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Indications for Total Hip Replacement:

Comparison of orthopaedic surgeons' and referring physicians' assessment

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ABSTRACT

OBJECTIVES: To analyse differences of opinions on indications for primary total hip replacements (THR) within and between orthopaedic surgeons and the physicians who refer patients to them.

METHODS: 22 orthopaedic centres in 12 European countries took part, resulting in a postal survey of 304 orthopaedic surgeons and 314 referring physicians. Each participant was asked to state what importance different domains (pain, functional impairment, physical examination, radiographs) have on their decision to recommend THR, and to select the most appropriate severity of each symptom or sign for THR. In addition, the participants were asked to prioritise other personal or environmental factors that affect their decision to undertake a THR.

RESULTS: Rest pain, pain with activity and functional limitations were the most important criteria for THR while limited range of motion and radiographic changes were of minor importance. There were both similarities and differences within and between surgeons and referring physicians in the overall approach to indications and to the most appropriate severity of disease for THR. The majority of surgeons agreed on severity levels in only 4 of 11 items and the majority of referring physicians in only one item. Between the groups major differences occurred with regard to the importance of activities of daily living and the appropriate level of symptoms for THR. In general, referring physicians reported that the disease needed to be more advanced to warrant surgery compared with surgeons.

CONCLUSION: Currently there is no consensus on objective indication criteria for THR. The observed differences between the gatekeepers (referring physicians) and surgeons could lead to variations and perhaps inequities in the provision of care.

Key words: osteoarthritis, total hip replacement, indication criteria, symptoms

INTRODUCTION

Total hip replacement (THR) relieves the pain and functional disability experienced by patients with moderate to severe arthritis of the hip, improving their quality of life[1]. It is a highly cost-effective procedure[2]. Mainly due to the high prevalence of symptomatic hip osteoarthritis in the Western World (about 10% of people 60 years or older) large numbers of THRs are undertaken, (e.g. about 170,000/annum in Germany and 40,000/annum in England). While there has been a lot of research on the outcomes of the procedure, particularly prosthesis survival, relatively little empirical work has been undertaken on the most appropriate indication for the procedure.

Wide variations in the provision of THR have been reported both within[3-6] and between OECD (Organisation for Economic Co-operation and Development) countries, rates varying from 50 to 130 procedures/100,000 inhabitants/annum in the 1990s.[7] There are many possible reasons for these variations, including differences in disease prevalence or severity, different population demographics, differences in expectations of patients and surgeons, and preferences for treatment, as well as restricted access to the procedure. Concerns have also been raised about possible underutilisation in some areas and overuse in others[8], and the suggestion that doctors may use varying indications for THR, and to "the very disturbing implication that this arbitrariness represents, for at least some patients, suboptimal or even harmful care".[9]

Generally acknowledged indications for primary THR include: joint pain, functional limitation, and some radiographic evidence of joint damage.[10] Many other factors can influence the decision to perform a THR in a patient with OA and there is a lack of consensus regarding the indicators and thresholds for these procedures.[3,10,11]

In many countries, general practitioners (GP´s) act as gate-keepers for referral to hip replacement surgery. However, it is not known, whether the GP´s or other referring physicians and the orthopaedic surgeons have the same views on who should have a THR. Furthermore, it is not known if the surgeons and the referring physicians agree internally on the appropriate level of disease severity in patients selected for surgery.

The EUROHIP group, is working on an European collaborative database of cost and practice pattern of total hip replacement.[12] One purpose of the „EUROHIP" project is the evaluation of decision-making processes for THR in different European countries. This part of the study analyses the differences of opinions between orthopaedic surgeons and their referring physicians' on the indications for a primary THR.

METHODS

The European collaborative database of cost and practise patterns of total hip replacement („EUROHIP“) is based on data provided by collaborating orthopaedic centres throughout Europe.[12] This survey was conducted in 2002 in 22 centres from 12 European countries with two different groups of physicians: all orthopaedic surgeons performing THR at each individual centre and the 20 physicians who referred the most patients to that centre for THR. The literature was reviewed to determine the factors that should be considered (listed in Table 1). After pilot work, a standard English language questionnaire about these parameters was agreed with the EUROHIP group; this was then translated into each national language and retranslated into English to resolve discrepancies.

