MIDWEST ORTHOPAEDICS | RUSH

Quadriceps Injuries in Major League Soccer: A 10-year Analysis of Injury Rate and Return to Play

Brian Forsythe MD, Catherine Hand BS, Camden Bohn BA, Daanish-Khazi Syed BS, Josh Chang BS, Andrew Savoia BS, Harmanjeet Singh BS, Jonathan Spaan BS, Kyle Borque MD, Bert Mandelbaum MD

BACKGROUND

- Anterior cruciate ligament (ACL) injuries are significant in Major League Soccer (MLS) athletes, impacting player availability and performance.
- Understanding ACL injury patterns and recovery timelines can help optimize rehabilitation protocols and player management strategies in professional soccer.

PURPOSE

This study analyzes the incidence of ACL injuries and the timelines for return-to-play (RTP).

➔ Examine the incidence of ACL injuries in MLS athletes.

➔ Assess RTP timelines following ACL reconstruction.

➔ Identify factors associated with RTP duration.

➔ Evaluate post-injury performance.

METHODS

- MLS Injury Surveillance database was queried for ACL injuries from 2010-2021.
- ACL injury definition: injury involving ACL, with or without co-ligament involvement, requiring medical attention
- Demographic and injury characteristics were collected for descriptive analysis.
- Matched-cohort design:

- Injured athletes were matched to uninjured controls (1:2 ratio). Matching based on position, age, season of injury, and baseline statistics.

- Performance analysis:

  - First 4 full seasons post-injury compared to pre-injury baseline

- Statistical analysis:

  - Univariate 2-group comparisons performed using independent t-tests.

RESULTS

Table A. Forward Metrics Compared with 1 Year Before Index Year

Player Metrics	Control	Quadriceps Injury	P-Value
Games Played per Season			
Index Year	0.38 ± 9.86	0.96 ± 10.37	0.347
1 Y After Injury	1.91 ± 10.90	2.27 ± 11.24	0.328
2 Y After Injury	2.7 ± 9.67	3.59 ± 9.63	0.462
3 Y After Injury	3.23 ± 8.52	1.51 ± 9.50	0.085
Minutes Played per Season			
Index Year	-32.18 ± 817.53	52.35 ± 829.80	0.626
1 Y After Injury	64.71 ± 864.80	115.65 ± 869.60	0.494
2 Y After Injury	181.34 ± 860.52	246.52 ± 774.87	0.532
3 Y After Injury	249.89 ± 855.58	63.27 ± 743.52	0.098
Goals per Season			
Index Year	-0.75 ± 4.19	0.27 ± 4.42	0.704
1 Y After Injury	-0.51 ± 4.72	0.64 ± 5.14	0.718
2 Y After Injury	0.14 ± 4.88	1.19 ± 4.34	0.633
3 Y After Injury	0.39 ± 4.77	0.02 ± 3.56	0.129
Assists per Season			
Index Year	0.03 ± 2.69	1.05 ± 2.95	0.836
1 Y After Injury	0.28 ± 2.57	0.48 ± 2.31	0.675
2 Y After Injury	0.45 ± 3.25	0.41 ± 2.46	0.447
3 Y After Injury	0.50 ± 2.96	-0.11 ± 1.83	0.134

Table B. Midfielder Metrics Compared with 1 Year Before Index Year

Player Metrics	Control	Quadriceps Injury	P-Value
Games Played per Season			
Index Year	0.85 ± 9.37	0.49 ± 9.49	0.137
1 Y After Injury	0.27 ± 10.05	0.49 ± 10.14	0.383
2 Y After Injury	0.11 ± 9.66	1.00 ± 11.72	0.620
3 Y After Injury	1.20 ± 9.67	1.13 ± 9.07	0.336
Minutes Played per Season			
Index Year	38.39 ± 884.93	10.52 ± 889.32	0.117
1 Y After Injury	-25.35 ± 920.21	19.67 ± 909.02	0.425
2 Y After Injury	-55.98 ± 885.54	80.42 ± 963.03	0.753
3 Y After Injury	8.53 ± 907.52	31.28 ± 825.79	0.380
Goals per Season			
Index Year	-0.23 ± 2.83	0.13 ± 3.35	0.970
1 Y After Injury	-0.37 ± 2.50	-0.12 ± 3.29	0.917
2 Y After Injury	-0.38 ± 2.74	-0.42 ± 2.68	0.599
3 Y After Injury	-0.74 ± 2.12	-0.49 ± 2.43	0.874
Assists per Season			
Index Year	-0.19 ± 3.54	0.19 ± 3.22	0.437
1 Y After Injury	-0.32 ± 3.42	0.12 ± 3.16	0.520
2 Y After Injury	-0.45 ± 3.22	0.44 ± 3.25	0.880
3 Y After Injury	-0.24 ± 3.20	0.56 ± 3.42	0.785

