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Research Article

Hip Arthroscopy in Professional Soccer Players: A Retrospective Study

Daniele Mazza[1,2], Alessandro Carrozzo[3], Alessandro Annibaldi[3], Francesco De Carli[4*], Alessandro Maggiori[4], Giorgio Liberati Petrucci[4], Vincenzo Santoriello[2,5], Paolo Zeppilli[2,5], Angelo De Carli[2,4]

[1]Istituto Dermopatico dell'Immacolata, Via dei Monti di Creta, 104, Rome, Italy

[2]Italian Football Association, Via G. Allegri 14, Rome, Italy

[3]Istituto di Medicina e Scienza dello Sport CONI - Italian Olympic Committee, Rome, Italy

[4]Orthopaedic Unit and Kirk Kilgour Sports Injury Center, S. Andrea Hospital, University of Rome "Sapienza", Via di Grottarossa 1035-1039, 00189, Rome, Italy

[5]Catholic University, Milan, Italy

[*]**Corresponding author:** Francesco De Carli, S. Andrea Hospital, University of Rome "Sapienza", Via di Grottarossa 1035-1039, 00189, Rome, Italy

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Abstract

Introduction: Femoroacetabular Impingement (FAI) presents challenges for professional soccer players, characterized by abnormal contact between the femoral head and acetabulum, leading to pain, reduced range of motion, and potential long-term consequences like cartilage damage. Soccer's high demands, including rapid directional changes and high-impact movements, increase the likelihood of FAI among athletes. This study evaluates the outcomes of hip arthroscopy in professional soccer players, focusing on Return-to-Play (RTP) rates and performance metrics before and after surgery.

Methods: This retrospective study analyzed male professional soccer players who underwent hip arthroscopy between 2015 and 2020. Data on age, Body Mass Index (BMI), position, injury history, RTP rates, and percentage of played Minutes Per Season (MPS), were collected from Transfermarkt. Statistical analyses were performed using SPSS, focusing on descriptive statistics and ANOVA.

Results: The analysis included 28 players with an average age of 26.25 years. The mean RTP was 182.75 days, with MPS decrease from 57.7% pre-injury to 41.2% post-surgery (P=.024). Market value decreased from €5.53 million to €4.62 million, not statistically significant (P=.762). 7.1% of players transitioned to lower leagues post-surgery.

Discussion: The findings show a significant decrease in MPS after surgery and considerable recovery time before return to play. Although players returned to play, their performance did not fully recover, indicating potential issues with current rehabilitation protocols. Market value trends suggest economic consequences of reduced performance.

Conclusion: This study highlights the need for tailored rehabilitation strategies for FAI in professional soccer players to optimize recovery and performance.

Keywords: Femoroacetabular impingement; Hip arthroscopy; Players; Soccer

Introduction

Femoroacetabular Impingement (FAI) is a clinically significant condition that poses considerable challenges for professional soccer players [1]. Characterized by abnormal contact between the femoral head and the acetabulum, FAI leads to joint pain, decreased range of motion, and potential long-term consequences such as cartilage damage and osteoarthritis [2,3]. Soccer, with its demanding physical requirements and high incidence of hip-related injuries, has increasingly highlighted FAI as a common diagnosis among athletes. The unique movements inherent in the sport-such as rapid changes in direction, high-impact kicking, and frequent twisting-can exacerbate pre-existing hip abnormalities or contribute to the development of FAI. As professional soccer players strive to maintain peak performance, the repercussions of hip injuries and FAI can significantly affect their ability to train, compete, and sustain their careers. Moreover, the complexities of diagnosing and treating FAI in this population necessitate a multidisciplinary approach, integrating surgical, rehabilitative, and preventive strategies to optimize outcomes [4-6].

As the most widely played sport globally, with over 200 million participants in 200 countries, soccer poses unique challenges related to injury management, particularly concerning hip health [7]. Reports indicate that a significant number of soccer athletes exhibit radiographic signs of FAI, which can impede their performance and overall career longevity [8,9]. Hip arthroscopy has emerged as a valuable surgical intervention for managing FAI, effectively addressing the underlying anatomical issues that contribute to pain and dysfunction [10,11]. However, a paramount consideration for soccer players undergoing this procedure is their ability to return to their pre-injury level of performance. This becomes crucial in a sport where peak physical condition and agility are vital for success. The present study is designed to evaluate the outcomes of hip arthroscopy specifically in professional soccer players by performing a comparative analysis of their performance metrics one year prior to surgery and one year following the procedure. The primary outcomes of interest include the rate of Return To Play (RTP) and the number of played Minutes Per Season (MPS) post-operatively versus pre-operatively. Additionally, the study will investigate any failures or complications arising from the surgery, as well as how these factors may influence the athletes' market values, which can significantly impact their careers. The hypothesis of the study is that femoroacetabular impingement and hip arthroscopy intervention have a significant impact on performance in professional soccer players.

