

How do the expectations of patients compare with their surgeons regarding outcomes of periacetabular osteotomy?

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ABSTRACT

Our objective was to determine the frequency and strength of agreement between patients and their surgeons on preoperative expectations of the outcomes of periacetabular osteotomy (PAO) surgery. We also sought to determine whether patient preoperative function and pain levels were associated with patients' and surgeons' expectations and to identify the motivating factors for patients to undergo PAO. Two surgeons and their combined 68 patients preoperatively completed 4-point Likert-scales rating their expectations of improvement in six domains representing different hip symptoms after surgery. Domains included pain, stiffness, locking, stability, walking ability and athletic ability. Concordance between patient and surgeon expectation was evaluated by the percent of exact and partial agreement. Correlation analyses were performed to investigate associations between expectations of improvement and patient factors. Exact agreement between patients and surgeons ranged from 18.2% (stiffness) to 55.9% (pain) and partial agreement between patients and surgeons ranged from 48.5% (stiffness) to 100% (pain). Patients with higher UCLA scores tended to have lower surgeon expectations of improving walking ability ($r = -0.34$; $P = 0.007$) but higher expectations for improved athletic ability ($r = 0.25$; $P = 0.04$), and surgeons anticipated more improvement in walking for patients with higher stiffness ($r = 0.31$, $P = 0.01$) and pain ($r = 0.38$, $P = 0.002$). Similarly, patients with higher Short Form-12 physical component summary had lower surgeon expectations of improvement in walking ability ($r = -0.40$, $P = 0.002$) and stiffness ($r = -0.35$, $P = 0.006$). In the most domains there was frequent discrepancy between patient and surgeon expectations, with patients being more optimistic than their surgeons in every domain. For the pain domain, patients and surgeons had similar expectations.

INTRODUCTION

Acetabular dysplasia is a major etiological factor in the pathophysiology of hip osteoarthritis [1, 2]. The periacetabular osteotomy (PAO) is a frequent surgical treatment for symptomatic acetabular dysplasia in the young adult population [3–5]. The goals of PAO are two-fold: to alleviate associated hip symptoms, particularly pain; and to prevent or delay the progression of osteoarthritis [4, 6, 7].

Historically, assessments of outcomes in orthopedic procedures have been derived from the surgeon's perspective of results from radiographs and clinical assessments [8]. However, in the past three decades, there has been a shift

toward the patient's perspective in the evaluation of outcomes [8, 9]. Patient-reported outcome measures and 'evidence-based-medicine' are now in widespread use within orthopedics [10]. Simultaneously, patient-centered care has gained rapid popularity in the wider sphere of health-care delivery in recent times, and patient satisfaction has been touted as a potential measure of the quality of health care delivery [9, 11].

Patients' expectations of treatment have been identified in many studies as a determining factor in patient satisfaction and patient-reported outcomes [12–27]. Expectations vary by surgery and have been shown to correlate with

various demographic, psychological and clinical factors [18, 21, 28, 29]. In patients with femoroacetabular impingement (FAI), patient-perceived success of the surgery depended on whether expectations were met or unmet [30]. Interestingly, the discrepancy between patients and surgeons preoperative expectations is greater in patients who had unsatisfactory outcomes [31, 32]. This suggests that alignment of the expectations of patients and surgeons may be important for the achievement of patient satisfaction.

Examining how the patient's perspective of PAO differs from the surgeon's will help us identify areas in which surgeon-patient communication can improve. This could assist in managing patients' expectations, and consequently, maximize patient satisfaction and outcomes. Given the effect of expectations on patient-reported outcomes we strived to answer three questions in this study: (i) What is the frequency and strength of agreement between patients and their surgeons on preoperative expectations of the outcomes of the PAO surgery in six domains representing different hip symptoms? (ii) Are patient preoperative function and pain levels associated with patients' and surgeons' expectations? (iii) What are the most important factors motivating patients to undergo the PAO?

