ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

Hip Arthroscopy Does Not Negatively Influence Return To Play Performance In National Hockey League Players: Evaluation With Advanced Team-Based Statistics

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Faculty Disclosure Information

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- Paid Speaker for DJO
- Educational Support: Evolution Surgical, Inc, Foundation Medical, LLC, Arthrex, Inc, Smith and Nephew

Dr. M LaPrade and Dr. Dock
- None

Dr. Smith
- Educational and Hospitality Support: Arthrex, Inc, Medwest Associates, Stryker, Smith and Nephew

Dr. R LaPrade
- Consultant: Ossur and Smith and Nephew
- Royalties: Ossur, Smith and Nephew, Elsevier
- Research grants: AANA, AOSSM, Ossur, Smith and Nephew
- Committees: AOSSM and ISAKOS
- Editorial boards: AJSM, KSSTA, JEO, JKS, JISPT, OTSM

Dr. Larson
- Consultant: Responsive Arthroscopy and Smith & Nephew
- Stock Options: Responsive Arthroscopy

Background

- Studies have reported high rates of cam morphology and labral injury in National Hockey League (NHL) players [1-2]

- Previous studies evaluating performance after return-to-play (RTP) following hip arthroscopy in NHL players show variable results [3-7]

Background

- The use of team-based advanced statistics has gained interest in the hockey community and medical literature but has not yet been studied in the setting of RTP after hip arthroscopy

TABLE 1
Glossary of Team-Based Advanced Performance Statistics

Advanced Statistic	Definition
Corsi %	The percentage of shot attempts taken by a player's team out of the total shot attempts (player's team + opponent) while the player is on the ice. This includes shots on net, blocked shots, and shots that miss the net
Relative Corsi %	Corsi percent of the player compared with the Corsi percent of the rest of the team when the player is not on the ice
Fenwick %	The percentage of shot attempts taken by a player's team out of the total shot attempts (player's team + opponent) while the player is on the ice, excluding blocked shots
Relative Fenwick %	Fenwick percent of the player compared with the Fenwick percent of the rest of the team when the player is not on the ice
G %	Percentage of goals scored for the player's team when the player is on the ice
xG %	The expected percentage of goals scored by the player's team using the model created by MoneyPuck and described in the text
Relative xG %	The expected percentage of goals compared with the rest of the player's team
Icetime %	The percentage of icetime the player plays during games in which they are active

Purpose/Hypothesis

- Purpose:
  - Use team-based advanced performance statistics to evaluate postoperative performance after hip arthroscopy in NHL players in comparison with:
    - Their preoperative performance
    - Matched controls of uninjured skaters

- Hypothesis:
  - No significant difference between preoperative and postoperative performance after hip arthroscopy in NHL players
  - No significant difference when compared with matched controls of uninjured players

Methods

- 56 eligible NHL players found through public records who underwent hip arthroscopy over 12 seasons and had a prior healthy season prior to surgery
  - Goalies excluded due to small number
- Team-based advanced performance statistics were recorded for the preinjury season, index (injury) season, and first 2 years after RTP
- Relative percentages of each statistic were collected to allow for intra-team comparisons
- A control group of NHL players without injury was collected and matched 1:2 by age, years of play, and draft round

Results

- The RTP rate at the NHL level:
  - 89% for 1 season
  - 70% for 2 seasons
    - 54% of those who did not return to the NHL level played at a lower professional level

- There were no significant differences in demographics between:
  - The study and control group
  - Those who did RTP to NHL level and those who did not

TABLE 2
Baseline Characteristics for Hip Arthroscopy and Control Groups[a]

	Hip Arthroscopy Group	Control Group	*P*
Age at index year, y	28.3	28.1	.741
Previous years in NHL, n	7.1	7.2	.934
Draft round	2.8	2.8	.978
Height, in	73.2 (185.9 cm)	73.1 (185.6 cm)	.756
Weight, lb	199.9 (90.7 kg)	203.2 (92.2 kg)	.215
Shoot right-handed, %	58	60	.817

[a]NHL, National Hockey League. The draft round and age at index year are reported as mean.

TABLE 3
Baseline Characteristics for Hip Arthroscopy Group Who Did RTP and Did Not RTP[a]

	RTP Group	Did Not RTP Group	*P*
Age at index year, y	28.0	30.1	.106
Previous years in NHL, n	7.3	7.1	.889
Draft round	2.7	3.2	.548
Height, in	73.3 (186.1 cm)	73.2 (185.9 cm)	.921
Weight, lb	199.9 (90.7 kg)	199.9 (90.7 kg)	.995
Shoot right-handed, %	48	27	.229

[a]NHL, National Hockey League; RTP, return to play. The draft round and age at index year are reported as mean.

