

Are There Sex-Based
Differences in Outcomes
After Hip Arthroscopy?

A Systematic Review

#### Authors:

Helen Crofts, MD BSc Cameron Proceviat, BSc Jordan Leith, MD, FRCSC Mark McConkey, MD, FRCSC Olufemi R. Ayeni, MD, PhD, MSc Parth Lodhia, MD, FRCSC







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## **Introduction**

- Last decade has seen more refined indications for hip arthroscopy:
  - Femoroacetabular impingement
  - Labral tears
  - Borderline dysplasia
- Number of hip arthroscopies being performed continues to expand<sup>1</sup>
- Increased reporting of outcomes in different population groups
  - Novel patient reported outcomes measures for non-arthritic hip population (HOS, iHOT, HAGOS)<sup>2, 3</sup>
- Reporting of outcomes in different population groups 6,7
  - Sex
  - Increased BMI
  - Age
- Differences in hip morphology exist between sexes 4, 5
  - Increased hip range of motion in females
  - · Increased alpha angle in males
- Reporting on revision arthroscopy rates and conversion to total hip arthroplasty show no clear consensus



## **Purpose**

To assess differences in outcomes between males and females following hip arthroscopy.

Hypothesis: there will be no differences between sexes with respect to postoperative PROMs, revision arthroscopy, conversion to total hip arthroplasty, or complications



## **Methods**

### Study Design:

• Systematic review performed according to PRISMA guidelines

### Inclusion criteria:

• Studies that reported outcomes following primary hip arthroscopy with a sex-specific analysis

### Exclusion criteria:

- Not in the English language
- Fewer than ten subjects or cadaveric studies
- Review articles, book chapters, technique reports, abstracts and case reports

### Search strategy:

- MEDLINE, Embase, Cochrane and PubMed databases
- "hip," "arthroscopy," "outcome," "gender difference," "gender," "sex," and "patient reported outcome".





## **Methods**

### Data collection

- study descriptors
  - level of evidence, sample size
- patient demographics
  - age, number of hips, sex, follow-up time, indication for surgery
- outcomes
  - PROMs, MCIDs, PASS
  - conversion to total hip arthroplasty
  - rates of revision arthroscopy
  - complications

### Data analysis

- Forest plots generated in cases with at least three studies reporting an outcome and when absolute numbers of patients were available
- pooled mean differences for continuous variables and pooled odds ratio for binary outcomes

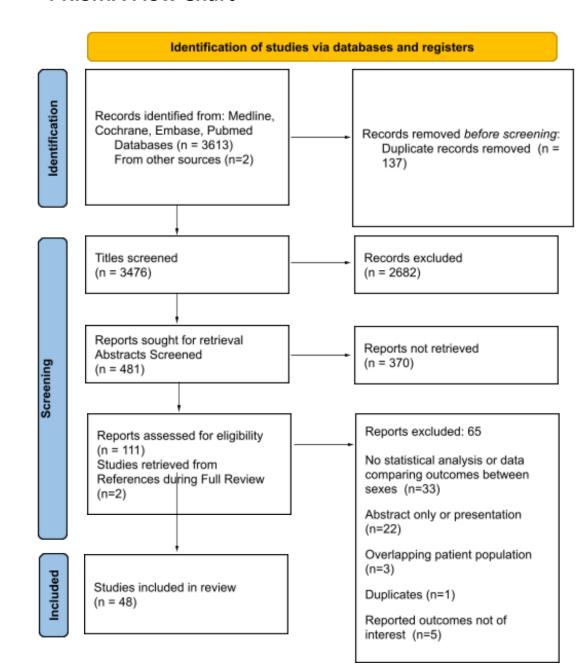




- 48 studies included
- 58544 hips (54% female)
- Average age: 39.4
- Mean follow-up: 39.8 months
- Mean MINORS score: 11.8



#### **PRISMA Flow Chart**



### **Patient Reported Outcome Measures**

- •21 studies, 30 different PROMs reported
- •Forest plots generated for mHHS, HOS-SSS, HOS-ADL, NAHS
- •No sex based differences in post-operative outcomes

