

ePoster #31: Documented Knee Dislocation Associated With Poorer Outcomes After KD3 Multi-ligamentous Knee Injuries

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Disclosures

Michael Alaia, MD

- BodyCad: Paid consultant
- Journal of Cartilage and Joint Preservation: Editorial or governing board
- JRF Ortho: Paid consultant
- Mitek: Paid consultant
- Orcosa, Inc: Research support
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- Arthrex, Inc: Research support
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Background

- Previous research has found that the incidence of neurovascular injury is greatest among multiligamentous knee injuries (MLKI) with documented knee dislocation.
- However, it is unknown whether there is a comparative difference in functional recovery based on evidence of a true dislocation.



Purpose:

- The purpose of this study was to determine whether three-ligament MLKI with documented tibiofemoral dislocation (KD3) truly represents a more severe injury than MLKI without documented dislocation.

Hypothesis:

- The hypothesis was that patients who had a documented dislocated KD3 injury would have poorer functional outcomes and increased neurovascular morbidity compared to those who did not.

Methods

- A multi-center, retrospective review of patients who were initially evaluated at one of two academic level 1 trauma centers for the treatment of MLKI from the May 2012 to February 2021.
- Inclusion criteria:
 - Diagnosed with a complete three-ligament MLKI confirmed intraoperatively or on magnetic resonance imaging (MRI), had undergone surgical treatment, and had a minimum of 2-year follow-up.
- Exclusion criteria:
 - Did not undergo surgical treatment, if their initial diagnosis of a three-ligament injury was found to include a fourth ligament, or if they did not sustain a complete three-ligament knee injury and were thus downgraded to a two-ligament equivalent injury.

Methods

- Recorded variables: age, sex, BMI, mechanism of injury, date of index and subsequent staged surgeries if applicable, documented knee dislocation, vascular injury, peroneal nerve palsy, and requirement for external fixation at initial presentation.
- Identified patients were assigned to one of two groups based on the dislocation status of their knee.
 - Documented knee dislocation in this study was defined as any of the following:
 1. Evidence of tibiofemoral disarticulation on lateral and anteroposterior radiograph
 2. Equivalent radiology report for patients transferred from an outside institution
 3. Patients with clinical documentation in the electronic medical record of the performance of a manual reduction at the time of presentation, in the pre-hospital setting, or at an outside institution.

Results

- 64 patients included (age: 34.8 ± 11.4 , 60.0% male, follow-up of 6.5 years (range: 2.1-10.7)); 20 (47.6%) patients had a documented knee dislocation

Demographics & Injury Characteristics Among Patients With and Without Documented Knee Dislocation			
	Dislocated	Non-Dislocated	p-value
N	20	22	0.481
Age (years)	36.4 ± 12.7	33.5 ± 10.1	0.208
Sex, n (% female)	6 (30.0)	11 (50.0)	0.187
Body mass index	29.6 ± 8.1	31.8 ± 7.7	
Medial or lateral, n (%)			0.721
KD3-L	8 (40.0)	10 (45.5)	-
KD3-M	12 (60.0)	12 (54.5)	-
Mechanism of injury, n (%)			0.314
High	11 (55.5)	7 (31.8)	-
Low	7 (35.0)	12 (35.0)	-
Ultra-low	2 (10.0)	3 (13.6)	-
Any neurovascular injury, n (%)	9 (45.0)	3 (13.6)	0.040
Peroneal nerve injury, n (%)			0.084
Complete	6 (30.0)	1 (4.5)	-
Partial	1 (5.0)	2 (9.1)	-
Vascular injury, n (%)	3 (15.0)	1 (4.5)	0.333
External fixation, n (%)	7 (35.0)	2 (9.1)	0.062
Surgical procedures, n	2.4 ± 1.2	1.9 ± 1.1	0.116

Results – Clinical Outcomes (Dislocated vs Not)