Both the questionnaires for the surgeons and for the referring physicians contained one part with the question “What importance have pain, function, physical examination and radiographs for you in the decision whether your patient should undergo total hip replacement?” For each item, 3 possible answer categories were available: “high”, “intermediate” or “low” importance.

In addition, the questionnaire asked respondents 11 questions under the heading „medical indication for total hip replacement“ which were identical for surgeons and referring physicians. First a case scenario was developed with the following description: „You see a patient with a history of hip pain in your office/hospital and your examination reveals a decreased range of hip motion as well as radiographic hip osteoarthritis.“ Participants were asked to „select the most appropriate level of each symptom/sign (independent from all other symptoms/signs) that would be an indication for total hip replacement from your point of view“. Five possible answers were possible for each item except the „amount of joint space“ which was divided into three categories.

Participants were also asked if they would consider other aspects of pain and/or functional impairment when making the decision, and how they would rate the importance of these items.
Finally the participants were asked to rank order seven symptoms with regard to the importance for their decision about the indication for THR.

Statistical analysis

After standard descriptive analyses using exact methods where appropriate, differences in the distribution of answers between surgeons and referring physicians were assessed testing for differences in the mean scores using the Cochran-Mantel-Haenszel statistic. For this purpose, in the first block the five possible answer categories for the most appropriate level were coded from 1 to 5 (1 to 3 for joint space). In the second block „low importance“ was coded as –1, „intermediate importance“ was coded as 0, and „high importance“ was coded as +1. Thus, the p-value for a difference between orthopaedic surgeons and referring physicians takes the inherent ordering of the categories into account. All analyses were performed using the statistical analysis system (SAS, version 8.2, NC, USA).

RESULTS

A total of 304 orthopaedic surgeons and 314 referring physicians responded to the questionnaire. The results in table 2 show both similarities and differences in the overall approach to indications to THR within and between the two groups. Most respondents in both groups agreed that rest pain and pain with activity were of high importance, with range of hip motion and x-ray changes being considered much less important. However, for the latter two and all of the remaining items a wide variability of answers was seen in both groups.

Significant differences were also seen between the groups for the importance of functional items such as difficulties climbing stairs and putting on shoes and socks: more referring physicians than surgeons indicated that these were very important criteria for their decision (36% vs. 23% and 39% vs. 22%, respectively).

Table 3 presents the orthopedic surgeons and referring physicians assessment of the most appropriate level of pain and functional impairment that would be an indication for total hip replacement. The heterogeneous judgement within both groups is reflected by the fact that the majority (more than 50%) of surgeons agreed on severity levels in only five of the 11 items (night and rest pain, analgesics, range of motion, joint space), and the majority of referring physicians agreed in only two items (climbing stairs, joint space).

While there was a wide range of views within the groups, the great majority of both groups considered pain severity important (table 3a): most agreed that severe pain, rest pain or night pain and need for analgesics should be present on several days per week before THR should be considered. However, nearly 15% of the referring physicians but only 6-9% of the surgeons thought that such symptoms should be present all the time; in contrast 12 % of the surgeons felt that one day/week of night pain warranted surgery.

In table 3b the levels of functional impairment that might warrant an indication for THR are shown. Reduced walking distance was considered important by both groups, but the degree of restriction mentioned by the majority of surgeons (<1 Km, approx 0.7 miles) was less than that of referring physicians (<0.5 Km). For other impairments (climbing stairs, putting on shoe and socks, need for crutch) the referring physicians again suggested more advanced disease as a prerequisite for surgery than surgeons.

Similar differences were observed with regard to joint damage. 43% of referring physicians, compared with only 16% of surgeons thought that hip flexion needed to be reduced to below 45° to constitute an indication for surgery. However, for radiographic changes comparable results over a wide range were noted in both groups, with more than 95% requiring joint space narrowing of at least 50%, but 40% demanding total loss of joint space. Interestingly, these last two items had no relevance to a considerable number of participants in both groups (20-25%) for their decision to recommend THR to a patient.

