

# SURGEON VOLUME, TRACTION SET-UP, AND CAPSULAR REPAIR AMONG SEVERAL FACTORS IDENTIFIED TO INFLUENCE HIP ARTHROSCOPY OPERATIVE AND ROOM TIME

Lucas Bartlett DO<sup>1</sup>, Shawn Geffken BS<sup>3</sup>, Shebin Tharakan BS<sup>3</sup>, Francis Landman MD<sup>1</sup>, Brandon Klein DO, MBA<sup>1</sup>, Guillaume D. Dumont MD, MBA<sup>2</sup>, Randy M. Cohn MD<sup>1</sup>

1.Northwell Orthopedics, New Hyde Park, NY

2.Department of Orthopaedic Surgery, Lexington Medical Center, Columbia, SC

3.NYIT College of Osteopathic Medicine, Westbury, NY

# AUTHORSHIP DISCLOSURE

All authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper

# OBJECTIVES

The purpose of this study was to identify surgeon related, patient-specific, or procedural-related factors that are predictive for operative duration and total operating room time during hip arthroscopy

# MATERIALS AND METHODS

- All patients undergoing hip arthroscopy within our multi-institutional health system between January 1st, 2014 and June 15th, 2022 were retrospectively identified using CPT codes
- Inclusion criteria comprised any patient who underwent hip arthroscopy at one of the 11 facilities evaluated within our health system during the aforementioned timeframe. A total of 950 hip arthroscopies were initially identified
- Procedures were excluded if they met the following criteria
  - Required open conversion
  - Associated patients had incomplete medical documentation or operative reports

# MATERIALS AND METHODS

For included procedures, various factors were independently recorded by two reviewers from office notes, operative reports, and other medical documentation

Patient-specific	Surgeon-related	Procedure-Related
<ul style="list-style-type: none"><li>• Age</li><li>• Sex</li><li>• BMI</li><li>• ASA Class</li><li>• Medical Comorbidities</li><li>• Surgical Indication</li></ul>	<ul style="list-style-type: none"><li>• Annual procedure volume</li></ul>	<ul style="list-style-type: none"><li>• Traction set-up (posted vs. postless)</li><li>• Femoroplasty</li><li>• Acetabuloplasty</li><li>• Labral Management<ul style="list-style-type: none"><li>• Repair</li><li>• Reconstruction</li><li>• Debridement</li></ul></li><li>• Capsular Management<ul style="list-style-type: none"><li>• Capsulotomy shape (T vs. Interportal)</li><li>• Capsular repair</li></ul></li></ul>

# MATERIALS AND METHODS

- Operative time was defined as the length of time (minutes) between skin incision and skin closure. “Idle room time” was calculated as the difference between the total room time and operative time.
- The annual procedure volume (APV) was recorded for each surgeon and was defined as the total number of cases performed divided by the total number of years active during the study period.
- Surgeons were arbitrarily stratified into volume-based tertiles.
  - High volume surgeons were defined as performing more than 25 hip arthroscopies per year
  - Mid-volume surgeons performed between 10 and 25 procedures annually
  - Low-volume surgeons performed fewer than 10 procedures annually.

# MATERIALS AND METHODS

- Statistical analysis was performed with SPSS 28 (IBM, Armonk, NY)
- A paired *t*-test or ANOVA was used to determine significance for continuous variables, while a Chi Square test was utilized for categorical variables
- Proportional comparisons were performed using a Z-test
- Factors predictive for longer or shorter operative and idle room time were identified with a multivariate regression analysis
  - Significant changes were defined as one standard deviation greater or less than the average cohort time
- A p-value less than 0.05 was used to demonstrate statistical significance for all tests.

# RESULTS: PATIENT DEMOGRAPHICS

- A total of 904 arthroscopic hip procedures in 832 patients (72 staged bilateral) were included in the analysis
- A total of 46 cases (4.8%) were excluded.
  - Procedures converted open (n=22)
  - Incorrect or insufficient medical coding and/or operative reports (n=24).

Age, mean (SD)	37.7 (14.4)
Adult vs Pediatric, n (%)	
<i>Adult</i>	831 (91.9%)
<i>Pediatric</i>	73 (8.1%)
Sex, n (%)	
<i>Male</i>	352 (38.9%)
<i>Female</i>	552 (61.1%)
BMI, mean (SD)	27.4 (5.8)
BMI Class, n (%)	
<25	343 (37.9%)
25-29.9	305 (33.7%)
> 30	256 (28.3%)
ASA, n (%)	
<i>I</i>	222 (24.6%)
<i>II</i>	546 (60.4%)
<i>III or greater</i>	134 (15%)

Any Comorbidity, n (%)	820 (90.7%)
<i>DM</i>	66 (7.3%)
<i>HTN</i>	149 (16.5%)
<i>Cardiac</i>	126 (13.9%)
<i>Respiratory</i>	201 (22.2%)
<i>Auto-Immune</i>	101 (11.2%)
<i>Misc.</i>	62 (6.9%)
Surgical Indication, n (%)	
<i>FAI with labral tear</i>	554 (61.3%)
<i>Isolated labral tear</i>	182 (20.1%)
<i>FAI without labral tear</i>	58 (6.4%)
<i>Traumatic chondrolabral injury</i>	45 (5.0%)
<i>Diagnostic arthroscopy</i>	23 (2.5%)
<i>Infection</i>	7 (0.8%)
<i>Other</i>	32 (3.8%)



