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Ethnic differences in preoperative function of patients undergoing total knee arthroplasty

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Abstract The prevalence of osteoarthritis is high in all ethnic and demographic groups. The timing of surgery is important because poor preoperative functional status is related to poor postoperative function. The aim of our study was to compare the preoperative knee function in patients of Asian origin with that of Caucasians living in the same community. We carried out a prospective study of 63 consecutive Asian patients and 63 age- and gender-matched Caucasian patients undergoing total knee arthroplasty. Preoperative Knee Society Clinical Rating System scores were recorded as a separate knee score and knee function score. The mean preoperative knee score in Asian patients was 37.6 compared with 41.5 in Caucasians ($p<0.12$); this difference was not statistically significant. The mean preoperative knee function score in Asian patients was 32.5 compared with 45.0 in Caucasians ($p<0.00015$); this difference was highly statistically significant. We conclude that patients of Asian origin undergoing total knee arthroplasty have lower preoperative knee function than Caucasians do. Cultural beliefs and social support partially explain this discrepancy, but health care providers must attempt to educate patients and close family members about the importance of timing the surgery to obtain the optimum benefits of pain relief and function.

Résumé La prévalence de l'arthrose est importante dans tous les groupes ethniques et démographiques. L'indication opératoire est importante en relation avec une dégradation de la fonction pré-opératoire. Le but de cette étude est de comparer la fonction pré-opératoire genou chez des

patients d'origine asiatique et caucasienne vivant dans la même communauté. Nous avons conduit une étude prospective chez 63 patients asiatiques et 63 patients caucasiens en appareillant le sexe et ayant bénéficié d'une prothèse totale du genou. Le score de la Knee Society a été utilisé avec le score genou et le score fonction. Le score pré-opératoire moyen genou pour les patients asiatiques était de 37,6, comparé au score chez les patients caucasiens 41,5 ($p<0,12$), la différence n'est pas statistiquement significative. Le score moyen pré-opératoire fonction chez les patients asiatiques était de 32,5 comparé à celui des patients caucasiens 45,0 ($p<0,00015$), cette différence est hautement significative. On peut conclure que les patients d'origine asiatique devant bénéficier d'une prothèse totale du genou ont une fonction du genou inférieure aux patients caucasiens. Les aspects culturels et sociaux expliquent cette différence de même que les aspects éducatifs et permettent de décider de l'intervention chirurgicale de façon à obtenir le maximum de bénéfice de cette intervention et le meilleur résultat sur la douleur et la fonction.

Introduction

Total knee arthroplasty is a safe and cost-effective treatment for advanced arthritis of the knee [6, 7]. The timing of surgery is important because poor preoperative functional status is related to poor postoperative function [5, 11].

The prevalence of osteoarthritis is high in all ethnic and demographic groups [7], so the rate of arthroplasty surgery in ethnic groups should be proportional to the relative prevalence of osteoarthritis in each group. But racial and ethnic disparity in the use of joint replacement surgery has been reported in a number of North American studies [2, 13, 18]. Hispanics, African-Americans, and patients without Medicare or private health insurance also reach arthroplasty surgery with lower preoperative functional and health status [10].

To our knowledge, no studies have investigated ethnic differences in knee arthroplasty usage or function in the

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United Kingdom. The aim of our study was to compare the preoperative knee function in patients of Asian origin with that of Caucasians living in the same community.

Materials and methods

A prospective study was undertaken in patients undergoing total knee arthroplasty at our institution, which serves an ethnically diverse inner city population, between June 2001 and December 2003. Ethics committee approval was obtained as part of a study to investigate long-term outcomes for the PFC Sigma implant (DePuy Johnson & Johnson). Patients undergoing revision knee arthroplasty were excluded from both groups.

Sixty-three consecutive patients of Asian origin were matched for age, gender, and diagnosis with 63 Caucasian patients. Knee function was assessed using the American Knee Society Clinical Rating System [8], which consists of two parts: The knee score rates the knee itself for pain, stability, and range of motion, with deductions for flexion contracture, extensor lag, and malalignment. The function score rates the patient's ability to walk and climb stairs, with deductions for using a walking aid. The maximum score is 100 in each group. The Knee Society Clinical Rating System is usually reported as two separate scores.

The *t*-test was used to compare preoperative Knee Society scores for the ethnic groups.