#### **Modified Harris Hip Score**

Study	Total	Mean	Male SD	Total	Mean	Female SD		Mean Difference	MD	95%-CI
Beck et al.	72	83.70	18.3000	71	83.70	18.3000		+	0.00	[-6.00; 6.00]
Ben Tov et al.	6	84.23	7.0000	14	88.45	3.8700		*	-4.22	[-10.18; 1.74]
Chandrasekaran et al.	13	94.30	6.7800	77	88.80	10.7900			- 5.50	[ 1.10; 9.90]
Flores et al.	57	84.40	17.6000	72	85.80	16.1000			-1.40	[-7.29; 4.49]
Frank et al.	75	83.37	7.1500	75	80.43	8.8000			2.94	[ 0.37; 5.51]
Glein et al.	73	89.00	13.5000	73	85.60	16.8000			3.40	[-1.54; 8.34]
Maerz et al.	269	90.80	17.9300	352	81.40	22.8100			9.40	[ 6.20; 12.60]
Saks et al.	102	84.20	17.5600	95	84.97	13.9000			-0.77	[-5.18; 3.64]
Shibata et al.	54	96.30	20.2000	42	97.90	4.4000			-1.60	[-7.15; 3.95]
Heterogeneity: $I^2 = 74\%$	$\tau^{2} = 1$	3.4845,	p < 0.01						7	
							-10	-5 0 5	10	

#### **Hip Outcome Score- Sport Specific Subscale**

			Male			Female							
Study	Total	Mean	SD	Total	Mean	SD		Mean	Differ	ence		MD	95%-CI
Beck et al.	72	73.30	28.7000	71	76.70	20.4000		_				-3.40	[-11.55; 4.75]
Chandresekaran et al.	13	91.00	13.6000	77	78.60	21.6000			-	- 0		12.40	[ 3.57; 21.23]
Frank et al.	75	86.29	11.5500	75	81.18	14.4800			-			5.11	[ 0.92; 9.30]
Glein et al.	73	78.30	26.0000	73	78.00	25.6000		_	-			0.30	[-8.07; 8.67]
Martinez et al.	104	72.20	20.2000	52	62.60	19.3000			_	- 10	_	9.60	[ 3.07; 16.13]
Heterogeneity: $I^2 = 60\%$	$\tau^2 = 2$	0.7641,	p = 0.04					1					
			(*)				-20	-10	0	10	20		

#### **Hip Outcome Score- Activity of Daily Living**

Study	Total	Mean	Male SD	Total	Mean	Female SD		Mea	n Differe	nce	MI	D 9	5%−CI
Beck et al.	72	85.60	17.2000	71	86.70	19.1000	_		*		-1.1	0 [-7.06	; 4.86]
Chandrasekaran et al.	13	93.40	11.2500	77	91.80	9.2500			-		- 1.6	0 [-4.86	; 8.06]
Frank et al.	75	90.57	10.2400	75	89.65	10.8500				_	0.9	2 [-2.46	; 4.30]
Martinez et al.	104	87.00	17.6000	52	82.90	17.9000			_	-	<b></b> 4.1	0 [-1.83;	10.03]
Heterogeneity: $I^2 = 0\%$ ,	$\tau^2=0,$	p = 0.67	7			Γ						-	-
						-1	0	-5	0	5	10		

#### Non-Arthritic Hip Score

Study	Total	Mean	Male SD	Total	Mean	Female SD	Mear	Differe	ence	MD	95%-CI
Chandresekaran et al.	13	94.50	7.3000	77	89.20	9.9000		1 —		<b>—</b> 5.30	[ 0.76; 9.84]
Glein et al.	73	88.40	14.9000	73	86.30	16.5000	_		_	2.10	[-3.00; 7.20]
Saks et al.	102	85.10	16.7600	95	85.08	14.4600	-	-	_	0.02	[-4.34; 4.38]
Heterogeneity: $I^2 = 27\%$	$\tau^2 = 2$	3126, 1	0 = 0.26				I		1		
- The state of the		•					-5	0	5		







#### **Minimal Clinically Important Difference (MCID)**

#### **Modified Harris Hip Score**

		Male		male			
Study	Events	Total	Events	Total	Odds Ratio	OR	95%-CI
Beck et al.	33	61	49	65 -		0.38 [	0.18; 0.82]
Flores et al.	35	57	51	72		0.66	0.31; 1.37]
Glein et al.	51	70	53	67	-	0.71 [	0.32; 1.56]
Maerz et al.	205	269	290	352	-	0.68	0.46; 1.01]
Saks et al.	81	102	79	95	-	0.78	0.38; 1.61]
Wolfson et al.	116		200	217		1.41 [	0.57; 3.50]
Heterogeneity:	$I^2 = 0\%$	$t^2 = 0$ .	p = 0.44				

#### **Patient Acceptable Symptom State (PASS)**

#### **Modified Harris Hip Score**

Study	Events	Male Total	Events	emale Total	Odds Ratio	OR	95%-CI
Beck et al.	40	72	47	71		0.64	[0.32; 1.26]
Flores et al.	44	57	55	72	-	1.05	[0.46; 2.38]
Glein et al.	59	70	53	67	-	1.42	[0.59; 3.39]
Maerz et al.	199	269	213	352		1.86	[1.31; 2.62]
Saks et al.	83	102	77	95	<del></del>	1.02	[0.50; 2.09]
Wolfson et al.	101	123	145	217	-		[1.33; 3.92]
Heterogeneity:	$I^2 = 57\%$	$\tau^{2} = 0$	.0950 p =	= 0.04			