Comparison of Postoperative Clinical Outcomes Between Patients With and Without Documented Knee Dislocation			
Variable	Dislocated	Non-Dislocated	p-value
VAS pain	36.4 ± 12.7	33.5 ± 10.1	0.269
IKDC	49.9 ± 23.7	63.0 ± 20.4	0.043
Lysholm	59.8 ± 28.4	74.5 ± 22.3	0.023
Tegner			
Pre-injury	5.9 ± 2.9	6.6 ± 2.4	0.567
Current	2.9 ± 1.8	4.7 ± 2.6	0.027
Difference	-3.0 ± 2.9	-1.9 ± 2.7	0.234

Abbreviations: VAS visual analog scale, IKDC International Knee Documentation Committee Subjective Knee Form

Results – Clinical Outcomes (KD3L vs KD3M)

Comparison of Postoperative Clinical Outcomes Between Patients With Lateral Versus Medial Involvement

	KD3-L	KD3-M	p-value
VAS pain	44.5 ± 32.5	28.1 ± 31.7	0.272
IKDC	57.0 ± 22.1	56.6 ± 24.2	0.959
Lysholm	66.0 ± 22.1	69.2 ± 26.8	0.712
Tegner			
Pre-injury	7.1 ± 1.6	5.2 ± 3.3	0.040
Current	3.7 ± 2.2	4.0 ± 2.8	0.877
Difference	-3.4 ± 2.6	-1.2 ± 2.5	0.006

Abbreviations: VAS visual analog scale, IKDC International Knee Documentation Committee Subjective Knee Form

Discussion

- Documented KD3 knee dislocation had significantly poorer clinical and functional outcomes than those with non-dislocated KD3 knees.
 - The differential for IKDC and Lysholm scores both surpassed the minimal clinically important difference (MCID), in favor of non-dislocated MLKIs, which highlights the prognostic value of a documented dislocation.
- As hypothesized, significantly greater neurovascular morbidity was identified in the dislocation group (45%) compared to the non-dislocated MLKI group (13.6%).
- This study highlights that “KD” and “MLKI” are two distinct entities, and not two interchangeable terms.
 - Use of the Schenck classification system should be strictly restricted to cases of true KDs in order to standardize reporting and protect the accuracy of future research or modified to create a sub-variant or suffix to denote a true dislocation.

Limitations

- Approximately one-third of eligible patients were lost to follow-up, introducing the possibility of selection bias.
 - To reduce the risk of response bias, patients were contacted up to five separate times over a six month period
- There is speculation within the literature that a proportion of patients with non-dislocated MLKIs may represent KDs that had spontaneously reduced.
 - The authors of this manuscript maintain that our level of suspicion was low, given the close interrogation of all available pre-hospital, emergency room, and inpatient medical records when assigning patients to each group. The phrase “spontaneously reduced” entails a presumptive diagnosis, yet as to date there has not been any clear scientific proof of this clinical entity in the literature.
- Surgical procedures were not accounted for within the scope of this project. MLKIs represent a wide spectrum of injury patterns, and so both groups contained heterogeneity owing to the variety of ligaments torn and surgical procedures performed

Conclusions

1. Patients undergoing surgical management of KD3 injuries with true, documented knee dislocation had significantly worse clinical and functional outcomes than those with non-dislocated joints at mean 6.5-year follow-up.
2. Greater rates of neurovascular injury were found in the true knee dislocation group.
3. Laterally based injuries fared worse than their medial counterparts.

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Clinical and Functional Outcomes of Documented Knee Dislocation Versus Multiligamentous Knee Injury: A Comparison of KD3 Injuries at Mean 6.5 Years Follow-up

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“Current classification of MLKI based solely on ligament involvement may be obscuring outcomes research by not accounting for true dislocation. Use of the Schenck classification system should be strictly restricted to cases of true KDs in order to standardize reporting and protect the accuracy of future research, should include a suffix to denote a true knee dislocation, and separation of non-dislocated MLKIs using the Anatomic Classification for MLKI is recommended.”

NYU Langone Orthopedics

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procedures
performed
annually



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and navigation
platforms systemwide



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United States



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two accredited programs

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fellows across
six specialty programs



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