Complication Rates for Hip Arthroscopy are Underestimated: A Population-Based Study

Jeremy Truntzer, MD, Daniel J. Hoppe, MD MEd FRCSC,
Lauren M. Shapiro, MD, Geoffrey D. Abrams, MD, Marc Safran, MD

Stanford University

Jeremy Truntzer, MD

I have no financial relationships to disclose

One or more of my co-authors have the following disclosures:

American Journal of Sports Medicine: Editorial or governing board
CONMED Linvatec: Paid consultant; Paid presenter or speaker
Cool Systems, Inc: Paid consultant
Cool Systems, IncCradle Medical, IncBiomimedicaEleven Blade Solutions: Stock or stock Options
Cool Systems, IncCradle Medical, IncFerring PharmaceuticalsBiomimedicaEleven Blade Solutions: Unpaid consultant
Cytonics: Paid Consultant; Stock or stock options
DJ Orthopaedics: IP royalties
Ferring Pharmaceuticals: Research support
International Society for Hip Arthroscopy: Board or committee member
International Society of Arthroscopy, Knee Surgery, and Orthopaedic Sports Medicine: Board or committee member
JISAKOS: Editorial or governing board
Journal of Hip Preservation Surgery: Editorial or governing board
Medacta: Paid consultant; Paid presenter or speaker
Saunders/Mosby-Elsevier: Publishing royalties, financial or material support
Smith & Nephew: IP royalties; Paid presenter or speaker; Research support
Stryker: IP royalties
Wolters Kluwer Health - Lippincott Williams & Wilkins: Publishing royalties, financial or material support

Introduction

- Incidence of hip arthroscopy has seen an exponential rise with an increasing diversity of procedures performed[1,2]
- Previous studies report seemingly low rates of complications, faster return to activity, and improved patient reported outcomes compared to open procedures[1]
- New hip arthroscopy CPT codes released in 2011 reflect growth and changing indications: CPT-29914, 29915, 29916[3]
- Studies demonstrate learning curve relating surgeon experience to complication rate[4]

Background

- Overall complication rates between 0.42-7.5%, with major complications occurring between 0.45-0.58%[5]
- Complications most commonly include traction-related injuries, chondrolabral damage, infection, iatrogenic hip instability, proximal femur fracture, fluid extravasation, DVT and PE
- Multiple studies report on conversion to THA, which represents arguably the most definitive endpoint of an undesired outcome[6]
- Current studies are based on retrospective data, small sample sizes and short study periods, or originate from high volume centers[7,8]
- Results may not be generalizable to the at-large population and reflect standard volume orthopaedic practice

Purpose

- To identify major and minor complication rates associated with hip arthroscopy from a payer-based national database and compare with existing literature

- Hypothesis: Perioperative and post-operative complication rates, specifically the rates of proximal femur fracture, hip dislocations, and conversion to total hip arthroplasty, would be higher using a national database with more inclusive follow-up when compared to existing data

Methods

- All patients who underwent hip arthroscopy were identified in the Humana database between 2007 and 2014
- For CPT code 29999, an unlisted procedure code utilized for hip arthroscopy, patients were included if associated with an ICD-9 related to hip pathology
- Records of all patients who underwent hip arthroscopy were searched for CPT and ICD-9 codes associated with complications specific to hip arthroscopy based on various time periods[3]
  - Select complications were also identified amongst the general Humana population
- Complications were separated into major and minor in severity[4]

Methods Cont.