The additional items listed by the participants as being important for their decision for THR were divided into seven groups: pain (e.g. duration of pain, pain with exercise, back pain, knee pain, etc.), physical limitations (e.g. reduced abduction, deformity), activities of daily living (e.g. self-care, use of public transportation, caring for household, independent life, etc.), participation in sport, sexual activities, professional life (e.g. type of profession, requirements of and limitation in professional life) and quality of life (e,g,

travel, social isolation, depression). The areas considered most important by both surgeons and referring physicians were: quality of life issues, activities of daily living, sports and sex.

Table 4 shows the results of the rank order question. Surgeons and referring physicians ranked pain symptoms first, with rest pain having the highest importance, followed by night pain and pain with activities. As shown, the only discrepancy between groups was in the order of the last two items: surgeons, but not referring physicians, ranking radiographic change above social contact.

DISCUSSION

These results from the first multi-centre, multi-national, European survey of opinions on the indications for total hip replacement show that opinions about the severity of joint disease differ widely between different referring physicians and surgeons, and that there are some important differences between these groups of doctors. Referring physicians tended to think more often that patients need to have more severe disease to warrant surgery than the surgeons. In addition, referring physicians tended to put more weight on social issues and quality of life, whereas surgeons were more concerned with the extent of joint damage. These differences may be explained by the fact that the referring physician has many non-surgical options, and wants to treat the whole patient, whereas surgeons want to treat damaged joints surgically.

Currently, there are no universally accepted criteria by which to determine the severity of osteoarthritis and the appropriate indication of THR. Consensus groups have developed different criteria for THR in Canada[3,8], New Zealand[11], and the USA[10]. Constant pain, with or without substantial functional impairment, and radiographic changes are the generally agreed criteria for joint replacement. This is in part consistent with our findings: both groups of surgeons and referring physicians uniformly agreed that pain (especially rest pain, but also night pain and pain with activity) and functional impairment are most important for their decision to recommend THR. On the other hand, radiographic changes and decreased range of motion were only of high importance for between a quarter and a third of all respondents. In addition, there was no consensus within groups regarding the appropriate severity of radiographic changes, and within the referring physicians for the limitation in the range of motion.

Marked differences were seen between the groups in regard to the importance of certain activities of daily living, like difficulties with climbing stairs and putting on shoes and socks. While many referring physicians emphasize the importance of activities of daily living, most surgeons give lower importance to these items. The latter is surprising, since patients are highly interested in the effect of surgery on their activities of daily living[13-15], and seem to value these issues stronger than their surgeons[16]. This might in part explain the differences in expectation[17] and evaluation of outcome[18-20] in THR between patients and physicians.

Thus, while our data are consistent with other findings from attempts to produce a consensus on the indications for THR[21], they also emphasize the degree of variation within surgeons and referring physicians, as well as the overall differences between the two groups. Variation within surgeons could lead to some patients considered appropriate by one surgeon being refused a THR by another or vice-versa. Under the plausible assumption that these variations are not random, they might also be one explanation for the large within and between country variations in the rates of provision that have been observed.[7]

The differences between referring physicians, as a group, and surgeons could also be of great relevance to service provision. In most countries referring physicians act as „gatekeepers“ to surgery. Our data suggests that gatekeepers think that patients need to be more severely affected to warrant surgery than do the surgeons themselves. The referring physicians may, therefore, be holding patients back who, if they got to the surgeon, would be offered a THR. Similarly the wide variations in the views of different

referring doctors that we observed could lead to variations and perhaps inequities in the provision of THR.

The present study has both strengths and weaknesses. On the positive side, the selection of the main criteria was made on the basis of a comprehensive review of the literature, and the survey instrument was designed and piloted in consultation with a wide group of physicians, surgeons and epidemiologists. Large numbers of respondents were involved and the response rate and completion of forms was excellent. Obviously the main limitation of our survey is that it is based on a convenience sample from self-selected centers of excellence, and thus is not representative. Responses on the questionnaire may not completely reflect actual practice. Also, by considering individual criteria one at a time, the complexity of the decision making process and potential interactions of different indications cannot be taken into account. Since some participants named additional items, we might have missed relevant determinants. Especially limited participation in recreational sports and discomfort with sexual activities have been mentioned repeatedly. This is consistent with some earlier reports, indicating that these factors are most important for a subgroup of patients.[13] At least one other factor that might be important – gender – was not considered at all.[22] Finally, we do not have any information on the views of the patients themselves, that most certainly play a very important role in the decision making.

