A Positive Hip Arthrogram May Predict Lower Function in Patients with Primary Hip Arthroplasty

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Abstract

Background A local anesthetic hip arthrogram is a simple test mainly used as an adjunct to define the origin of hip pain. Temporary pain relief (a positive response) following an injection may lead to a surgeon recommending hip surgery. However, it is unclear whether relief of pain corresponds to better postoperative pain relief or function. **Questions/purposes** We therefore compared the function in patients with a positive response to a local anesthetic hip arthrogram who underwent primary THA and patients with typical osteoarthritis presentation who underwent primary THA without a preoperative arthrogram. **Methods** We retrospectively reviewed 22 patients who had a positive response to a local anesthetic hip arthrogram who subsequently underwent primary hip arthroplasty and a

control group of 74 patients who had typical osteoarthritis hip pain and subsequent primary hip arthroplasty without having a previous arthrogram. All patients completed the Oxford Hip Score, WOMACTM function short form, and the SF-12 preoperatively and at regular clinical followups. The minimum followups were 28 months (mean, 42 months; range, 28–72 months) for the study group and 33 months (mean, 52 months; range, 33–73 months) for the control group.

Results Patients in the arthrogram group had lower mean functional scores: 30 versus 39 for the Oxford Hip Score, 39 versus 46 for the WOMACTM, and 36 versus 42 for the physical component of the SF-12.

Conclusions Preoperative use of a local anesthetic hip arthrogram remains an important tool to differentiate spinal disorders or confirm the hip as the cause of pain. However, patients who have a preoperative hip arthrogram to clarify symptoms may report a lower function score and pain relief than patients who do not.

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

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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 study was performed at Southern General Hospital, Glasgow, UK.

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Introduction

The origin of hip pain sometimes can be difficult to isolate despite clinical history, examination, and plain radiography. A local anesthetic hip arthrogram is a simple test that can be used as an adjunct to define the origin of hip pain in potentially difficult diagnostic decisions. It reportedly can differentiate spinal disorders from hip pain [18]. Crawford et al. suggested that 12 hours of temporary pain relief following a preoperative injection predicts that the hip without previous surgical intervention is the principal cause

of the pain [5]. Some authors [9, 10, 14, 21] recommend a local anesthetic injection for temporary relief of chronic hip pain including those with osteoarthritis, but its main limitation is the transient therapeutic effect for patients [9, 10, 14, 21]. Ilgen et al. reported a positive response to a local anesthetic hip arthrogram has a positive predictive value of 95% and negative predictive value of 88% for improving function, pain relief, and satisfaction in response to the THA [13]. However, these findings have not been confirmed and it is unclear whether relief of pain following an injection corresponds to better postoperative pain relief or function.

We therefore compared the function in patients with a positive response to a local anesthetic hip arthrogram who underwent primary THA and patients with typical osteoarthritis presentation who underwent primary THA without a preoperative arthrogram.

Patients and Methods

In a pilot study we retrospectively reviewed 81 patients who underwent a local anesthetic hip arthrogram before THA, treated between June 2005 and February 2009, and a group of control patients who had THA without a preoperative local anesthetic hip arthrogram. The mean ages of the patients in our study and control groups at the time of surgery were 58 and 62 years respectively. The 81 arthrograms were performed to differentiate spinal disorders or confirm the hip as the cause of pain because there were minimal radiologic changes (Grade 1) according to the Kellgren-Lawrence classification [17] on the AP view of the pelvis and lateral view of the hip. Forty-one patients (51%) had complete relief of hip pain symptoms and temporary improvement in function for 12 hours, followed by gradual return to preinjection status after injection of local anesthesia (bupivacaine 0.5% and up to 8 mL maximum); this response was considered a positive response. Of these 41 patients, 23 subsequently had THA. The indications for surgery after a positive response were: (1) patients with a positive response to a local anesthetic hip arthrogram, and (2) patients who were willing to undergo THA after a positive response to a local anesthetic hip arthrogram. The contraindications for THA were: (1) patients who did not wish to undergo THA despite a positive response to the preoperative local anesthetic hip arthrogram, and (2) patients with a negative response with no complete relief of hip pain symptoms and no temporary improvement in function after a preoperative local anesthetic hip arthrogram. One patient who had surgery died, leaving a study group of 22 patients who underwent primary THAs after a positive response to the local anesthetic hip arthrogram as an adjunct to define their origin of hip pain. The control group consisted of 74 patients (matched

to the study group for age and sex, as this would be reflective of their level of activity before surgery) who presented with typical osteoarthritis hip pain and had subsequent primary hip arthroplasty without an antecedent arthrogram. In this study, none of the patients had a history of previous hip surgery and there were no other exclusion factors. Therefore, the patients are typical of the overall population. Their social deprivation index was not measured but all came from the same geographic area. No patients in the analysis were lost to followup, but there were some missing function scores from their case notes. The minimum followups were 28 months (mean, 42 months; range, 28–72 months) for the study group and 33 months (mean, 52 months; range, 33–73 months) for the control group. No patients were recalled specifically for this study; all data were obtained from medical records.

We observed no differences in the mean age at surgery between the control group (95% CI, 62 ± 12) and study group (95% CI, 58 ± 13 years). We also observed no difference in the mean ($\pm$ SD) preoperative Oxford Hip Scores between the control group (95% CI, 14 ± 8) and study group (95% CI, 12 ± 10) (Table 1). The groups were similar in sex, with the arthrogram group consisting of six men and 16 women compared with the control group consisting of 20 men and 54 women. All of the patients underwent cemented THA (28-mm bearing) via the posterior approach. The mean times between surgery and when questionnaires were obtained postoperatively for both groups were 42 and 52 months respectively to allow for an adequate period for patients to respond to their postoperative improvements before obtaining their questionnaires [12, 19].