MATERIALS AND METHODS

Study design

This was a prospective cohort study of PAO candidates and their treating surgeons at a single site which performs a high volume of PAO surgery. The surveys were conducted during preoperative visits between October 2012 and April 2014. An institutional review board approved this research before the study commenced.

Patients were skeletally mature, had experienced hip symptoms for at least 3 months, had radiographic evidence of acetabular dysplasia, and Tonnis Grade 0 or 1 osteoarthritis. Excluded from our study were PAO patients who had an associated neuromuscular condition (e.g. trisomy 21, Charcot-Marie-Tooth and Cerebral Palsy) or were illiterate in English. All study subjects had completed one or more consultations with their surgeon. Two surgeons were surveyed in this study, with 14 and 24 years of experience, respectively, in performing PAO. During preoperative consultations, surgeons utilized imaging studies and models of the hip to discuss with patients the nature of their structural hip disorder and how the PAO corrects the disorder. Patients were informed of the potential short- and long-term goals of the PAO. They were also educated on the expected recovery time course, the rehabilitation program and the potential intra-operative and postoperative complications.

Questionnaires

Patients were given two questionnaires to fill out: an expectations questionnaire and a demographic and hip function questionnaire. The treating surgeons were also given a section of the expectations questionnaire to complete independently. Both patients and surgeons were blinded to each other's responses.

We developed an expectations questionnaire for the purposes of this study that was modified from a prior study of hip impingement ([Supplementary Appendix](#)) [30]. It consisted of questions inquiring about patient baseline hip symptom and function state, the importance of having specific symptoms and functions improve after surgery, the reasons for undergoing the PAO, and their realistic expectations of improvement after recovery from surgery. The questions covered six domains representing specific hip symptoms and functions usually affected by acetabular dysplasia. The domains were (i) ability to play sports, (ii) walking ability, (iii) hip stiffness, (iv) locking and catching of the hip, (v) hip stability and (vi) hip pain.

The first portion of the survey asked subjects whether they experienced difficulty in relation to each of the six hip domains using a 'yes-no' response construct. Then, they were asked to rate how important it was that the PAO improved each of the six hip domain states on a 4-point Likert scale: 1-very important, 2-moderately important, 3-slightly important or 4-not important at all. To assess reasons for deciding to undergo the PAO, subjects were given the following options to rate importance: other therapies had not helped, fear of a worsening of my current situation, to regain my independence, improvement in performance of everyday activities, improvement in ability to do sports, improvement in walking capacity, pain reduction and recommended by my doctor. These were rated on a 5-point Likert scale: 1—extremely important, 2—very important, 3—moderately important, 4—slightly important or 5—not important at all

Finally, subjects were asked for each of the six hip domains, 'What is your realistic expectation of improvement in the following after surgery?' The response format for this question was also a 4-point Likert scale: 1—not improved at all, 2—slightly improved, 3—moderately improved or 4—greatly improved. The surgeons also completed this specific portion independently for each of their patients in the study.

Each patient completed a self-administered demographic and outcomes questionnaire. This included demographic

and historical information such as: age at time of surgery, gender, hip surgical history and education level attained at the time of surgery. Also, Short Form-12 (SF-12) scores, WOMAC pain and stiffness sub-scores and UCLA activity scores were included in analysis. Hip surgical history was dichotomized: whether the subject had hip surgery previously or not. Educational level was an ordinal measure of the number of years of formal education the subject had completed at the time of surgery.