Determining when to do a total hip arthroplasty for the treatment of osteoarthritis is difficult. Ultimately, this question needs to be answered by the individual patient with the assistance of his or her physician. If, at a given point in time, a patient believes that the overall benefit of total hip arthroplasty outweighs the risks, then delaying the procedure until the benefit is even greater, makes no sense.[23] However, currently there is no consensus on objective indication criteria. Applying the most commonly used determinants in the present survey, wide variability of decisions from physicians responsible for the care of these patients surfaced.

In our view future work needs to take a more comprehensive approach, considering indications and modifying factors simultaneously, and exploring so-called appropriateness criteria[24]. With input of the views of patients, more emphasis may need to be placed on societal values and contextual factors. The indications and prioritization for hip replacement may need to be considered within an appropriate theoretical framework, such as the ICF (International Classification of Functioning, Disability and Health)[25] and must also include understanding of factors that affect the willingness of patients to undergo surgery[17,26,27]. Finally, our work points towards a strong need for more collaboration and consultation between surgeons and their referring physicians within any locality, so that they could, for example, agree upon their own “appropriateness criteria” for their population.

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References:

REFERENCES

1. Murray D. Surgery and joint replacement for joint disease. *Acta Orthop Scand Suppl 1998;281:17-20.*
2. Faulkner A, Kennedy LG, Baxter K, Donovan J, Wilkinson M, Bevan G. Effectiveness of hip prostheses in primary total hip replacement: a critical review of evidence and an economic model. *Health Technol Assess 1998;2-6:1-133.*
3. Naylor CD, Williams JI. Primary hip and knee replacement surgery: Ontario criteria for case selection and surgical priority. *Qual Health Care 1996;5-1:20-30.*
4. Katz JN. Preferences, quality, and the (under)utilization of total joint arthroplasty. *Med Care 2001;39-3:203-5.*
5. Peterson MG, Hollenberg JP, Szatrowski TP, Johanson NA, Mancuso CA, Charlson ME. Geographic variations in the rates of elective total hip and knee arthroplasties among Medicare beneficiaries in the United States. *J Bone Joint Surg Am 1992;74-10:1530-9.*
6. Majeed A, Eliahoo J, Bardsley M, Morgan D, Bindman AB. Variation in coronary artery bypass grafting, angioplasty, cataract surgery, and hip replacement rates among primary care groups in London: association with population and practice characteristics. *J Public Health Med 2002;24-1:21-6.*
7. Merx H, Dreinhofer K, Schrader P, Sturmer T, Puhl W, Gunther KP, Brenner H. International variation in hip replacement rates. *Ann Rheum Dis 2003;62-3:222-6.*
8. Hawker GA, Wright JG, Coyte PC, Williams JI, Harvey B, Glazier R, Wilkins A, Badley EM. Determining the need for hip and knee arthroplasty: the role of clinical severity and patients' preferences. *Med Care 2001;39-3:206-16.*
9. Eddy DM. Clinical decision making: from theory to practice. Anatomy of a decision. *Jama 1990;263-3:441-3.*
10. NIH consensus conference: Total hip replacement. NIH Consensus Development Panel on Total Hip Replacement. *Jama 1995;273-24:1950-6.*
11. Hadorn DC, Holmes AC. The New Zealand priority criteria project. Part 1: Overview. *Bmj 1997;314-7074:131-4.*
12. Stürmer T, Dreinhöfer KE, Gröber-Grätz D, Brenner B, Dieppe P, Guenther KP, Puhl W. Variations within, and differences between the views of orthopaedic surgeons and referring physicians on the determinants of outcome after total hip replacement. *J Bone Joint Surg Br. (accepted for publication).*
13. Wright JG, Young NL. The patient-specific index: asking patients what they want. *J Bone Joint Surg Am 1997;79-7:974-83.*
14. Trousdale RT, McGrory BJ, Berry DJ, Becker MW, Harmsen WS. Patients' concerns prior to undergoing total hip and total knee arthroplasty. *Mayo Clin Proc 1999;74-10:978-82.*
15. Moran M, Khan A, Sochart DH, Andrew G. Evaluation of patient concerns before total knee and hip arthroplasty. *J Arthroplasty 2003;18-4:442-5.*
16. McGee MA, Howie DW, Ryan P, Moss JR, Holubowycz OT. Comparison of patient and doctor responses to a total hip arthroplasty clinical evaluation questionnaire. *J Bone Joint Surg Am 2002;84-A-10:1745-52.*
17. Moran M, Khan A, Sochart DH, Andrew G. Expect the best, prepare for the worst: surgeon and patient expectation of the outcome of primary total hip and knee replacement. *Ann R Coll Surg Engl 2003;85-3:204-6.*
18. Lieberman JR, Dorey F, Shekelle P, Schumacher L, Thomas BJ, Kilgus DJ, Finerman GA. Differences between patients' and physicians' evaluations of outcome after total hip arthroplasty. *J Bone Joint Surg Am 1996;78-6:835-8.*
19. Knahr K, Kryspin-Exner I, Jagsch R, Freilinger W, Kasparek M. [Evaluating the quality of life before and after implantation of a total hip endoprosthesis]. *Z Orthop Ihre Grenzgeb 1998;136-4:321-9.*

