

ACL Injuries and Their Impact on Performance Metrics in Professional Football

Daniele Mazza, Vincenzo Santoriello, Alessandro Carrozzo, Francesco De Carli, Angelo De Carli, Paolo Zeppilli

INTRODUCTION: Anterior cruciate ligament (ACL) injuries are among the most severe musculoskeletal injuries in professional football, often necessitating surgical reconstruction and prolonged rehabilitation. Although return-to-play (RTP) rates following ACL reconstruction (ACLR) are relatively high, there is growing concern that players may not fully recover their pre-injury performance levels. Given the complexity of "return to sport," which involves not only physical but also psychological and biomechanical recovery, performance-based evaluation post-ACLR is crucial. This study aims to assess the effect of ACL injuries on post-recovery performance among elite soccer players, focusing on changes in key match metrics before and after injury.

METHODS: A retrospective cohort study was conducted on 53 professional male soccer players from the top five European leagues (Serie A, Premier League, Bundesliga, LaLiga, and Ligue 1) who sustained ACL injuries between 2022 and 2024. Data were extracted from publicly available platforms (Kama.sport and Transfermarkt) and verified through official club and league sources. Inclusion criteria required a minimum one-year follow-up after ACLR and a complete set of performance metrics for 20 matches before and after RTP. Variables included minutes played, goals, assists, duels, aerial duels, passes attempted, recoveries, and other engagement-related statistics. Paired samples t-tests were used to compare pre- and post-injury performance, and Cohen's d was calculated to determine effect sizes. Goalkeepers were analyzed as a separate subgroup.

RESULTS: The mean RTP duration was 245.7 ± 55.0 days. Players exhibited statistically significant declines in several performance domains after RTP. Notably, duels decreased from 59.3 to 33.7 ($\Delta = -25.7$; $p < 0.001$, $d = 0.63$), aerial duels from 19.9 to 10.9 ($p = 0.001$), and minutes played from 570.3 to 367.4 ($p < 0.001$). Passes attempted, balls recovered, and successful shots also showed significant reductions (all $p < 0.01$). Offensive metrics such as goals and assists declined modestly but were not statistically significant ($p = 0.099$ and $p = 0.083$, respectively), although the effect sizes ($d \approx 0.23$ – 0.24) suggest possible clinical relevance. In contrast, the goalkeeper subgroup ($n=3$) showed no statistically significant changes across analyzed metrics.

DISCUSSION AND CONCLUSION:

Despite achieving medical clearance and returning to competitive play, professional footballers demonstrate significant post-injury declines in physical engagement and match performance metrics following ACL reconstruction. These results underscore the disconnect between medical RTP and actual performance recovery, especially in outfield players whose roles demand continuous physical exertion and technical involvement. Our findings advocate for a paradigm shift in post-ACLR evaluation, emphasizing performance-based recovery benchmarks and individualized rehabilitation strategies tailored to playing position. Future research should incorporate psychological and biomechanical assessments and extend follow-up to examine long-term career impact and reinjury risk.