Statistics

Frequencies of exact and partial agreement were reported between expectations of patients and their treating surgeon for each domain. Agreement between the patient–surgeon pair was calculated for each of the six domains. To calculate agreement, the patient's expectation rating (1–4) was subtracted from his or her surgeon's rating (1–4) such that agreement values ranged from –3 to +3, with negative values indicating higher patient expectations, positive values indicating lower patient expectations and 0 indicating exact agreement between patient and surgeon. Partial agreement was defined as agreement within one ranking, i.e. discrepancy values of –1, 0 and +1. To measure the precision or strength of agreement, Cohen's kappa (k) values with 95% confidence intervals were estimated for all responses in each domain. Quadratic weighted k was estimated for exact agreement and simple k was estimated for partial agreement. Kappa values were interpreted: <0.40 = poor; $0.4–0.75$ = fair to good; >0.75 = excellent. The strength of association or the correlation between patients' ratings and surgeons' ratings was assessed using Spearman's rank correlation analysis. Bowker's and McNemar's tests of symmetry were used to examine whether one group tended to have higher or lower expectation ratings for each domain. To evaluate possible associations between agreement in expectations and certain demographic and clinical factors, Spearman's rank correlation analyses and Wilcoxon sign rank test were used, respectively, for ordinal or continuous variables and binary variables. Statistical significance was set at $P < 0.05$ level.

RESULTS

Between October 2012 and April 2014, there were 150 PAO cases eligible for this study. Of these, 29 (19%, 29/150) patients did not complete the expectations questionnaire and 4 (3%) subjects had bilateral PAO within the recruiting timeframe. Therefore 117 individual subjects were included in the analysis. Sixty-eight (58%, 68/117) subjects had corresponding completed surgeon expectations questionnaires. Cohort patient demographics are presented in Table I.

The highest proportion of agreement in preoperative expectation between patients and surgeons was for hip pain (56%; Table II). The lowest agreement was in expectations of improvement in hip stiffness after the PAO (18%; Table II). Furthermore, kappa values showed agreement was strongest for expectations of hip pain (weighted $k = 0.26$, simple $k = 0.74$; Table II). Patient–surgeon agreement was weakest for expectation of hip stability, walking ability and hip stiffness (Table II). In most domains a high percentage of patients ($>50\%$) expected more than their surgeons (Fig. 1). In contrast, for the pain domain more than 50% of the patient–surgeon pairs had exact agreement in expectation for degree of pain relief. Tests of symmetry indicated that patients had more optimistic expectations than surgeons for improvement of symptoms and function ($P < 0.05$ for all domains).

Patients with higher UCLA activity scores tended to have greater expectations for improved hip pain and stability. Those with higher pain scores had higher expectations for improved walking ability and those with higher SF-36 MCS scores lower expectations for improved walking ability (Table III). Patients with higher UCLA scores tended to have lower surgeon expectations for improved walking ability but higher expectations for improved athletic ability (Table III). In addition, surgeons anticipated more improvement in walking, stiffness and locking/catching for patients with higher stiffness and pain (Table III). The age of the patient, educational level, WOMAC stiffness and pain sub-scores and SF-12 scores were correlated with the surgeons' expectations in certain domains (Table III).

The most common reason patients decided to undergo PAO was to reduce hip pain as this was most commonly reported to be extremely and very important to the patient (Table IV). Other important reasons that the patients identified for undergoing PAO were improving their walking ability and fear that the condition will worsen over time (Table IV).

DISCUSSION

To our knowledge, this study is the first to examine patient expectations of PAO outcomes. We sought to define and understand patients' preoperative expectations of the PAO. Our most important finding is that in the majority of patients, expectations of outcome after PAO are greater than that of their surgeons. Findings from this research raise and highlight important issues regarding the alignment of patient and surgeon expectations of PAO outcomes. These issues merit further consideration and investigation to maximize patients' satisfaction and outcome of treatment.

