

Intra-articular Hip Injuries in National Basketball Association Players

A Descriptive Epidemiological Study

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Background: Since the most recent epidemiologic study of injuries in National Basketball Association (NBA) players was completed in 2012, the understanding and diagnosis of intra-articular hip injury has advanced.

Purpose: To report the epidemiology of intra- versus extra-articular hip injuries in NBA players with regard to missed games, risk factors for injury, and treatment types.

Study Design: Cohort study; Level of evidence, 3.

Methods: The NBA injury database was queried for all reported hip and groin injuries from 2013 to 2017. The injuries were then divided into intra-articular and extra-articular types. Variables compared between injury types included player age, NBA tenure, season schedule (preseason or offseason), onset type, injury mechanism, roster position, games missed, time to return to play, and need for surgery.

Results: A total of 224 athletes sustaining 353 total hip pathologies were identified. Of these injuries, 216 (61.2%) were sustained during game competition and affected 156 (69.6%) of the athletes. Intra-articular injuries represented 39 (11.0%) cases and involved 36 (16.1%) players. The time to return to play was significantly longer after intra-articular versus extra-articular injury (44.6 ± 96.0 vs 11.8 ± 32.0 days; $P = .03$), and the number of games missed was significantly greater after intra-articular versus extra-articular injury (8.0 ± 18.7 vs 1.54 ± 4.9 games; $P = .03$). Patients with intra-articular hip injuries were more likely to undergo surgery (odds ratio, 5.5 [95% CI, 1.8-16.7]; $P = .005$). There was no statistically significant difference in the number of games missed due to surgery (35.2 ± 8.3 [intra-articular] vs 35.4 ± 11.6 [extra-articular]; $P = .42$) or nonoperative treatment (4.2 ± 3.4 [intra-articular] vs 1.3 ± 0.5 [extra-articular]; $P = .11$). Years of NBA tenure were not significantly different between intra-articular and extra-articular injuries (7.1 ± 3.7 vs 6.3 ± 4.0 years). For both types of hip injury, there was no correlation between player age and either days to return to play or number of games missed ($R^2 = 0.014$).

Conclusion: NBA players with intra-articular hip injuries underwent surgery more frequently and had a longer return-to-play time compared with those with extra-articular hip injuries. NBA tenure and player age were not correlated with the risk of developing hip injury or the need for surgery.

Keywords: NBA; intra-articular hip; hip impingement; basketball; FAI; FAIS

The current high level of physicality and intensity in the National Basketball Association (NBA) is one that can place its athletes at increased risk of a multitude of injuries. It is well-documented in the literature that the most commonly sustained injuries among NBA athletes are related to the ankle and the knee.^{5,12,26} Although less prevalent, another subset of injuries of particular interest and potential severity are related to the hip. The most recent epidemiological investigation of hip injuries in the NBA from 1988 to 2012 found that 14.6% of all injuries sustained in the NBA during that time period were related to the hip,

groin, or thigh.¹² It was found that the majority of these injuries were extra-articular, particularly muscle strains, but those authors noted that intra-articular hip injuries were most likely underestimated. Since the publication of that study, the awareness and understanding of intra-articular hip injury has progressed.

Intra-articular hip injuries are a source of activity-related anterior hip and groin pain that can be quite limiting.³ This is especially true in the case of an elite athlete, in which an intra-articular hip injury can be career altering or even career ending.^{2,15,24} The most common intra-articular hip injuries are related to the acetabular labrum and chondral surface.^{4,23} These injuries are commonly attributed to consequences of femoroacetabular impingement syndrome (FAIS). Symptoms can be

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exacerbated by activities requiring repetitive pivoting or hip flexion.