#### **Hip Outcome Score- Sport Specific Subscale**

Study	Events	Male Total	Fe Events	emale Total		Od	lds Ra	atio		OR	95%-CI
Beck et al.	29	60	42	58			-			0.36	[0.17; 0.77]
Glein et al.	49	70	57	67			_				[0.18; 0.95]
Martinez et al.	66	104	34	52							[0.46; 1.85]
Heterogeneity: I	$r^2 = 47\%$	$\tau^2 = 0$ .	0351, <i>p</i> =	0.15							
					0.2	0.5	1	2	5		

#### **Hip Outcome Score- Sport Specific Subscale**

		Male	Fe	emale							
Study	Events	Total	Events	Total		Od	lds R	atio		OR	95%-C
Beck et al.	39	69	45	64			+			0.55	[0.27; 1.12
Glein et al.	58	70	55	67			-			1.05	[0.44; 2.55
Martinez et al.	47	104	36	52			-			0.37	[0.18; 0.74
Heterogeneity:	$I^2 = 41\%$	$\tau^2 = 0$ ,	p = 0.19								•
Heterogeneity:	= 41%,	τ = 0,	p = 0.19		0.2	0.5	1	2	5	5	





#### **Revision Arthroscopy**

- Trend towards females having higher rate of revision

Study	Events	Male Total	Fe Events	emale Total	Odds Ratio	OR	95%-CI
Carton et al.	5	84	2	25		0.73	[0.13; 4.00]
Chandresekaran et al.	0	13	5	77		0.49	
Filan and Carton	48	796	14	135	-	0.55	[0.30; 1.04]
Kester et al	52	1794	96	2163	-	0.64	[0.46; 0.91]
Lebus et al.	11	170	24	141		0.34	[0.16; 0.72]
Maerz et al	10	269	35	352		0.35	[0.17; 0.72]
Martinez et al.	2	104	0	52		<b>—</b> 2.56	[0.12; 54.32]
Perets et al.	3	96	35	209		0.16	[0.05; 0.54]
Saks et al.	2	109	8	109		0.24	[0.05; 1.14]
West et al.	45	1139	27	668	+	0.98	[0.60; 1.59]
Heterogeneity: $I^2 = 37\%$	$\tau^2 = 0.09$	48, p =	= 0.11				•
,		•			0.1 0.5 1 2 10		

### - No difference between sexes

**Conversion to Total Hip Arthroplasty** 

• •		Male		emale			/
Study	Events	Iotal	Events	Iotai	Odds Ratio	OR	95%−CI
Allahabadi et al.	38	675	44	886	<del></del>	1.14	[0.73; 1.78]
Carton et al.	9	88	1	24	<del>-   • -</del>	2.62	[0.32; 21.78]
Chandresekaran et al.	0	13	0	77			
Filan and Carton	0	796	2	135 -		0.03	[0.00; 0.70]
Kaldua et al.	8	45	7	39	-	0.99	[0.32; 3.03]
Kester et al	80	1794	155	2163	+	0.60	[0.46; 0.80]
Lebus et al.	30	170	12	141	-	2.30	[1.13; 4.69]
Maerz et sl.	16	269	9	352	-	2.41	[1.05; 5.54]
Martinez et al.	4	104	0	52		4.70	[0.25; 89.00]
McCarthy et al	24	47	25	64	-	1.63	[0.76; 3.48]
Perets et al.	12	108	13	219	<del>  -</del>	1.98	[0.87; 4.50]
Saks et al.	5	109	6	109	<del></del>	0.83	[0.24; 2.79]
West et al.	247	302	123	150	+	0.99	[0.59; 1.64]
Yao et al.	133	1800	205	2930	<u> </u>	1.06	[0.85; 1.33]
Zimmerer et al	18	71	22	41		0.29	
Heterogeneity: $I^2 = 64\%$ ,	$\tau^2 = 0.20$	87, p <	< 0.01				•



## Complications

- 3 studies reporting complications
- nerve injury, thromboembolic events and wound issues
- No clear differences between sexes



# **Conclusions**

Patient Reported Outcome Measures	Significant improvements from pre- to post-operative scores for both sexes.  MCID and PASS: trend towards females reaching MCID at higher rates than males, no differences for PASS
Revision Arthroscopy	Trend towards females being more likely to undergo RA than males
Conversion to total hip arthroplasty	No difference between sexes
Complications	No difference between sexes



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