Patients were seen for followups at 6 weeks, 12 weeks, 6 months, 1 year, and then yearly thereafter. Plain radiologic assessments of the hips (AP radiographs of the pelvis) were obtained during followups at 6 weeks and 1 year. We reviewed the patients and they did not have any major complications (for example, joint infections, dislocations, fractures, or requiring revision surgeries). At each visit, patients completed functional outcome scores, including the Oxford Hip Score [7], WOMACTM function short form [25], and SF-12 preoperatively and at regular followups.

We determined the differences in function scores and age at surgery using Student's *t*-test. Chi-square tests were used to test for differences in function scores between the control and study groups. All statistical analyses were performed using SPSS (Version 18, SPSS Inc, Chicago, IL, USA).

Results

Patients in the study group who had a hip arthrogram compared with patients without an antecedent hip arthrogram had lower mean Oxford Hip Scores (30 versus 39,

Table 1. Characteristics of control and study (arthrogram) groups

Patient characteristics	Group	Number of patients	Mean	Standard deviation	Range	Confidence interval
Age at time of surgery (years)	Study (arthrogram)	22	58.18	13.044	36–80	95%
	Control	74	61.65	12.248	35–82	
Preoperative Oxford Hip Score	Study (arthrogram)	13	12.15	9.974	1–40	95%
	Control	74	14.22	7.574	2–32	

Table 2. Postoperative scores by control and study (arthrogram) groups

Scoring method	Group	Number of patients	Mean	SD	Range	p value
Oxford Hip Score	Study (arthrogram)	18	30.44	13.82	3–48	0.026*
	Control	69	38.77	10.06	10–48	
WOMAC™ short version	Study (arthrogram)	18	38.67	14.44	10–56	0.07
	Control	73	45.68	12.15	7–56	
SF-12 Physical component	Study (arthrogram)	17	35.51	11.58	20.05–56.58	0.058
	Control	57	42.01	13.10	15.21–61.76	
SF-12 Mental component	Study (arthrogram)	17	42.61	13.22	22.48–65.85	0.02*
	Control	57	51.25	9.26	31–65.14	
Satisfaction scale	Study (arthrogram)	22	65.91	31.20	25–100	0.004*
	Control	74	88.32	17.22	25–100	

* p value < 0.05.

respectively), WOMAC™ scores (39 versus 46, respectively), and SF-12 Physical (36 versus 43, respectively) and Mental (43 versus 51, respectively) components (Table 2).

Discussion

By temporarily relieving pain in patients with atypical hip pain, a local anesthetic hip arthrogram is a simple and reliable test that often clarifies a diagnosis and provides guidance for therapeutic options including whether to recommend a THA [1, 6, 13]. A THA relieves pain and improves function and quality of life for patients with end-stage arthritis [8, 15]. Some of the factors that may predict a greater benefit from THA include male sex, primary THA rather than revision, and poorer preoperative health-related quality of life [8, 22, 24]. Patients who meet the appropriate criteria for a primary THA are more likely to experience better postoperative health-related quality of life [23]. However, it is unclear whether relief of pain following injection in these patients with atypical pain corresponds to better postoperative pain relief or function. We therefore compared the function in patients with a positive response to a local anesthetic hip arthrogram who underwent primary THA and patients with typical osteoarthritis presentation who underwent primary THA without a preoperative arthrogram.

Readers should be aware of the limitations of our retrospective study. First, we had a small number of patients for analysis, with some missing data for function scores from the case notes, although no patients were lost to followup. Therefore attrition bias in the function scores may be present. Second, there may be selection bias for both groups owing to a nonrandom sample of a population, but none of the patients had a history of previous hip surgery and there were no other exclusion factors to best represent patients typical of the overall population. We intend this study as a pilot study to direct further research and prospective studies.

We found that patients who had a local anesthetic hip arthrogram for diagnostic purposes before undergoing THA had lower Oxford Hip Scores, WOMAC™, and SF-12 Physical and SF-12 Mental component scores than the control patients who had typical osteoarthritis pain, did not have an arthrogram, and underwent THA. We agree with Crawford et al. [6] and Illgen et al. [13] that a hip anesthetic arthrogram is a useful diagnostic tool for difficult cases before THA, as a positive response can predict improvement in pain relief and function after THA. However, in our study, these patients had lower function scores than those who did not require a preoperative local anesthetic hip arthrogram. Although we did not measure various aspects of the preoperative patient status, we suspect our findings could be attributable to their preoperative

health-related quality of life, such as patient characteristics (clinical presentation) [4] and psychologic distress [12], which could have affected the functional outcome of the study group. It is possible that patients' expectations of pain relief and improved function after THA may be higher after an initial positive response to a local anesthetic arthrogram. We speculate that patients who have had a positive arthrogram may be paradoxically less satisfied than those who did not require a hip arthrogram for diagnosis. Patient satisfaction after surgery does not always correlate with surgeons' assessments [2, 16] and is complex and could be affected by patients' expectations and knowledge of the procedure (THA) from their community network [11, 20]. Thus, some authors [1, 3] have recommended the combination of different objective and subjective scoring systems to evaluate patient satisfaction and outcomes for THA. These factors could be evaluated in detail in future prospective studies.

We believe that a preoperative local anesthetic hip arthrogram is an important diagnostic and therapeutic tool (temporary complete pain relief) to differentiate spinal disorders or confirm the hip as the cause of pain because there were minimal radiologic changes according to the Kellgren-Lawrence classification. However, our observations suggest patients who have a positive response to a preoperative local anesthetic hip arthrogram may be more likely to report lower function scores and pain relief after primary THA compared with patients who do not require a preoperative local anesthetic hip arthrogram. The contributing factors could be explored in further studies.

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