Injury to the labrum or acetabular chondral labral surface occurs due to a combination of the bony abnormality of FAIS and the extreme positioning and stress imparted in certain athletics. FAIS can occur due to deformity of the proximal femoral head-neck junction (cam deformity), the acetabular rim (pincer deformity), or a combination of both. The severity of cam deformity is most often measured by the alpha angle, which is defined as the angle between the femoral neck and the point where the femoral head loses its sphericity.¹⁸ Higher alpha angles, indicating earlier loss of sphericity, can lead to impingement between the femoral head and the acetabular labrum, with angles $>55^\circ$ associated with increased hip pain and impingement findings.¹⁰ High-impact running and jumping athletes, including basketball players, have been shown to have an increased risk of developing FAIS, which may be due to the finding that male basketball athletes had a 10-fold increase in an alpha angle $>55^\circ$ than age-matched controls.^{19,25}

In elite athletes, intra-articular hip injuries are well described in hockey and football players, but evaluation of the role in basketball players is much less defined.^{7,21} While some FAIS can be treated successfully with nonoperative means, because of the potential for progression of labral and chondral pathology, the majority of persistently symptomatic intra-articular injuries are treated surgically with good results, especially in the elite athlete.^{9,13,16,17,20}

The purpose of this study was to compare the epidemiology of intra-articular versus extra-articular hip injuries in NBA athletes with regard to injury severity, measured by days missed and treatment type rendered. We also sought to determine whether certain player characteristics such as player age or years of NBA experience were significant contributing factors for intra-articular hip injury.

METHODS

Data Collection

This study used records retrieved from the NBA centralized injury database. Data use approval was obtained from the NBA Research Committee. The NBA injury database is a standardized, audited system that has been customized and is deployed uniformly across all 30 teams in the NBA. The database is updated with injury and illness data for all NBA players active on a roster by the team's medical staff.¹⁴ The data are often entered by the team athletic training staff after evaluation by a team physician as injuries occur. In cases of more chronic conditions such as

TABLE 1
Intra-articular Injuries in the NBA From the 2012-2013
Through 2016-2017 Seasons (n = 39)

Intra-articular Injury	No. Reported	No. Underwent Surgery
Labral tear	8	4
Hip impingement	8	1
Joint capsule strain	7	0
Hip inflammation	4	0
Hip arthritis	3	1
Femoral head contusion	3	0
Acetabulum sprain/contusion	2	0
Labral sprain/capsulitis	2	0
Hip effusion	1	0
Teres ligament sprain	1	0

FAIS, the data are entered upon initial complaint and then tracked until the athlete's condition improves. The data for this study were curated and provided by IQVIA, an NBA epidemiology partner.

We queried the database for hip injuries that occurred from the 2012-2013 through the 2016-2017 seasons. Information collected included injury type (intra- vs extra-articular), player age, years of NBA tenure, season schedule (preseason vs offseason), onset type, injury mechanism, missed games as a result of the injury, days to return to NBA play, and whether surgery was required. The injuries were divided into those with either intra-articular or extra-articular pathology (Tables 1 and 2).

Statistical Analysis

Continuous variables, such as age and days to return to game play, were reported as mean \pm SD and were compared between the intra-articular and extra-articular injury groups using an independent-samples *t* test. Correlation between continuous variables was analyzed using simple linear regression. Categorical variables, such as number of intra-articular versus extra-articular hip injuries, were analyzed using a 2-sided Pearson chi-square test. A *P* value $<.05$ was considered significant. Statistical analysis was performed using SPSS Statistics Version 24 (IBM Corp).

RESULTS

Characteristics

A total of 224 athletes sustaining 353 total hip injuries were identified. Of these injuries, 216 (61.2%) were sustained

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Ethical approval was not sought for the present study.

TABLE 2
Extra-articular Injuries in the NBA From the 2012-2013 Through 2016-2017 Seasons (n = 314)