Table I. Characteristics of study population

<i>Demographic and clinical factors</i>	<i>Entire cohort (n = 117) Mean ± SD</i>	<i>Sub-cohort (n = 68) Mean ± SD</i>
Age (years)	26.1 ± 9.32	25.7 ± 9.22
Male [freq. (%)]	23 (20%)	11 (16%)
Years of education [median (IQR)]	15 (12–12)	15 (12–12)
Prior hip surgery [freq. (%)]	28 (27%)	21 (33%)
SF-12 PCS	38.4 ± 10.87	38.5 ± 9.65
SF-12 MCS	51.9 ± 11.55	52.2 ± 10.72
WOMAC stiffness	3.4 ± 2.16	3.3 ± 2.04
WOMAC pain	7.4 ± 4.78	6.9 ± 4.66
UCLA activity	6.5 ± 2.75	6.9 ± 2.65

SD, standard deviation; IQR, interquartile range; PCS, Physical Component Score; MCS, Mental Component Score; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; UCLA, University of California at Los Angeles.

Table II. Agreement between patient and surgeon ratings of preoperative expectations of outcomes in different domains (N = 68)

<i>Domain</i>	<i>% Exact agreement</i>	<i>Weighted k</i>	<i>95% CI</i>	<i>Description</i>
Hip pain	56%	0.26	[−0.07, 0.58]	Poor
Hip stability	31%	0.08	[−0.15, 0.31]	None
Athletic ability	30%	0.21	[−0.01, 0.42]	Poor
Hip locking/catching	27%	0.24	[0.10, 0.38]	Poor
Walking ability	26%	0.11	[−0.03, 0.25]	None
Hip stiffness	18%	0.08	[−0.03, 0.19]	None
<i>Domain</i>	<i>% Partial Agreement</i>	<i>Simple k</i>	<i>95% CI</i>	<i>Description</i>
Hip pain	100%	0.74	[0.61, 0.86]	Fair to good
Hip stability	73%	0.43	[0.30, 0.55]	Fair to good
Athletic ability	75%	0.45	[0.33, 0.58]	Fair to good
Hip locking/catching	59%	0.37	[0.25, 0.50]	Poor
Walking ability	61%	0.40	[0.28, 0.53]	Poor
Hip stiffness	49%	0.27	[0.15, 0.38]	Poor

k, Cohen's kappa; CI, confidence interval.

There was no consistency between expectations of outcomes in the investigated domains between patients and surgeons. This is similar to expectations of total hip replacement [33]. In patients undergoing total joint

replacement, patient–surgeon disparity in expectations was highest in improvement in ability to perform sports and other activities requiring high range of motion, especially for younger patients. However, expectations were most

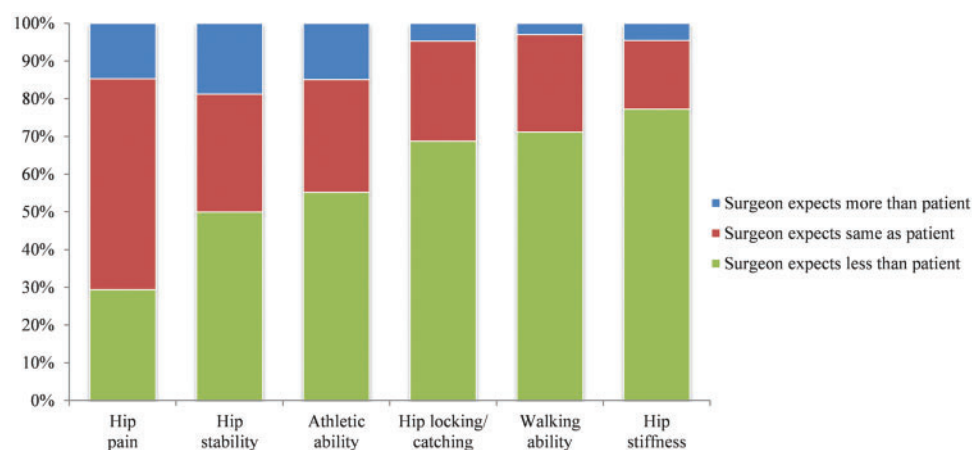


Fig. 1. Comparison of patient and surgeon expectations of outcome of PAO surgery by domain.