		Codes
Hip arthroscopy procedures		CPT-29860, CPT-2986, CPT-2986, CPT-29863, CPT-29914, CPT-29915, CPT-29916, CPT-29999
Hip pathology		ICD-9-D-71515, ICD-9-D-71525, ICD-9-D-71535, ICD-9-D-71595, ICD-9-D-71605, ICD-9-D-71615, ICD-9-D-71625, ICD-9-D-71635, ICD-9-D-71645, ICD-9-D-71655, ICD-9-D-71665, ICD-9-D-71685, ICD-9-D-71695, ICD-9-D-71805, ICD-9-D-71845, ICD-9-D-71855, ICD-9-D-71865, ICD-9-D-71875, ICD-9-D-71885, ICD-9-D-71895, ICD-9-D-71985, ICD-9-D-71995
Complication	**Timing from hip arthroscopy**	**Code(s)**
Superficial wound complications	Within 90 days	ICD-9-D-8900, ICD-9-D-8901, ICD-9-D-8902, ICD-9-D-9160, ICD-9-D-9161, ICD-9-D-9162, ICD-9-D-9163, ICD-9-D-9169
Deep Infections	Within 90 days	ICD-9-D-71105, ICD-9-D-71145, ICD-9-D-71106, ICD-9-D-56731
Deep vein thrombosis	Within 90 days	ICD-9-D-4534, ICD-9-D-45340, ICD-9-D-45341, ICD-9-D-45342, ICD-9-D-4538, ICD-9-D-45389, ICD-9-D-4539
Pulmonary embolism	Within 90 days	ICD-9-D-41511 ICD-9-D-41512 ICD-9-D-41513 ICD-9-D-41519
Abdominal compartment syndrome	Within 30 days	ICD-9-D-95893, ICD-9-D-72973, ICD-9-D-9589
Total hip arthroplasty	Within 6 months, 1 year, 5 years	CPT-27130
Nerve injuries	Within 6 months	ICD-9-D-3561, ICD-9-D-9563, ICD-9-D-3552, ICD-9-D-3553, ICD-9-D-3554, ICD-9-D-3556, ICD-9-D-9075, ICD-9-D-9079, ICD-9-D-9560, ICD-9-D-9561, ICD-9-D-9562, ICD-9-D-9563, ICD-9-D-9564, ICD-9-D-9565
Hip Bursitis	Within 1 year	ICD-9-D-7273
Heterotopic ossification	Within 1 year	ICD-9-D-72810, ICD-9-D-72819, ICD-9-D-72813, ICD-9-D-72691
Proximal femur fracture	Within 30 days, 1 year, 5 years	ICD-9-D-73396, ICD-9-D-73397, ICD-9-D-82000, ICD-9-D-82001, ICD-9-D-82002, ICD-9-D-82003, ICD-9-D-82009, ICD-9-D-82010, ICD-9-D-82011, ICD-9-D-82012, ICD-9-D-82013, ICD-9-D-82019, ICD-9-D-82020, ICD-9-D-82021, ICD-9-D-82030, ICD-9-D-82031, ICD-9-D-82032, ICD-9-D-8208, ICD-9-D-8209
Avascular necrosis of the femoral head	Within 90 days, 1 year, 5 years	ICD-9-D-73342
Hip dislocation	Within 90 days, 1 year, 5 years	ICD-9-D-83500, ICD-9-D-83501, ICD-9-D-83502, ICD-9-D-83503, ICD-9-D-83510, ICD-9-D-83511, ICD-9-D-83512, ICD-9-D-83513

Results

- Incidence of minor and major complications in the 2581 patients who underwent hip arthroscopy (2007-2014)

Minor (4.22%)	**% (N)**
Superficial wound complications within 90 days	NA (NR)
DVT within 90 days	0.79 (16)
Abdominal compartment syndrome within 30 days	0.00 (0)
Nerve injuries within 6 months	NA (<10)
Bursitis within 1 year	1.23 (25)
Heterotopic ossification within 1 year	2.85 (58)
Major (1.74%)	
Deep infections within 90 days	NA (NR)
Proximal femur fractures:	
Within 30 days	NA (NR)
Within 90 days	0.74 (19)
Within 1 year	0.89 (23)
Within 5 years	1.08 (28)
Avascular necrosis of femoral head:	
Within 90 days	NA (NR)
Within 1 year	NA (NR)
Within 5 years	0.58 (15)
Hip dislocations:	
Within 90 days	NA (NR)
Within 1 year	0.58 (15)
Within 5 years	0.77 (20)
Pulmonary embolism within 90 days	NA (NR)
Other	
Total hip arthroplasty:	
Within 6 months*	1.78 (33)
Within 1 year*	2.85 (53)
Within 5 years*	4.74 (88)

*Includes laterality

Results Cont.