Results

The mean patient age was 64.4 years (range 46–83, SD=7.4) in the Asian group and 64.7 in the Caucasian group (range 48–83 years, SD=7.9), with 39 women and 24 men in each group. The indication for knee arthroplasty was osteoarthritis in 61 patients and rheumatoid arthritis in two patients in both groups. Of the Asian patients, 89% (56/63) were Indian and 11% Pakistani in origin.

The mean preoperative knee score was lower in Asian patients, but this difference was not statistically significant. The mean preoperative knee score for Asian men was 36.8, and the value in Caucasians was 41.9 ($p<0.30$). Female Asians scored 37.8, whereas Caucasians scored 41.3 ($p<0.30$). The overall knee score in Asian patients was 37.6 compared with 41.5 in Caucasians ($p<0.12$).

The mean preoperative knee function was lower in Asian patients, and this difference was highly statistically significant in female patients and for the overall results. The mean preoperative knee function for Asian men was 37.2, and the value in Caucasians was 46.8 ($p<0.07$). Female Asians scored 29.6, whereas Caucasians scored 43.9 ($p<0.001$). The overall knee function in Asian patients was 32.5 compared with 45.0 in Caucasians ($p<0.0002$).

Discussion

The decision to proceed to a total knee arthroplasty in patients with end-stage arthritis is influenced by a variety of factors. These include the severity of symptoms, quality-of-life issues, associated medical comorbidity, physiological age, and patient expectations and concerns. A patient's ethnic origin should not influence the mode of treatment.

Migration patterns to the United Kingdom in the latter half of the 20th century created an ethnically diverse population in urban areas. Many of the earliest arrivals were from the Indian subcontinent [19], and this generation of elder Asians is now presenting to the health care system with a wide variety of disorders. The natural history of disease progression is often different from that in the indigenous population. This is clearly demonstrated with respect to cardiac conditions [14] and type II diabetes [1].

Ethnic diversity and health care inequalities are highlighted in a number of studies [17, 18]. The majority are based on North American models. It is important that we learn from the difficulties they have reported in order to minimise potential inequalities in our own health system.

Our study clearly demonstrates that Asian patients have lower preoperative Knee Society Clinical Rating System results compared with their Caucasian contemporaries. The differences were highly statistically significant in the knee function aspect of the scoring system and were more pronounced for female patients.

To reduce this inequality, it is crucial to highlight factors that may be influencing this result and identify methods to counter these problems. Issues that have been reported to explain the disparity in arthroplasty rates in the United States are related to residential segregation [15] and low socioeconomic status [2]. These differences are less marked in the United Kingdom because most inner city hospitals treat a wide range of ethnic groups. The socioeconomic status of patients in our study was similar despite ethnic differences.

The perception of the benefits of a particular procedure for an individual will strongly influence his or her choice of treatment. Figaro et al. [4] reported that in a group of 98 black patients from Harlem (New York) with disabling severe arthritis, only 36% believed that knee arthroplasty would improve knee pain. Despite their disability, they perceived themselves to have a high quality of life. These attitudes have been mirrored in other studies, and ethnic minorities are less likely to consider total knee replacement [16].

It is not clear whether we can extrapolate the conclusions from studies based on Hispanics and black patients to our Asian cohort. Irrespective of ethnicity, the same issues are likely to be a concern; there are differences in perception of benefit, a lack of personal experiences with arthroplasty surgery, and differences in trust in the physician and the health care system [16]. Religious beliefs, preference for natural remedies, and fear of surgery [3] also influence decision making. Many factors are at play when patients consider any form of surgery. The relative importance placed upon certain factors differs between ethnic groups

and may explain why Asian patients have lower preoperative scores. Any delay in presentation will lead to lower preoperative scores because disease progression will be more marked.

Why, if Asian patients' knee function scores are lower, are they not receiving surgical intervention earlier in the disease process? Is the health system in the United Kingdom failing to provide equal care to all members of the community? Culturally, it is common for the elders in Asian society to be part of the extended family, so despite debilitating symptoms, their activities of daily living may be assisted by close family members. This support may explain a later presentation with more severe osteoarthritis.

Total knee arthroplasty, although a very effective procedure, does have the potential for serious complications [9]. The implications of prolonged hospital stay and increased morbidity following revision surgery for infection and the risk of thromboembolic disease must be clearly understood prior to surgery. Issues around informed consent are controversial [12]. Educational barriers may exist with patients in lower socioeconomic groups, and the added language difficulties that are common in ethnic minorities also make informed consent an increasing challenge. This may introduce a bias into the decision between continued conservative management and total knee arthroplasty.