Table III. Association between patient and surgeon expectations and preoperative patient factors (N = 68)

	Demographic and clinical factors													
	Age		Education		SF-12 MCS		SF-12 PCS		Stiffness		Pain		UCLA	
	r	P	r	P	r	P	r	P	r	P	r	P	r	P
<i>Patient expectations</i>														
Athletic ability	-0.11	0.38	-0.10	0.45	-0.06	0.63	-0.14	0.29	0.10	0.45	0.13	0.31	0.20	0.11
Walking ability	-0.04	0.76	-0.103	0.43	-0.31	0.02	-0.18	0.166	0.09	0.49	0.26	0.04	0.18	0.17
Hip stiffness	0.05	0.68	0.07	0.58	-0.22	0.10	-0.14	0.307	0.21	0.11	0.11	0.40	0.14	0.28
Hip locking/catching	0.18	0.16	0.03	0.84	-0.10	0.48	-0.30	0.02	0.11	0.40	0.17	0.20	0.15	0.25
Hip stability	0.07	0.58	0.01	0.93	-0.11	0.39	-0.20	0.13	0.08	0.52	0.11	0.40	0.28	0.03
Hip pain	-0.08	0.52	0.03	0.83	-0.18	0.16	0.00	0.98	0.09	0.51	0.15	0.23	0.26	0.04
<i>Surgeon expectations</i>														
Athletic ability	-0.04	0.72	0.05	0.73	-0.02	0.90	0.16	0.22	-0.02	0.89	-0.02	0.89	0.25	0.04
Walking ability	0.05	0.67	0.003	0.98	-0.26	0.04	-0.40	0.002	0.31	0.01	0.38	0.002	-0.34	0.007
Hip stiffness	0.03	0.84	-0.07	0.61	-0.18	0.17	-0.35	0.006	0.28	0.03	0.41	0.001	-0.02	0.89
Hip locking/catching	0.24	0.05	0.13	0.30	-0.09	0.51	-0.26	0.04	0.27	0.03	0.29	0.02	-0.01	0.97
Hip stability	0.24	0.05	0.29	0.02	-0.21	0.11	-0.15	0.27	0.03	0.81	0.14	0.27	-0.01	0.96
Hip pain	0.20	0.10	0.22	0.09	-0.21	0.11	-0.03	0.84	0.02	0.90	0.17	0.19	0.00	0.97

r, Spearman's rank correlation coefficient; SF, short form; MCS, Mental Component Score; PCS, Physical Component Score; UCLA, University of California at Los Angeles.

Bold P-values <0.05.

aligned in relation to hip pain and walking ability [8, 33, 34]. We found that in our cohort of PAO patients agreement in patient–surgeon expectations was high for hip pain and ability to play sports. Surgeons may be inclined to

be more hopeful concerning outcomes related to sporting activity due to reported improved sporting activity after PAO and the lack of post-operative restrictions that are placed on patients undergoing arthroplasty [35, 36].

Table IV. Reasons for deciding to undergo periacetabular osteotomy (N = 117)

	<i>Extremely important</i>	<i>Very important</i>	<i>Moderately important</i>	<i>Slightly important</i>	<i>Not important at all</i>
<i>Domain-specific items</i>					
Reduce hip pain	79%	15%	3%	0%	3%
Improve hip stability	44%	29%	9%	9%	9%
Improve athletic ability	46%	14%	20%	12%	9%
Reduce locking or catching of the hip	35%	22%	22%	5%	17%
Improve walking ability	66%	18%	10%	6%	0%
Reduce hip stiffness	35%	28%	20%	9%	8%
<i>Other reasons for PAO</i>					
Fear that current condition could worsen	71%	18%	9%	2%	2%
Improve ability to perform daily activities	57%	31%	7%	4%	0%
Essence of maintaining independence	54%	24%	10%	9%	3%
Surgeon recommended PAO	51%	31%	16%	2%	0%
Prior treatments have not worked	49%	26%	9%	5%	12%

PAO, periacetabular osteotomy.