- Comparison of select complications following hip arthroscopy compared to the general population (Humana)

Complication	Population %	Hip Arthroscopy %	Relative Risk (95%CI)	P-Value
Hip dislocations within 1 year	0.04	0.58	19.60 (11.83-32.46)	<.001
Proximal femur fractures within 1 year	0.52	0.89	2.22 (1.47-3.33)	<.001
THA within 1 year	0.18	2.85	15.72 (12.05-20.50)	<.001

Complication	Population %	Hip Arthroscopy %	Relative Risk (95%CI)	P-Value
Proximal femur fractures within 1 year				
< 50 years	0.05	0.84	18.02 (9.71-33.43)	<.001
> 50 years	0.68	1.53	2.23 (1.30-3.82)	<.001
THA within 1 year				
< 50 years	0.02	1.39	57.66 (35.36-94.02)	<.001
> 50 years	0.24	5.28	22.05 (16.11-30.18)	<.001

Discussion

- Overall rates of complications were considerably higher than previously reported in the literature
- Higher rates of major complications were observed including proximal femur fractures, dislocations, and conversion to THA
- Higher relative risk was observed for major complications following hip arthroscopy compared to the general population, especially for younger patients

Conclusion

- By using a national database with longer and more inclusive follow-up, many of the recognized limitations of prior observational studies were avoided
  - Loss to follow-up, reporting bias, and more successful results from centers of excellence
- The higher complication rates observed in this study may provide a more accurate estimation of risk for the community-based orthopaedic surgeon
- Large prospective RTCs are needed to better understand risk factors and improve patient selection to reduce complications

References

1. Colvin AC, Harrast J, Harner C. Trends in hip arthroscopy. *J Bone Joint Surg Am* 2012;94:e23.
2. Montgomery SR, Ngo SS, Hobson T, Nguyen S, Alluri R, Wang JC, et al. Trends and demographics in hip arthroscopy in the United States. *Arthroscopy* 2013;29:661-665.
3. Sing DC, Feeley BT, Tay B, Vail TP, Zhang AL. Age-Related Trends in Hip Arthroscopy: A Large Cross-Sectional Analysis. *Arthroscopy* 2015;31:2307-2313.e2302.
4. Hoppe DJ, de Sa D, Simunovic N, Bhandari M, Safran MR, Larson CM, et al. The learning curve for hip arthroscopy: a systematic review. *Arthroscopy* 2014;30:389-397.
5. Harris JD, McCormick FM, Abrams GD, Gupta AK, Ellis TJ, Bach BR, Jr., et al. Complications and reoperations during and after hip arthroscopy: a systematic review of 92 studies and more than 6,000 patients. *Arthroscopy* 2013;29:589-595.
6. Bedard NA, Pugely AJ, Duchman KR, Westermann RW, Gao Y, Callaghan JJ. When Hip Scopes Fail, They Do So Quickly. *J Arthroplasty* 2016;31:1183-1187.
7. Cvetanovich GL, Chalmers PN, Levy DM, Mather RC, 3rd, Harris JD, Bush-Joseph CA, et al. Hip Arthroscopy Surgical Volume Trends and 30-Day Postoperative Complications. *Arthroscopy* 2016;32:1286-1292
8. Pugely AJ, Martin CT, Harwood J, Ong KL, Bozic KJ, Callaghan JJ. Database and Registry Research in Orthopaedic Surgery: Part I: Claims-Based Data. *J Bone Joint Surg Am* 2015;97:1278-1287.