Oxford Hip Scores at 6 Months and 5 Years Are Associated With Total Hip Revision Within the Subsequent 2 Years

Peter Devane MD, Geoffrey Horne MD,
Daniel J. Gehling MD

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Abstract

Background The Oxford hip score (OHS) is commonly reported in research studies as a reflection of pain and function but it is unclear whether it predicts subsequent prosthesis failure.

Questions/purposes We determined whether OHS obtained at 6 months and 5 years after surgery predicts risk of revision within the subsequent 2 years.

Methods We reviewed data from the New Zealand Joint Registry between January 1999 and December 2010. OHS at 6 months was available for 17,831 total hip patients. Patients were separated into four categories based on their OHS: 10,458 (59%) scored 42–48, 4726 (26%) scored 34–41, 1592 (9%) scored 27–33, and 1028 (6%) scored

0–26. Five-year OHSs were available for 3665 patients. Of these patients, 2619 (72%) scored 42–48, 657 (18%) scored 34–41, 225 (6%) scored 27–33, and 164 (4%) scored 0–26. **Results** For patients with a 6-month OHS, revision risk within 2 years was 0.4% in the 42–48 group, 1.0% in the 34–41 group, 1.7% in the 27–33 group, and 6.2% in the 0–27 group. For patients with 5-year OHS, revision risk within 2 years was 0.3%, 1.1%, 3.6%, and 6.1%, respectively. Increase in revision risk for the 0–27 versus the 42–48 OHS group was 15-fold at 6 months and 18-fold at 5 years.

Conclusions Our data suggest patients with an OHS of 42–48 at 6 months need a 5-year postoperative appointment. Those patients with a 5-year OHS of 42–48 need not be followed up for a further 5 years.

Level of Evidence Level III, retrospective, comparative study. See the Guidelines for Authors for a complete description of levels of evidence.

Each author certifies that he or she, or a member of his or her immediate family, has no funding or commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

All ICMJE Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research* editors and board members are on file with the publication and can be viewed on request. Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained. This work was performed at the Wellington Hospital, Department of Orthopedics, Wellington, New Zealand.

P. Devane (✉), G. Horne
Department of Orthopedics, CCDHB–Wellington Hospital,
Riddiford Street, Wellington, New Zealand
e-mail: peterdevane@yahoo.co.nz

D. J. Gehling
Department of Orthopaedic Surgery, University of Toledo,
Toledo, OH, USA

Introduction

Patient-related outcome measures (PROMs) have been increasingly used to determine success or failure in joint arthroplasty [1, 4, 5, 10, 11, 14, 16, 20]. Appropriately applied, these scoring systems can provide objective information about the patients' perspective on pain and function [1, 7, 12, 16]. However, the research concepts that develop from PROMs should be translated to patient care, and it can be difficult to conceptualize how to apply the nature of continuous distributions of PROMs to clinical practice. In this report, patients are divided into ordinal groups based on the Oxford hip score (OHS) [2, 9, 19] and compared among these groups.

PROMs have been used in the New Zealand Joint Registry (NZJR) as an objective measure of outcome after

joint arthroplasties [17]. Specifically, the OHS has been used for those patients who underwent hip arthroplasty, because it is a standardized, validated, and simple patient-assessed report [1, 6, 16]. Although it is reportedly useful for assessing pain and function, it is unclear whether the scores predict subsequent prosthesis failure.

This study aims to expand on a previously reported correlation of OHSs at 6 months postoperatively and increased risk of revision within 2 years (6 months to 2.5 years after surgery) [21]. The OHSs at 5 years after THA are analyzed to determine risk of revision within 2 years (5–7 years after surgery), and the revision risk is quantified.