Extra-articular Injury	No. Reported	No. Underwent Surgery
Hip flexor contusion/strain/sprain	58	2
Gluteus maximus/medius contusion/strain/sprain	48	1
Hip ischium/ilium contusion	43	0
Greater trochanteric bursitis/contusion	33	2
General hip contusion/hip pointer	28	0
Hip soreness/sprain/strain	25	1
Other muscle strain/sprain	17	1
Pubic bone contusion/athletic pubalgia	15	1
Iliacus contusion/sprain/strain	14	0
Tensor fascia lata contusion/sprain/strain	11	0
Piriformis strain	8	0
Ischial tuberosity contusion	3	0
Neuropathy/nerve inflammation	3	0
Hip bursitis	2	0
Inguinal ligament injury	2	0
Proximal hamstring strain	2	0
Hip, other	2	0

during game competition and affected 156 (69.6%) of the athletes. Intra-articular injuries represented 39 (11.0%) cases and involved 36 (16.1%) players. For intra-articular pathology, the mechanism of injury was noted to be insidious in 23 (59.0%) athletes, acute in 10 (25.6%), and unknown in 6 (15.4%). The most common intra-articular hip injuries were labral hip tears (20.5%) and hip impingement (20.5%).

Impact on Play

The time to return to play after intra-articular hip injury was significantly longer compared with extra-articular hip injury (44.6 ± 96.0 vs 11.8 ± 32.0 days; $P = .03$). The number of NBA games missed secondary to intra-articular hip injury was also significantly higher than for extra-articular hip injury (8.0 ± 18.7 vs 1.54 ± 4.9 games; $P = .03$).

Risk Factors

There was no difference in age between patients who sustained intra-articular vs extra-articular hip injuries (27.9 ± 3.7 vs 27.1 ± 4.3 years; $P = .31$). Years of NBA tenure were not predictive of intra-articular versus extra-articular injury (7.1 ± 3.7 vs 6.3 ± 4.0 years; $P = .72$). In both intra-articular and extra-articular injuries, there was no correlation between player age and days to return to play or number of games missed ($R^2 = 0.014$), and the event type (game vs practice) was not a statistically significant predictor of need for surgery (odds ratio, 2.8 [95% CI, 0.36-21.2]; $P = .46$).

Nonoperative Management

In evaluating players who underwent nonoperative treatment, those with intra-articular injuries missed more total days (36.5 ± 12.4 vs 1.3 ± 0.5 days; $P = .08$) and NBA games (4.2 ± 3.4 vs 1.3 ± 0.5 ; $P = .11$) than those with

extra-articular injuries, but neither reached statistical significance.

Surgical Intervention

Players with intra-articular hip injuries were more likely to undergo surgery (odds ratio, 5.5 [95% CI, 1.8-16.7]; $P = .005$). Surgery was performed in 14.3% of intra-articular versus 2.6% of extra-articular injuries. However, there was no statistically significant difference in the number of NBA games missed secondary to surgery for intra-articular versus extra-articular injury (35.2 ± 8.3 vs 35.4 ± 11.6 ; $P = .42$).

DISCUSSION

The results of this study demonstrate that the reported incidence of intra-articular hip injuries in the NBA has increased significantly over the past 5 years.

Multiple studies have examined an overview of NBA injuries over the past 10 to 25 years using the NBA medical database. Drakos et al⁵ reviewed all reported NBA injuries from 1988 to 2005 and found 6% of injuries to be related to hip pathology, but they did not further break down whether the injuries were intra- or extra-articular. Starkey²⁶ also reviewed the NBA medical database for the time period of 1988 to 1998 but noted that only 2.4% of injuries were related to the hip. This difference is interesting and could be attributed to different classifications about what constitutes hip injury in each study, or it could highlight that the incidence or, more likely, the recognition of hip injuries in the NBA increased as time has progressed and our understanding of nonarthritic hip conditions has significantly improved.

In the most recent epidemiological evaluation, Jackson et al¹² focused more specifically on hip, groin, and thigh injuries sustained in the NBA from 1988 to 2012. Their

review found that 14.6% of all injuries documented were hip or groin related. Their study noted that the majority of these injuries were extra-articular in nature, with hamstring strain being the most commonly sustained injury. Only 1.6% of injuries noted were documented as intra-articular hip injuries. The authors had commented that they believed this number to be underestimated, as is supported by the results of the current study. They speculated that the increase in documented intra-articular hip injuries was because of a better understanding and diagnostic recognition of those pathologies. The advancing understanding of intra-articular injuries and potential causative intrinsic and extrinsic factors has allowed for more accurate diagnoses of injuries that in prior epidemiological studies were most likely misclassified.