Table C. Defender Metrics Compared with 1 Year Before Index Year

Player Metrics	Control	Quadriceps Injury	P-Value
Games Played per Season			
Index Year	0.17 ± 10.16	1.40 ± 9.93	0.949
1 Y After Injury	1.62 ± 9.67	2.47 ± 10.32	0.859
2 Y After Injury	0.73 ± 10.22	1.58 ± 9.51	0.816
3 Y After Injury	4.57 ± 8.76	0.50 ± 10.07	**0.002**
Minutes Played per Season			
Index Year	-13.28 ± 906.11	120.16 ± 879.80	0.944
1 Y After Injury	104.82 ± 875.05	206.24 ± 933.31	0.852
2 Y After Injury	40.99 ± 925.32	103.73 ± 843.67	0.691
3 Y After Injury	360.18 ± 834.92	44.69 ± 904.84	**0.004**
Goals per Season			
Index Year	0.03 ± 1.09	0.18 ± 1.28	0.959
1 Y After Injury	0.21 ± 1.36	0.12 ± 1.43	0.307
2 Y After Injury	0.02 ± 1.07	0.11 ± 1.13	0.822
3 Y After Injury	0.28 ± 1.26	-0.13 ± 0.90	**0.008**
Assists per Season			
Index Year	0.13 ± 1.53	0.13 ± 2.28	0.989
1 Y After Injury	0.09 ± 1.41	0.12 ± 1.77	0.995
2 Y After Injury	-0.02 ± 1.31	-0.08 ± 1.68	0.961
3 Y After Injury	0.24 ± 1.44	-0.18 ± 1.32	0.395

Table D. Goalkeeper Metrics Compared with 1 Year Before Index Year

Player Metrics	Control	Quadriceps Injury	P-Value
Games Played per Season			
Index Year	0.10 ± 12.73	4.00 ± 12.29	0.983
1 Y After Injury	-0.23 ± 12.43	-0.20 ± 12.62	0.647
2 Y After Injury	1.89 ± 12.44	2.19 ± 12.72	0.660
3 Y After Injury	-0.07 ± 11.40	8.66 ± 13.84	0.999
Minutes Played per Season			
Index Year	5.74 ± 1146.63	367.91 ± 1107.17	0.983
1 Y After Injury	-29.15 ± 1122.93	-6.20 ± 1138.82	0.662
2 Y After Injury	160.24 ± 1119.66	207.26 ± 1144.54	0.674
3 Y After Injury	-11.55 ± 1025.98	792.37 ± 1246.97	0.999
Clean Sheets per Season			
Index Year	0.12 ± 3.56	1.10 ± 3.99	0.979
1 Y After Injury	-0.01 ± 3.56	0.18 ± 3.78	0.780
2 Y After Injury	0.51 ± 3.29	1.18 ± 4.19	0.895
3 Y After Injury	0.41 ± 3.80	2.95 ± 4.33	0.997
Conceded Goals per Season			
Index Year	0.31 ± 17.91	6.05 ± 18.18	0.981
1 Y After Injury	0.49 ± 18.54	-0.56 ± 16.73	0.493
2 Y After Injury	2.09 ± 18.04	1.45 ± 16.30	0.534
3 Y After Injury	-0.13 ± 16.20	10.17 ± 19.54	0.993

Key findings:

- Total of 1,550 quadriceps injuries were identified with the median RTP time increasing from 14.4 days (2010-2015) to 23.0 days (2016-2021) p<0.001
- Reinjury rate was high at 40.7%, though it decreased from 37.3% to 32.6% over time (p=0.05)
- Players injured in rain/snow returned significant faster than those in clear/sunny conditions (10.9 days, 18.8 days, respectively, p<0.001)
- Defenders showed significant declines in performance metrics 3 years post-injury
- Other positions (forwards, midfielders, goalkeepers) had stable post-injury performance

DISCUSSION

- Overall RTP duration has lengthened, possibly reflecting mor conservative rehab protocols aimed at reducing reinjury risk

Environmental conditions (e.g. weather) may impact injury severity or mechanism, influencing recovery time

Defenders may be more vulnerable to long-term performance declines, possibly due to physical demands and movement patterns unique to the position, i.e. frequent max sprints

These results suggest a possible need for position-specific rehabilitation and load management post-injury