# RESULTS: SURGEON DEMOGRAPHICS

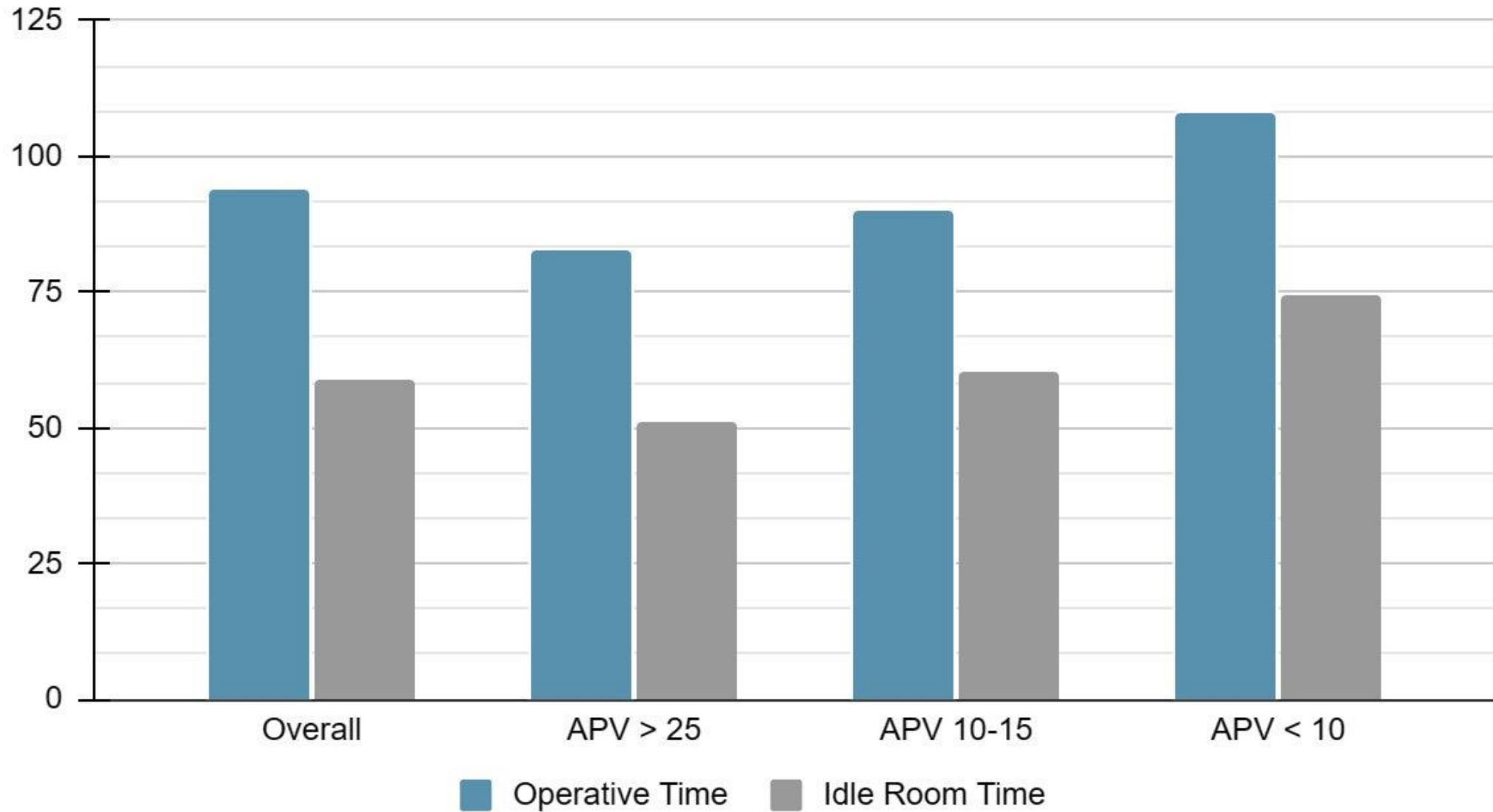
- The average APV was 6.5 cases for all included surgeons (n=25).
- Two surgeons were considered high volume (average APV: 31.8) and collectively performed 50.1% (453/904) of all cases.
- Three surgeons were considered mid-volume (average APV: 17.5) and performed 34.8% (315/904) of cases.
- The remaining 20 surgeons performed less than 10 procedures annually (average APV: 2.4) over the study period and accounted for 15.0% (136/904) of procedures.

# RESULTS: PROCEDURE UTILIZATION

- Postless traction was implemented in 84.2% (761/904) of cases
- Femoroplasty and acetabuloplasty were performed in 58.5% (529/904) and 59.2% (535/904) of cases respectively
- A total of 91.5% (827/904) of procedures included labral treatment
- Capsular repair was performed in 48.1% (435/904) of cases.
  - It was performed more frequently when femoroplasty was performed (314/529, 59.4%,  $p < 0.001$ ).