The reasons for the lower preoperative scores are multifactorial. Primary care physicians and orthopaedic specialists who practise in areas with a high concentration of ethnic minorities need to be aware of the cultural differences and psychological issues that prevail in the local community. Patients and their families need to be educated about their diagnoses and advised clearly about the risks and benefits of different management options.

We conclude that patients of Asian origin undergoing total knee arthroplasty have lower preoperative knee function than Caucasians do. Cultural beliefs and social support partially explain this discrepancy, but health care providers must also attempt to educate patients and close family members about the importance of timing the surgery to obtain the optimum benefits of pain relief and function.

References

1. Earle KK, Porter KA, Ostberg J, Yudkin JS (2001) Variation in the progression of diabetic nephropathy according to racial origin. *Nephrol Dial Transplant* 16(2):286–290
2. Escalante A, Espinosa-Morales R, del Rincon I et al (2000) Recipients of hip replacement are less likely to be Hispanic, independent access to health care and socioeconomic status. *Arthritis Rheum* 2:390–399
3. Figaro MK, Russo PW, Allegrante JP (2004) Preferences for arthritis care among urban African Americans: "I don't want to be cut". *Health Psychol* 23(3):324–329
4. Figaro MK, Williams-Russo P, Allegrante JP (2005) Expectation and outlook: the impact of patient preference on arthritis care among African Americans. *J Ambul Care Manage* 28(1):41–48
5. Fortin PA, Clarke AE, Joseph L et al (1999) Outcomes of total hip and knee replacements: preoperative functional status predicts outcome at six months after surgery. *Arthritis Rheum* 42:1722–1728
6. Harris WH, Sledge CB (1990) Total hip and knee replacement. *N Engl J Med* 373:801–807
7. Ibrahim SA, Siminoff LA, Burant CJ et al (2002) Differences in expectations of outcome mediate African American/White patient differences in "willingness" to consider joint replacement. *Arthritis Rheum* 46(9):2429–2435
8. Insall JN, Dorr LD, Scott RD, Scott WN (1989) Rationale of the Knee Society clinical rating system. *Clin Orthop Relat Res* 248:13–14
9. Knutson K, Lewold S, Robertsson O, Lidgren L (1994) The Swedish Knee Arthroplasty Register. A nation-wide study of 30,003 knees 1976–1992. *Acta Orthop Scand* 65(4):375–386
10. Lavernia CJ, Lee D, Sierra RJ et al (2004) Race, ethnicity, insurance coverage and preoperative status of hip and knee surgical patients. *J Arthroplasty* 19(8):978–985
11. Lingard EA, Katz JN, Wright EA et al (1999) Predicting the outcome of total knee arthroplasty. *J Bone Joint Surg Am* 86:2179–2186
12. Lupton M (2005) Informed consent: can a patient ever be fully informed? *Curr Opin Obstet Gynecol* 17(6):601–604
13. Mahomed NN, Barrett J, Katz JN, Baron JA, Wright J, Losina E (2005) Epidemiology of total knee replacement in the United States Medicare population. *J Bone Joint Surg Am* 87(6):1222–1228
14. Rajadurai J, Arokiasamy J, Pasamanickam K, Shatar A, Mei Lin O (1992) Coronary artery disease in Asians. *Aust N Z J Med* 22(4):345–348
15. Skinner J, Weinstein JN, Sporer SM et al (2003) Racial, ethnic and geographic disparities in rates of knee arthroplasty among medicare patients. *N Engl J Med* 349:1350–1359
16. Suarez-Almazor ME, Soucek J, Kelly PA, O'Malley K, Byrne M, Richardson M, Pak C (2005) Ethnic variation in knee replacement: patient preferences or uninformed disparity? *Arch Intern Med* 165(10):1117–1124
17. Vaccarino V, Rathore SS, Wenger NK, Frederick PD, Abramson JL, Barron HV, Manhapra A, Mallik S, Krumholz HM, National Registry of Myocardial Infarction Investigators (2005) Sex and racial differences in the management of acute myocardial infarction, 1994 through 2002. *N Engl J Med* 353(7):671–682
18. Wilson MG, May DS, Kelly JJ (1994) Racial differences in the use of total knee arthroplasty for osteoarthritis among older Americans. *Ethn Dis* 4:57–67
19. <http://www.movinghere.org.uk>