Methods

In this retrospective study, the authors focused on male professional football players who underwent hip arthroscopy between 2015 and 2020. The inclusion criteria specifically targeted male athletes who were part of the first team rosters of professional soccer clubs at the time of their injury. To create a comprehensive dataset, the researchers retrieved various parameters from the publicly available media-based platform Transfermarkt (www.Transfermarkt.com, GmbH & Co. KG, Hamburg, Germany). This data encompassed details such as age, Body Mass Index (BMI), playing position, injury history, affected side, return-to-play rate and time, as well as the percentage of played Minutes Per Season (MPS) both prior to and following the hip arthroscopy procedure. In cases where data were missing, the authors utilized other public online resources, including official team websites and press releases, in their efforts to ensure the dataset's completeness. RTP rate was quantified using the percentage of players who participated in at least one professional match after their hip arthroscopy compared to the total number of injured players. The RTP time was measured in days, calculated as the span from the date of the hip arthroscopy to the player's first match appearance, which could be with their first team, reserve team, youth team, or national team. The metric for MPS was defined as the ratio of minutes played during the season to the total available minutes for competition, expressed as a percentage. Furthermore, the players' market values were indicated in millions of euros (currency), providing insight into their economic worth within the sport.

The study also meticulously recorded instances where players transitioned to lower-tier leagues or chose to retire from professional football before the conclusion of their first complete season post-surgery. To categorize these downgrades, a framework based on the United European Football Association (UEFA) Country Ranking was employed to classify transfers to less competitive leagues. Additionally, any complications arising during the rehabilitation period-such as re-injuries (either to the same hip or the opposite one), re-operations, or any adverse events leading to a delay or failure to meet RTP goals-were clearly defined and documented.

Statistical Analysis

All analyses were performed with SPSS® Statistics software (version 25.0; IBM SPSS, Chicago, IL). Descriptive data were analyzed for the entire patient cohort. Statistical significance was set at $P<.05$. Descriptive data analyses were conducted depending on the nature of the considered criteria. For quantitative data, this included number of observed values (and missing values, if any), mean, SD, median. Qualitative data included the number of observed and missing values and the number and percentage of

patients per class. The normality of variables was assessed with a Kolmogorov-Smirnov test. Comparisons between seasons were made using ANOVA analysis of variance and post hoc analyses with Fisher's LSD.

Results

The initial population resulting from the database search consisted of 35 soccer players who underwent hip arthroscopy. Of these, 5 (14.2%) soccer players who retired in the season following surgery and 2 (5.2%) soccer players who had a serious injury that prevented them from playing in the season following hip arthroscopy were excluded. The final population was 28 patients with a mean age of 26.25 ± 3.5 years (range, 20-35 years). All demographic were expressed in Table 1. The mean height was 1.82 ± 0.07 (range, 1.72 - 1.96 m), the mean weight 76.3 ± 6.3 (range, 68-94) with a mean BMI of 23 ± 1.1 (range, 20.5-24.7 kg/m^2). The operated side was the non-dominant side in 53% of cases. The mean RTP was 182.75 ± 95.6 (range, 97-560) and the mean number of games missed was 22.2 ± 16 (range, 5-71). The mean MPS of the season before injury was 57.7 ± 25.7 and that of the season after surgery was 41.2 ± 28.4. The market value of the season before surgery was 5.53 ± 1.14, while that of the season after surgery was 4.62 ± 1.13. Comparing the MPS of the season before and after the injury, the latter was found to decrease in a statistically significant way (**P=.024**). In contrast, comparing the market value before and after hip arthroscopy, the decrease was not significant (P=.762). Of these 28 players, 2 (7.1%) soccer players changed to an inferior league in the season following surgery.

	Players (n=28)
Age, mean ± SD (range), years	26.25 ± 3.5 (20-35)
Height, mean ± SD (range), m	1.82 ± 0.07 (1.72 - 1.96)
Weight, mean ± SD (range), Kg	76.3 ± 6.3 (68-94)
BMI, mean ± SD (range), kg/m^2	23 ± 1.1 (20.5-24.7)
Side, n (%)	
Left	3 (8%)
Right	25 (92%)
Role, n (%)	
Goalkeeper	2 (7.1%)
Defender	10 (35.7%)
Midfielder	11 (39.3%)
Forward	5 (17.9%)

Table 1: Demographic Information of Included Patients. The data are presented either as mean ± standard deviation (mean ± SD) or as number and percentage (n %).