Capsular Treatment, n (%)	
<i>Interportal Capsulotomy, n (%)</i>	753 (83.2%)
<i>T Capsulotomy, n (%)</i>	142 (15.7%)
<i>Capsular Repair, n (%)</i>	435 (48.1%)
Labral Treatment, n (%)	
<i>Repair</i>	660 (73.0%)
<i>Reconstruction</i>	10 (1.1%)
<i>Debridement</i>	157 (17.4%)
Femoroplasty, n (%)	529 (58.5%)
Acetabuloplasty, n (%)	535 (59.2%)
Postless Traction Set-Up, n (%)	761 (84.2%)

## Average Operating and Idle Room Time by Surgeon Volume



# FACTORS PREDICTIVE OF OPERATIVE TIME

Name	OR	CI: Lower	CI: Upper	p-value
BMI				
<24.9	1.36	1.01	1.81	0.047
25-29.9	0.88	0.63	1.22	0.44
>30	1.04	0.81	1.33	0.78
ASA Class				
I	0.99	0.79	1.23	0.90
II	1.10	0.84	1.42	0.50
III or higher	1.03	0.78	1.35	0.84
Age				
Less than 18	0.87	0.67	1.16	0.36
Greater than or equal to 18	0.95	0.64	1.43	0.82
Sex				
Male	1.33	0.90	1.97	0.16
Female	1.09	0.82	1.45	0.57
APV				
<10	1.23	0.91	1.68	0.19
10-25	0.99	0.81	1.19	0.89
>25	0.53	0.34	0.84	0.009

Name	OR	CI: Lower	CI: Upper	p-value
Capsular Treatment				
T-shaped Capsulotomy	0.98	0.69	1.41	0.93
L-shaped Capsulotomy	1.06	0.52	2.14	0.87
Capsular Repair	1.28	1.02	1.60	0.04
Unrepaired Capsulotomy	1.16	0.79	1.69	0.46
Labral Treatment				
Labral Repair	0.91	0.70	1.20	0.52
Labral Debridement	0.81	0.37	1.80	0.61
None	0.73	0.46	1.18	0.21
Traction Setup				
Postless	1.22	0.79	1.87	0.38
Posted	0.84	0.59	1.19	0.32
Bony Procedures				
Isolated Femoroplasty	0.98	0.70	1.38	0.90
Isolated Acetabuloplasty	0.70	0.49	1.00	0.05
Combined	1.19	0.90	1.58	0.22
None	0.97	0.76	1.30	0.85

# FACTORS PREDICTIVE OF ROOM IDLE TIME

Name	OR	CI: Lower	CI: Upper	p-value
BMI				
<24.9	0.69	0.50	0.96	0.035
25-29.9	0.83	0.59	1.17	0.30
>30	0.97	0.69	1.36	0.85
ASA Class				
I	1.10	0.85	1.43	0.46
II	1.04	0.80	1.37	0.76
III or higher	1.31	0.87	1.97	0.21
Age				
Less than 18	1.01	0.76	1.35	0.93
Greater than or equal to 18	1.46	0.84	2.56	0.19
Sex				
Male	0.96	0.68	1.36	0.82
Female	1.34	0.99	1.83	0.07
APV				
<10	0.97	0.73	1.30	0.84
10-25	1.08	0.71	1.64	0.73
>25	1.07	0.58	1.96	0.83

Name	OR	CI: Lower	CI: Upper	p-value
Capsular Techniques				
T-shaped Capsulotomy	0.95	0.59	1.53	0.84
L-shaped Capsulotomy	1.81	0.63	5.26	0.28
Capsular Repair	0.90	0.63	1.9	0.57
Unrepaired Capsulotomy	0.89	0.59	1.36	0.60
Labral Management				
Labral Repair	1.75	1.11	2.77	0.02
Labral Debridement	0.62	0.22	1.71	0.36
None	1.07	0.79	1.44	0.67
Traction Setup				
Postless	1.12	0.75	1.67	0.58
Posted	1.46	1.05	2.03	0.03
Bony Procedures				
Isolated Femoroplasty	1.11	0.76	1.61	0.62
Isolated Acetabuloplasty	1.19	0.78	1.83	0.42
Combined	0.94	0.71	1.25	0.69
None	1.01	0.73	1.40	0.95

# CONCLUSION

- In this multi-institutional study, increased surgeon volume was associated with decreased operative time.
- Lower patient BMI and performing capsular repair were associated with increased operative time.
- Idle operating room time was increased in cases with labral repair and the use of posted traction while low patient BMI was associated with shorter idle room time.

# SIGNIFICANCE OF FINDINGS

- Hip arthroscopy is recognized as one of the fastest growing orthopaedic procedures in the United States.
- Identifying the drivers of prolonged operative and room time are important to help mitigate patient complications and procedure related costs following hip arthroscopy.