20. Brokelman RB, van Loon CJ, Rijnberg WJ. Patient versus surgeon satisfaction after total hip arthroplasty. *J Bone Joint Surg Br 2003;85-4:495-8.*
21. Mancuso CA, Ranawat CS, Esdaile JM, Johanson NA, Charlson ME. Indications for total hip and total knee arthroplasties. Results of orthopaedic surveys. *J Arthroplasty 1996;11-1:34-46.*
22. Hawker GA, Wright JG, Coyte PC, Williams JI, Harvey B, Glazier R, Badley EM. Differences between men and women in the rate of use of hip and knee arthroplasty. *N Engl J Med 2000;342-14:1016-22.*
23. Holtzman J, Saleh K, Kane R. Effect of baseline functional status and pain on outcomes of total hip arthroplasty. *J Bone Joint Surg Am 2002;84-A-11:1942-8.*
24. Brook RH. Appropriateness: the next frontier. *Bmj 1994;308-6923:218-9.*
25. Dreinhöfer KE, Stucki G, Ewert T, Huber E, Ebenbichler G, Gutenbrunner C, Chatterji S, Cieza A. ICF Core Set for Osteoarthritis. *J Rehab Med 2004;Suppl. 44:1-7.*
26. Mahomed NN, Liang MH, Cook EF, Daltroy LH, Fortin PR, Fossel AH, Katz JN. The importance of patient expectations in predicting functional outcomes after total joint arthroplasty. *J Rheumatol 2002;29-6:1273-9.*
27. Clark JP, Hudak PL, Hawker GA, Coyte PC, Mahomed NN, Kreder HJ, Wright JG. The moving target: a qualitative study of elderly patients' decision-making regarding total joint replacement surgery. *J Bone Joint Surg Am 2004;86-A-7:1366-74.*

Table 1. Parameters affecting indication for total hip replacement

Pain
- severity
- at rest
- at night
- with activity

Function
- walking distance
- need for cane / crutch
- need for analgesics
- difficulty climbing stairs
- difficulty putting on shoes / socks

Physical examination
- Range of motion

Radiograph
- Amount of joint space preserved on x-ray

Table 2. **Importance of determinants in the assessment whether a patient should undergo total hip replacement**
Comparison of orthopaedic surgeons' and referring physicians' assessment

	Orthopaedic surgeons			Referring physicians			
	Importance			Importance			
	high	intermediate	low	high	intermediate	low	p-value
	%	%	%	%	%	%	%
Rest pain	86.1	11.9	2.0	87.2	11.2	1.6	0.66
Pain with activity	70.1	27.0	3.0	68.8	27.7	3.5	0.67
Walking distance	51.6	44.1	4.3	54.6	42,5	2.9	0.34
Need for cane/ crutches	34.8	40.4	24.8	30.2	50.2	19.6	0.91
Difficulty climbing stairs	22.9	64.6	12.6	36.3	56.9	6.8	<.0001
Difficulties putting on shoes and socks	21.7	58.2	20.1	39.1	50.3	10.6	<.0001
Range of motion on examination	33.4	46.4	20.2	27.0	53.1	19.9	0.28
Amount of joint space preserved on x-ray	28.6	41.2	30.2	23.7	42.6	33.7	0.18

