	85
KD grade	KD I	32 (49.2%)	303 (61.0%)
	KD II	2 (3.1%)	18 (3.6%)
	KD III-M	8 (12.3%)	73 (14.7%)
	KD III-L	16 (24.6%)	62 (12.5%)
	KD IV	1 (1.5%)	29 (5.8%)
	KD V	6 (9.2%)	12 (2.4%)
Number of days between injury and surgery	Mean (SD)	102.4 (251.0)	246.9 (600.0)
	Median (IQR)	27.0 (16.0-65.0)	67 (24.0-218.5)
Graft type for involved ligaments	All allografts	27 (41.5%)	184 (37.0%)
	All autografts	4 (6.2%)	60 (12.1%)
	All repairs	3 (4.6%)	9 (1.8%)
	Combination	31 (47.7%)	244 (49.1%)
Use of external fixation	11 (16.9%)	35 (7.0%)	
Staged procedure performed	6 (9.2%)	32 (6.4%)	
Associated vascular injury	5 (7.7%)	18 (3.6%)	
Associated nerve injury	20 (30.8%)	91 (18.3%)	
Associated tendon injury	15 (23.1%)	74 (14.9%)	

Results



- Regression analysis identified decreased time between injury and surgery and increased injury severity as independent predictors of motion loss after MLKI ($p < 0.001$, Nagelkerke $R^2=0.08$)
 - Time between injury and surgery (OR=0.998, 95%CI[0.997-1.00])
 - Injury severity (KD-III OR=2.31, 95%CI[1.19-4.48], KD-V OR=5.42, 95%CI[1.84-15.98])
- While these factors were statistically significant, they only explain 8% of the variability in postoperative motion loss after MLKI

Discussion



- These results confirm that clinicians should be cognizant that decreased time between injury and surgery and more severe injuries may increase this risk of motion loss; however, postoperative factors not measured in this secondary analysis might more heavily impact motion loss after surgical treatment for MLKI
- Future studies are necessary to identify other factors such as pre-operative ROM, the postoperative inflammatory state of the knee, utilization of physical therapy and/or psychosocial factors that might influence motion loss after MLKI reconstruction to better inform postoperative care

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