Patients and Methods

This study is a retrospective, comparative study of the NZJR data. A total of 71,057 patients undergoing primary hip arthroplasty were recorded in the registry, of which 69,964 (98.5%) were conventional total hip and 1093 (1.5%) were resurfacing hip arthroplasties. There were 37,395 (53%) women and 33,662 (47%) men with a mean age of 68 and 65 years, respectively. The average age of those with primary hip arthroplasty was 67 years (range, 15–100 years). The approach used was classified as 44,458 (64%) posterior, 20,026 (29%) lateral, 3285 (5%) anterior, 1309 (1.7%) minimally invasive, 147 (0.2%) trochanteric osteotomy, and 101 (0.1%) image-guided cases. These totals do not correlate exactly with the total number of surgeries because there were some unreported data. The primary diagnosis was osteoarthritis in 61,517 (86%), and the diagnosis totals exceed the number of procedures because more than one diagnosis can be reported per case (Table 1). Of the 69,964 conventional hip arthroplasties, 2278 (3.2%) were revised and of the 1093 resurfacings, 32 (2.9%) were revised. The mean time to revision for conventional hip arthroplasty was 3.4 years, and for resurfacing arthroplasty, the mean time to revision was 1.8 years. The most common reason for revision was dislocation followed by loosening. Some revisions had more than one reason listed and each reason was recorded. Therefore, the totals in the reasons for revision do not equal the total number of revisions performed. Rerevisions of total hip prostheses were not included in the current report. Of the resurfacing arthroplasty group, the most common reason for revision was femoral neck fracture followed by deep infection and loosening of the acetabular component (Table 2).

The registry has been approved by the National Ethic Committee of New Zealand and has been a database of joint arthroplasties performed in New Zealand since 1999. An audit performed in March 2009 showed a 98% compliance rate nationwide. The data used for this article were from submissions between January 1999 and December

Table 1. Clinical statistics of the New Zealand Joint Registry, 1999–2010

Clinical statistic	Number	Percent
Sex		
Female	37395	53%
Male	33662	47%
Total	71057	
Type		
Conventional THA	69964	98.5%
Resurfacing hip arthroplasty	1093	1.5%
Total	71057	
Approach		
Posterior	44458	64%
Lateral	20026	29%
Anterior	3285	5%
Minimally Invasive	1309	1.7%
Trochanteric osteotomy	147	0.2%
Image-guided	101	0.1%
Total	69326	
Diagnosis		
Osteoarthritis	61,517	86%
Acute fracture	2,525	3.5%
Avascular necrosis	2,244	3%
Developmental dysplasia	1,857	2.6%
Rheumatoid arthritis	1,073	1.5%
Old fracture	941	1.3%
Other inflammatory	647	0.9%
Tumor	330	0.4%
Postacute dislocation	242	0.3%
Fracture acetabulum	145	0.2%
Other	206	0.3%
Total	71,727	

2010. A submission to the NZJR includes a patient identifier, date of surgery, body mass index, diagnosis, previous surgeries on the joint, approach, components, use of bone graft or augments, presence or type of cement used, use of perioperative antibiotics, type of operating room, surgery time, and training level of the operating surgeon [17]. The National Health Identifier is a unique patient identifier allowing patients to be followed even in different hospitals. Patients, however, do have surgery outside New Zealand, but this situation is believed to be uncommon.

When the NZJR was initially established in 1999, OHSs were sent to all registered patients. The rate of return of the questionnaires was 75%. However, because of the increasing logistical burden and cost of data collection, questionnaires have been restricted, after advice from the registry statistician, to a randomized 20% of the yearly total for primary THA. Each month, a random 28% of patients who have been registered for 6 months are selected