In a similar study, Epstein et al⁶ examined the rate of intra-articular hip injuries in NHL players. Their study examined NHL player injuries from 2006 to 2010, and they found that just under 10% of documented hip injuries were intra-articular in nature, with the most common injury found to be a labral tear. Although the nature of hockey injuries differs from those of basketball, it is believed that the greater understanding of intra-articular hip injury that has occurred in the past decade greatly contributes to the increased incidence of intra-articular injuries found in this study. This point is further supported by Feeley et al⁷ in their examination of hip injuries sustained in the NFL from 1997 to 2006. Their study did not show a documented labral tear until 2004. While extra-articular hip injury was much more commonly documented, Feeley et al found that intra-articular hip injuries caused players to miss significantly more playing time and required the highest rate of surgical intervention, as is seen in the current study.

Compared with extra-articular injuries, which are mainly muscular in nature and often treated with nonoperative management, intra-articular injuries more frequently require surgical intervention, as repetitive impingement can lead to labral and cartilage damage. Without surgical intervention to address the impingement, this intra-articular damage can continue to worsen and ultimately lead to irreversible changes and disability.⁸

With regard to impact on play, Schallmo et al²² evaluated the return-to-play rates and performance outcomes of elite athletes in the 4 major North American sports after hip arthroscopy using publicly reported data from 1999 to 2016. They noted that compared with baseball, football, and hockey athletes, NBA players undergoing hip arthroscopy were significantly younger, with a mean age of 26.6 ± 3.8 years. They reported that 85.7% (24/28) of NBA players returned to the professional level postoperatively. The players who returned to play were on average 4 years younger than those who did not. After adjusting for differences in expected career lengths, NBA players were also found to have the highest median career length (7.4 years) after surgery. A similar review was performed by Jack et al,¹¹ in which the NBA player subgroup analysis showed no significant difference found in games per season, career length, or postoperative performance between players who underwent hip arthroscopy for FAIS and matched control

players. NBA players were also again found to have the longest career length (4.4 ± 3.0 years) after hip arthroscopy for FAIS compared with professional football, hockey, and baseball athletes. Using a single-surgeon cohort and publicly available data, Begly et al¹ evaluated the return-to-play rates and postoperative performance of professional basketball players and reported a mean player age of 25.6 years at time of surgery and an average of 7.1 months between surgery and return to a professional game. They noted that all 18 players returned to presurgical competition levels without a significant decline in their measured performance metrics.

While basketball is not historically thought of as a sport in which athletes are at risk for hip injury, particularly when compared with soccer and hockey, the information in the study highlights that the incidence is rising. It is important for medical providers caring for these athletes to have a high suspicion for intra-articular injury and perform an appropriate workup, as these injuries can be more debilitating and more frequently require surgical intervention than extra-articular injuries.

Limitations

The weaknesses of this study are in line with any retrospective database review. The information in the database is compiled by athletic trainers and physicians of multiple teams without a true unified standard of classification or reporting. Because of the limitations of the available data, the effect of player position on sustaining an intra-articular hip injury was not able to be assessed. While the database does document the time missed with injury, as the player information is deidentified, it was not possible to assess whether players had recurrence of prior injuries or whether playing time had any effect on the incidence of injuries. Similarly, it was not feasible to track the long-term effects on performance and career longevity after these injuries. Additionally, the study is not able to fully account for other factors that could potentially lead to an increase in intra-articular injury, including increasing physical size of players, prolonged seasons, and a possible decrease in extra-articular injuries due to better conditioning.

CONCLUSION

The incidence of intra-articular hip injuries in NBA players has increased significantly over the past decade. Players with intra-articular injuries more frequently underwent surgery and had longer time to return to play than those with extra-articular injuries. Age and time spent in the NBA were not noted to be risk factors. Further evaluation of the impact of position played as well as the effect on long-term player production and career longevity would be beneficial to continue to further understand the role intra-articular hip injury plays in these elite athletes.

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