Risk of Lower Extremity Ligamentous injury Following Concussion Diagnosis: a TriNetX Database Study

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INTRODUCTION:
Concussion is one of the most frequently reported sports-related injury in the United States; there is evidence that residual deficits in neurocognition may increase the risk of lower extremity musculoskeletal injury after concussion in high school, college and professional athletes. The purpose of this study is to identify whether a similar trend is identified in a community-based population.
METHODS:
The TriNetX Research Network database was queried for all patients 10-60 years old who experienced an ambulatory or emergency visit from 2018-2020. Cohorts were defined by patients seen for concussion and patients seen for any other reason. These cohorts were then propensity score matched based on significant differences in demographics, after matching each cohort had 97,708 patients. The propensity score matched cohorts were then evaluated to identify patients who experienced a subsequent lower extremity ligamentous injury within 12 months.
RESULTS:
Patients with a history of concussion were more likely to experience a PCL sprain (0.04 vs. 0.02%, RR=1.79, p=.039), MCL sprain (0.18 vs. 0.08%, RR=2.355, p<.001), LCL sprain (0.05 vs. 0.02%, RR=2.202, p=.003) and ankle sprain (1.05 vs. 0.47%, RR=2.265, p<.001). There was no significant difference in the rate of ACL sprain between groups.
DISCUSSION AND CONCLUSION:
Patients diagnosed with concussion were more likely to experience a lower extremity ligamentous injury in the following year when compared with patients who did not have concussion. Patients should be counseled regarding this increased risk and additional neuromuscular evaluation and injury prevention education may be indicated following concussion diagnosis.

Table 1. Patient Demographics Before and After Propensity Score Matching

	Before Matching			After Matching		
	Concussion N=97,708	No Concussion N=16,598,191	Sig	Concussion N=97,708	No Concussion N-97,708	Sig
Age in Years	26.2 ± 13.7	33.6 ± 14.5	**<.001**	26.2 ± 13.7	26.2 ± 13.7	1.000
Female Sex	50,477 (51.7)	9,493,791 (57.2)	**<.001**	50,477 (51.7)	50,477 (51.7)	1.000
Overweight or Obese	5058 (5.2)	932,153 (5.6)	**<.001**	5058 (5.2)	5058 (5.2)	1.000

P<.05 in bold; data presented as mean ± SD or n (%)

Table 2. Incidence of Lower Extremity Soft Tissue Injury within One Year of Concussion

	Concussion N (%)	No Concussion N (%)	Risk Ratio (Concussion: No Concussion)	RR 95% CI	Sig
ACL Sprain/Tear	153 (0.16)	148 (0.15)	1.035	0.826-1.297	0.766
PCL Sprain/Tear	34 (0.04)	19 (0.02)	1.79	1.021-3.138	**0.039**
MCL Sprain/Tear	176 (0.18)	75 (0.08)	2.355	1.797-3.085	**<.001**
LCL Sprain/Tear	44 (0.05)	20 (0.02)	2.202	1.298-3.736	**0.003**
Ankle Sprain	972 (1.05)	444 (0.47)	2.265	2.026-2.534	**<.001**

P<.05 in bold, all data presented as n (%)