Table 2. Hip arthroplasties in the New Zealand Joint Registry

Arthroplasties in the NZJR	Conventional		Resurfacing		Total	
	Number	Percent	Number	Percent	Number	Percent
Total	69964		1093		71057	
Revisions	2278	3.3%	32	2.9%	2,310	3.3%
Reason for revision						
Dislocation	698	1.0%	1	0.1%	699	1.0%
Loosening acetabulum	534	0.8%	7	0.6%	541	0.8%
Loosening femur	400	0.6%	3	0.3%	403	0.6%
Deep infection	301	0.4%	8	0.7%	309	0.4%
Pain	243	0.3%	2	0.2%	245	0.3%
Fracture femur	217	0.3%	9	0.8%	226	0.3%
Polyethylene wear	47	0.1%	0	0.0%	47	0.1%
Osteolysis	37	0.1%	0	0.0%	37	0.1%
Implant breakage	37	0.1%	0	0.0%	37	0.1%
Metallosis synovitis	15	0.0%	0	0.0%	15	0.0%
Other	84	0.1%	4	0.4%	88	0.1%

by the registry computer to receive Oxford hip questionnaires. A 75% return rate ensures 20% of patients have completed OHSs 6 months after operation. All patients who complete and return a 6-month Oxford hip questionnaire are sent a further Oxford hip questionnaire at 5 years.

The OHS consists of 12 questions specific to the hip, and each question is answered by the patient with a number from zero to 4. Zero indicates severe pain or functional limitation, and 4 indicates no pain or functional limitation. The scores can range from zero to 48 with higher scores suggesting higher function and less pain. This modification was suggested by Murray et al. [16] and is in contrast to the initial OHS report, which was a score from 12 to 60. In the initial report, 60 indicated severe impairment and pain [6, 16]. The OHS is simple to use and is validated for the purpose of the current study [1, 6, 16]. In addition, the OHS is a patient report, which eliminates the difficulty in trying to categorize or rate a patient's function and pain by a surgeon [1]. Kalairajah et al. [10] further separated the OHS into four categories: 42 to 48 (best), 34 to 41, 27 to 33, and 0 to 26 (worst). Of the 17,831 primary OHSs reported at 6 months postoperatively, there were 10,485 (59%) with a score of 42–48, 4726 (26%) with a score of 34–41, 1592 (9%) with a score of 27–33, and 1028 (6%) with a score of 0–26. There were 3665 5-year OHSs available for analysis, which were divided into 2619 (72%) with a score of 42–48, 657 (18%) with a score of 34–41, 225 (6%) with a score of 27–33, and 164 (4%) with a score of 0–26. There were no missing data.

Revision is defined in the registry as surgery on the same joint if one or more of the components are exchanged, removed, manipulated, or added. Surgeries on other joints or soft tissue procedures around the index joint are not

considered revisions [17]. Revision risk within 2 years refers to any revision that occurs within 2 years of administration of the OHS.

Logistic regression analysis is used to assess the relationship between the OHSs at 6 months and 5 years and the risk of revision within the next 2 years after the OHS was measured.

Results

There were 17,831 patients undergoing THA who had completed an Oxford hip questionnaire at 6 months postoperatively and had a minimum 2.5-year followup after surgery. Of the 10,485 patients with an OHS of 42–48, 42 (0.4%) required revision within 2 years of completing an Oxford hip questionnaire. Forty-six (0.97%) of the 4726 patients with an OHS of 34–41 required revision, 27 (1.7%) of the 1592 patients with an OHS of 27–33 required revision, and 64 (6.2%) of the 1028 patients with an OHS of 0–26 required revision within 2 years of completing an Oxford hip questionnaire.

There were 3665 patients undergoing THA who had completed an Oxford hip questionnaire at 6 months postoperatively and then completed another Oxford hip questionnaire at 5 years postoperatively and had a minimum 7-year followup after surgery. Of the 2619 patients with an OHS of 42–48, nine (0.3%) required revision within 2 years of completing their 5-year Oxford hip questionnaire. Seven (1.1%) of the 657 patients with an OHS of 34–41 required revision, eight (3.6%) of the 225 patients with an OHS of 27–33 required revision, and 10 (6.1%) of the 164 patients with an OHS of 0–26 required revision

Table 3. Oxford hip score (OHS) data

Six-month OHS				
Score	Number	Percent	Number revised	Percent
42–48	10485	59	42	0.4
34–41	4726	26	46	1.0
27–33	1592	9	27	1.7
0–27	1028	6	64	6.2
Total	17831		179	
Five-year OHS				
Score	Number	Percent	Number revised	Percent
42–48	2619	72	9	0.3
34–41	657	18	7	1.1
27–33	225	6	8	3.6
0–27	164	4	10	6.1
Total	3665		34	

within 2 years of completing their 5-year Oxford hip questionnaire (Table 3).