Table 3a. **Most appropriate level of pain that would be an indication for total hip replacement Comparison of orthopaedic surgeons' and referring physicians´ assessment**

		1 day / month	1day / week	several days week	daily	permanently	p- value	no relevance
		%	%	%	%	%		%
Severe pain	(Surgeons)	2.3	5.0	47.2	36.5	9.0		0.0
	(Referring)	1.3	8.6	41.1	33.9	15.1	0.24	0.7
Rest pain	(Surgeons)	0.3	8.2	52.6	30.4	8.5		2.3
	(Referring)	0.7	6.1	47.1	30.8	14.2	0.03	3.3
Night Pain	(Surgeons)	0.7	12.7	54.4	25.8	6.4		5.4
	(Referring)	0.3	8.9	50.5	25.8	14.4	0.003	4.3
Pain with activity	(Surgeons)	0.3	1.7	39.0	43.2	15.7		3.7
	(Referring)	0.3	3.3	33.7	42	20.7	0.27	2.2
Need for analgesics	(Surgeons)	2.8	19.8	53.5	24.0			3.7
	(Referring)	1.4	21.2	43.0	34.5		0.06	4.8

Table 3b. **Most appropriate level for functional impairment that would be an indication for total hip replacement**
Comparison of orthopaedic surgeons' and referring physicians' assessment

		unlimited	1-3 km	0.5-1 km	> 0.5 km	unable to walk	p-value	no relevance
		%	%	%	%	%		%
Walking distance	(Surgeons)	0.3	11.1	46.7	39.0	2.8		4.7
	(Referring)	0.3	9.7	38.1	45.0	6.9	0.01	5.3
		no difficulty	**negotiates few steps**	**one foot at a time**	**assistance required**	**unable**		**no relevance**
		%	%	%	%	%		%
Difficulty climbing stairs	(Surgeons)	0.7	26.0	50.5	18.3	4.4		9.0
	(Referring)	0.0	17.2	56.8	20.9	5.1	0.03	3.6
		no difficulty	**some difficulty**	**needs long shoehorn**	**assistance required**	**unable**		**no relevance**
		%	%	%	%	%		%
Difficulty putting on shoes and socks	(Surgeons)	0.4	21.2	40.8	33.5	4.2		13.3
	(Referring)	0.3	15.3	40.6	40.6	3.1	0.11	6.5
		never	**1 day / month**	**1 day / week**	**several days/ week**	**daily**		**no relevance**
		%	%	%	%	%		%
Need for cane or crutch	(Surgeons)	1.4	4.1	21.5	52.5	20.5		25.3
	(Referring)	0.8	0.8	25.8	41.8	30.7	0.07	20.5
		flexion < 90	**flexion 45-90**	**flexion 30-45**	**flexion < 30**	**ankylosed**		**no relevance**
		%	%	%	%	%		%
Range of motion	(Surgeons)	3.0	75.9	19.4	1.3	0.4		20.7
	(Referring)	2.4	44.9	38.2	11.8	2.8	< 0.001	18.1

		> 50% preserved	< 50% preserved	none preserved		no relevance
		%	%	%		%
Amount of joint space	(Surgeons)	3.1	57.2	39.7		23.7
preserved on x-ray	(Referring)	4.3	53.9	41.8	0.87	24.9

Table 4. **Comparison of orthopaedic surgeons' and referring physicians' ranking of determinants with regard to their importance for the decision whether a patient should undergo total hip replacement**

	Orthopaedic surgeons	Referring physicians
Rest Pain	1	1
Night Pain	2	2
Pain with activity	3	3
Functional impairment	4	4
Decreased range of motion	5	5
Osteoarthritis X-Ray changes	6	7
Impaired social contact	7	6