Discussion

The main finding of the current study was that only 86% of professional soccer players return to play after sustaining a hip arthroscopy with a mean RTP time of 182.75 ± 95.6 days. Another important finding is that performances of the players are significantly lower in the season after hip arthroscopy as compared to the pre-injury season. The findings from this retrospective study emphasize the significant implications of Femoroacetabular Impingement (FAI) and hip arthroscopy on the performance metrics of professional soccer players. With the study revealing a statistically significant decrease in the percentage of played Minutes Per Season (MPS) post-surgery, we can infer that the impact of FAI is profound on athletes, both during and after rehabilitation. This aligns with existing literature that highlights the physical demands placed on soccer players and the resultant stress on their hip joints, making them particularly susceptible to conditions like FAI. The mean return-to-play (RTP) duration of approximately 183 days indicates a substantial recovery period, as athletes must navigate not just physical rehabilitation but also the mental challenges of reintegrating into competitive play. While the RTP rate demonstrates that the majority of players were able to return to some level of competitive soccer, the reduced MPS indicates that even those who returned may not fully regain their pre-injury performance levels. This observation raises important considerations regarding the adequacy of current rehabilitation protocols and the need for customized recovery plans that address the specific demands of professional soccer. Marom et al. [12] found that hip arthroscopic treatment for FAI in symptomatic competitive soccer players allowed three-quarters of them to return to soccer, with higher risk in older aged players. Despite not returning to soccer, two-thirds of players who did not return to soccer were satisfied with their outcome.

Numer studies have examined return-to-soccer rates following arthroscopic surgery for femoroacetabular impingement syndrome. Locks et al. [13] observed a return-to-soccer rate of 96% among 24 professional players. Barastegui et al. [14] reported a similar rate of 100% among 21 professional male players. More recently, Ortiz-Declet et al. [15] found a return-to-soccer rate of 79.4% among 34 amateur male and female soccer players, with only 19 players (56%) resuming competition at their pre-surgery level. In contrast, this study identifies a lower return-to-soccer rate of 74.7% in a larger cohort of competitive male and female players, with nearly two-thirds returning to their previous level or higher. Several factors could account for these variations in return-to-soccer rates across different studies. Notably, the market value of players showed a decrease from before surgery to after surgery, although not statistically significant. This finding suggests that while some players may return to play, their overall performance

and market potential may still be affected, possibly due to diminished performance levels as indicated by the reduced MPS. This highlights a critical intersection between athletic performance, economic value, and long-term career sustainability, which should be of concern to players, clubs, and sports management professionals alike.

The study's inclusion of players who transitioned to inferior leagues further underscores the potential long-term ramifications of FAI and surgical intervention. While only a small percentage of players experienced this change, it serves as an important cautionary note about the trajectory of an athlete's career post-recovery. The potential for players to not only miss extensive playing time but also to move down in competitive standings is a challenge that requires attention from coaches and medical staff to ensure adequate support during recovery. Additionally, the identification and documentation of complications such as re-injuries or adverse events reinforce the necessity for ongoing monitoring and evaluation in these athletes' rehabilitation journeys. These complications can lead to delayed return-to-play times and lower overall performance outcomes, emphasizing the need for a robust and tailored rehabilitation approach that prioritizes not just return to play, but also the restoration of pre-injury capabilities and overall joint health. Future research should aim to explore longitudinal outcomes beyond the first season post-surgery to garner a more holistic view of the recovery trajectory for professional soccer players. Investigating factors such as player sentiment, psychological resilience, and physical conditioning could offer insights into optimizing return-to-play standards and improving rehabilitation practices. Furthermore, comparative studies involving diverse populations, including female athletes or players from varying competitive levels, could add depth to the existing understanding of FAI's impact on different demographics.

Since the data for this study were sourced from publicly available online platforms, certain limitations are inherent in this approach. Recent research [16] suggests that these online sources may underreport the true incidence of injuries among athletes, meaning some injured players might have been missed in this study. Furthermore, the absence of medical records or imaging meant there was no information on related injuries. These elements can greatly affect recovery and performance following the surgery, and an analysis including such data would be advantageous. Nevertheless, due to the lack of a comprehensive injury database like those used by the NFL or NBA for European soccer, the sources we used are the best available and independent option, having successfully served similar studies in the past.

Conclusion

These study can better guide clinicians and soccer players with realistic expectations related to the arthroscopic management of hip injuries. The data serves to highlight the critical need for a comprehensive approach to manage femoroacetabular impingement in professional soccer players. By integrating surgical, rehabilitative, and performance-oriented strategies, stakeholders can better support athletes in their recovery, thereby enhancing their ability to effectively return to the competitive sporting environment. Recognizing the intricate relationship between injury prevention, effective treatment, and athletic performance is crucial for sustaining the careers of these high-level athletes and maximizing their contributions to the sport.

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