Discussion

The OHS is commonly used to reflect patient pain and function. It was chosen as the PROM of choice for the NZJR because of its specificity, reliability, and validity. Quintana et al. [21] suggested a 6-month OHS predicts risk of revision within 2 years. To confirm and expand on their findings, we determined whether OHSs obtained at 6 months and 5 years after surgery predict risk of revision within the subsequent 2 years.

There are limitations to this study. First, we had no preoperative OHSs, limited the timing of questionnaire administration to 6 months and 5 years, and had only 20% of the patients with OHSs that may influence the results. The number of OHSs available at 5 years is less than those at 6 months because of the longer followup required to collect data, death, revision, and approximately 75% return rate for the 5-year scores. All patients who completed a 5-year Oxford hip questionnaire had completed a 6-month Oxford hip questionnaire. One hundred seventy-nine patients who completed a 6-month Oxford hip questionnaire but were subsequently revised were not included in the 5-year OHS results. Quintana et al. [21] discussed these issues although we believed they would be offset by the large numbers of patients entered into the Registry over the last 12 years. Second, we did not analyze potentially confounding variables. Confounders for THA PROMs include an increase in preoperative body mass index [4], a lower preoperative functional score [8, 20], presence of low back pain or pain in other joints [18, 20], poorer overall physical

health [14, 20], and poorer mental health [20]. How these confounders relate to the risk of revision, however, is not a specific goal for this report.

We have been able to expand on the data from a previous report [21] that showed a 15-fold increase in risk of revision within 2 years for those patients with an OHS of 0–27 compared with those patients with a score of 42–48. With 3 years longer followup, we were able to include a greater number of patients, but our findings indicate a similar 16-fold increase between patients with the two scores. Fifty-nine percent of patients who had a THA had a 6-month OHS of 42–48, and only 0.4% of these patients required a revision within the first 2.5 years after surgery. Forty-one percent of patients had an OHS of 0–41, yet 1.9% of these patients required a revision within the first 2.5 years after surgery, a fivefold increase.

Our 5-year OHS results closely parallel the 6-month OHS results with 71% of patients having a 5-year OHS of 42–48. Of these, only 0.34% required revision within 2 years. Of the 29% of patients with a score of 0–41, 2.4% will require a revision within 2 years, a sevenfold increase. We believe these data suggest patients with lower scores should be followed more closely. There are additionally a group of other patients undergoing THA who will need regular followup, usually with radiographs, despite having an OHS greater than 42. These include patients with known osteolysis around a stable implant, accelerated wear, or faulty biomaterials.

In conclusion, our data show the 6-month OHS predicts the risk for revision within 2 years. This predictive effect does not weaken with time. Administration of the Oxford hip questionnaire at a longer time after surgery, 5 years in this case, shows a similar predictive effect on the need for revision within 2 years. The importance of routine followup after total joint arthroplasty has been questioned as to whether it is necessary for all patients [3, 13, 15, 22]. From these studies, and from our current data, we suggest administering an OHS to patients at 6 months after surgery. Patients who score 42 or greater (49% in this study) may be given a followup appointment for 5 years postoperatively in the knowledge that only 0.4% may have problems. At 5 years a further OHS is administered, and those scoring 42 or greater (71% in this study) can be given a further 5-year appointment in the knowledge that only 0.3% may have problems.

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