Improved sporting ability after surgery can be an important determinant of patient satisfaction after hip surgery [30, 34]. Another noteworthy finding from our study was the relative pessimism of surgeons in relation to patients concerning improving walking ability after the PAO. PAO candidates are less debilitated than hip arthroplasty patients, so surgeons may not anticipate vast improvement from their baseline walking ability.

Investigating whether some demographic and clinical factors affected patients and surgeons expectations of PAO allowed us to highlight differences between the groups. Surgeons seemed to rate their expectations for different domains based on clinical factors (WOMAC-sub scores, UCLA and SF-12 scores). Surgeons had lower expectations for improved walking ability in patients with higher activity level and better physical function compared with the patients. Interestingly, another study on expectations of total hip replacement also found that surgeons tended to rate their expectations based on hip-related clinical data while patients rated on criteria that were mainly psychological and non-hip related [33]. It is likely important that psychological factors are not overlooked while preparing patients for these procedures.

Activity level of patients was correlated with surgeon's expectations of walking ability and possibly explained the association between the discrepancy in patient–surgeon agreement for walking ability and activity level. Subjects who were less active tended to assume that their walking ability would not improve as much as the doctors might think; whereas subjects who were more active expected more improvements in their walking ability, contrary to their surgeons expectations. Patients with higher activity levels had higher expectations for improved hip stiffness, while surgeons thought these patients had less room to improve. These findings support the trend that active young adults have high expectations for surgery [8, 13, 18, 34].

Expectations of pain relief after PAO are critical. It has been documented that pain is the first and most common symptom that prompts an affected young adult to seek treatment for hip dysplasia [37]. PAO outcome studies have also acknowledged the effectiveness of the PAO in alleviating hip pain [2]. Reducing pain was the most frequently cited motivating factor in deciding to undergo PAO (Table IV). Pain reduction has been reported as one of the most important reasons for surgery among both hip preservation and hip replacement candidates [30]. Since

hip pain is one of the primary motivations for undergoing PAO, it is encouraging that patients and their surgeons are on the same page concerning the likelihood and extent of pain relief. We demonstrated that compared with surgeons, patients were more optimistic of improvement of symptoms and function after surgery. This resembles what Mannion *et al.* found in FAI patients in the only other study of patient expectations for hip preservation surgery [30].

This study has several limitations. The data come from a relatively small cohort of patients and two surgeons at a tertiary care orthopedic center. It is possible that different surgeons may have different expectations for the same patient. In addition, we used a non-validated questionnaire to measure expectations. However, we modified a questionnaire that was used for patients undergoing hip impingement surgery [30], which was a modification itself of a validated questionnaire for spine patients [22]. Most of the expectations survey instruments that have been developed and validated are specific to a particular surgical procedure or anatomic location [38]. At the time this study commenced there was not one for the PAO or hip preservation. Finally, the cross-sectional design and the analyses used in the study do not allow us to assume any causal relationships between preoperative expectations and characteristics.

In summary, this study reveals that PAO patients and surgeons frequently have differing expectations for their treatment outcomes. The patients' expectations were consistently higher than that of their surgeons. However, the greatest level of agreement was the expectation of pain relief, which was also the strongest motivator for the patients to undergo PAO. The discordant expectations of patients versus surgeons revealed in our study emphasize the need for improvement in patient–physician communication regarding the expectations after PAO surgery. The conversation surgeons have with patients should establish what the patient's specific problems are, and address the likelihood that the surgery will tackle all the patient's symptoms and limitations. Further studies should assess how preoperative expectations relate to postoperative assessment of outcomes and satisfaction in PAO patients.

SUPPLEMENTARY DATA

Supplementary data are available at *Journal of Hip Preservation Surgery* online.

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CONFLICT OF INTEREST STATEMENT

None declared.

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