Results—vs Postoperative Performance

- Games played:
  - Significant decrease in games played in the index (injury) year and 1st year of RTP vs pre-injury season
  - No difference for 2nd year of RTP

- Team-based advanced statistics:
  - There were no significant differences in any team-based advanced statistics between the pre-injury season and the index (injury) season, or years 1 or 2 after RTP

TABLE 4
Raw Team-Based Performance Statistics[a]

	Preinjury Year (n = 50)	Index (Injury) Year (n = 49)	First Year Postsurgery (n = 50)	Second Year Postsurgery (n = 41)
Games	63.58 ± 19.19	52.39 ± 25.50	48.92 ± 28.21	56.62 ± 21.79
Icetime %	29.09 ± 5.35	28.68 ± 5.94	27.06 ± 5.90	27.79 ± 5.25
Corsi %	50.50 ± 6.45	49.63 ± 6.72	49.11 ± 7.47	50.11 ± 7.43
Relative Corsi %	0.04 ± 8.08	−0.58 ± 9.16	−1.24 ± 8.95	0.00 ± 9.02
Fenwick %	50.62 ± 5.95	49.98 ± 6.46	49.15 ± 7.37	50.09 ± 7.21
Relative Fenwick %	0.12 ± 7.75	−0.41 ± 8.73	−1.56 ± 8.77	−0.10 ± 8.64
Goal %	50.39 ± 10.52	49.83 ± 13.47	49.63 ± 12.46	51.11 ± 9.99
xGoal %	50.87 ± 7.01	49.32 ± 8.59	48.66 ± 8.81	50.55 ± 7.91
Relative xGoal %	1.40 ± 9.12	0.00 ± 11.14	−0.87 ± 10.39	0.80 ± 9.68

TABLE 5
P Values for Team-Based Performance Statistics for NHL Players Undergoing Hip Arthroscopy[a]

	ANOVA	Preinjury vs Index Year	Preinjury vs Year 1	Preinjury vs Year 2
Games	.018	.015[b]	.003[b]	.119
Icetime %	.284	.718	.075	.255
Corsi %	.779	.513	.320	.796
Relative Corsi %	.879	.720	.453	.981
Fenwick %	.747	.606	.273	.711
Relative Fenwick %	.768	.752	.314	.903
Goal %	.939	.819	.744	.744
xGoal %	.503	.328	.168	.843
Relative xGoal %	.707	.493	.249	.764

Results—vs Matched Controls

- Games played:
  - Significant decrease in games played in index (injury) year and 1st year of RTP vs matched controls
  - No difference for pre-injury or 2nd year of RTP

- Team-based advanced statistics:
  - There were no significant decreases in any team-based advanced statistics vs matched controls at any time point
  - There was a significantly increased (improved) Goal % in the second year after RTP versus the control group

TABLE 6
Raw Team-Based Performance Statistics for Matched Controls of NHL Players[a]

	Preinjury Year (n = 100)	Index Year (n = 100)	First Year Postsurgery (n = 100)	Second Year Postsurgery (n = 78)
Games	66.89 ± 18.32	64.68 ± 16.25	60.25 ± 20.18	58.99 ± 21.92
% Icetime	28.41 ± 6.45	28.32 ± 6.58	27.84 ± 6.89	27.99 ± 6.89
Corsi %	50.35 ± 6.27	49.35 ± 6.44	49.25 ± 6.30	49.29 ± 6.64
Relative Corsi %	−0.59 ± 8.05	−1.13 ± 8.17	−1.21 ± 7.52	−1.25 ± 8.96
Fenwick %	50.35 ± 5.95	49.40 ± 6.18	49.25 ± 6.10	49.27 ± 6.48
Relative Fenwick %	−0.60 ± 7.59	−1.27 ± 7.73	−1.12 ± 7.22	−1.29 ± 8.85
Goal%	50.59 ± 9.45	48.40 ± 9.431	48.01 ± 11.43	47.81 ± 10.28
xGoal%	50.37 ± 7.07	49.25 ± 7.88	48.39 ± 7.86	48.23 ± 7.42
Relative xGoal%	−0.35 ± 8.91	−0.57 ± 11.06	−1.12 ± 10.29	−1.71 ± 9.95

TABLE 7
P Values for Team-Based Performance Statistics for NHL Players Undergoing Hip Arthroscopy[a]

	Preinjury Year	Index (Injury) Year	First Year Postsurgery	Second Year Postsurgery
Games	.157	.001[b]	.007[b]	.291
% Icetime	.249	.372	.237	.431
Corsi %	.446	.404	.454	.282
Relative Corsi %	.325	.356	.467	.198
Fenwick %	.396	.303	.465	.275
Relative Fenwick %	.297	.279	.382	.243
Goal %	.454	.252	.221	.049[b]
xGoal %	.341	.482	.427	.065
Relative xGoal %	.134	.385	.443	.098

Discussion

- This study utilized team-based advanced performance statistics that are more relevant to hockey performance in comparison with previous studies

- There were no significant decreases in team-based advanced performance statistics after RTP from hip arthroscopy for NHL players versus their pre-injury levels or versus a matched control group of uninjured players

- Results indicate that NHL players who RTP at the NHL level are able to return to their previous level of performance, albeit playing in fewer games the first season after surgery

Limitations

- The study is reliant on publicly available information
- We are unable to report on differences in extent of the injury, including possible concomitant groin or core muscle injury, presence or absence of labral pathology, or any associated hip dysplasia or osteoarthritis
- While team-based performance statistics are commonly used in the hockey community, they are not a perfect measure for performance
  - We used relative team-based statistics to compare players within their own team to account for either a very strong or weak team
  - No significant differences in any relative statistics

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