



Audit

Primary total hip replacement: a comparison of a nationally agreed guide to best practice and current surgical technique as determined by the North West Regional Arthroplasty Register

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Background: In 1999, a statement of best practice in primary total hip replacement was approved by the Council of the British Orthopaedic Association (BOA) and by the British Hip Society (BHS) to provide a basis for regional and national auditable standards. We have compared practice in the North West Region of England to this document to ascertain adherence to this guide to best practice.

Methods: A total of 86 surgeons from 26 hospitals were included in a questionnaire study.

Results: A mean of 93.3% of operations were performed in the surgeon's usual theatre. All of these theatres had vertical laminar air flow systems. Of respondents, 42.2% routinely used exhaust suits, 68.1% routinely used impermeable disposable gowns, and 26.1% used impermeable re-usable gowns. The Charnley femoral and acetabular prostheses were the most commonly used prostheses. All surgeons used some form of anti-thromboembolic prophylaxis: 66.2% use a combination of both mechanical and chemical means. All surgeons used antibiotic prophylaxis. The most popular choice of antibiotic was a cephalosporin – 70.7% used a 3-dose regimen over 24 h, 2.6% of surgeons continued antibiotic prophylaxis for 48 h after surgery, and 93.7% of surgeons routinely use antibiotic-loaded cement. All surgeons routinely cleaned, irrigated and dried the acetabulum and femur before cement insertion. Only one surgeon did not use any form of femoral canal occlusion. 69.4% used an intramedullary bone block. Retrograde filling of the femoral shaft by means of a cement gun was practised by 65.1%.

Conclusions: This study has demonstrated considerable variation of practice in total hip arthroplasty across the North West Region and significant divergence from the statement of best practice approved by the BOA and BHS. The introduction of a properly funded national hip register will surely help to clarify the effect of such diverse practice on patient outcome. We would recommend that all trusts locally audit their practices and correlate them with these nationally agreed guidelines.

Key words: Total hip arthroplasty – Register – Practice – Guidelines

Primary total hip arthroplasty (THA) is a common and cost-effective procedure¹ which provides well-documented evidence of improvement in function and quality of life.² National hip registers are well established in Sweden³ and Norway⁴ and have proven effective in identifying poorly performing prostheses⁵ and surgical techniques.⁶ Within the UK, there is a notable variation in the types of implants used, surgical techniques, postoperative surveillance and longer term outcomes across the country.⁷⁻⁹ Calls for a national register in the UK have been made,¹⁰ but as yet only regional registers exist.¹¹

In October 1999, a statement of best practice in primary total hip replacement was approved by the Council of the British Orthopaedic Association (BOA) and by the British Hip Society (BHS).¹² This document aimed to describe best practice in general terms. It stressed that there is currently a lack of auditable standards for the operation and associated care, and that standards can only be set by the wide-spread collection of uniform data made available for both regional and national audit.

The North West Arthroplasty Register (NWAR) was started with regional funding in 1992 by the senior author (MLP). In 1995, only 5 hospitals were involved. Presently, over 30 hospitals are included in the register. In December 1997, the 144 consultant orthopaedic surgeons in the North West Region were contacted by post with a standard surgical technique questionnaire (SSTQ). This questionnaire contained questions regarding the annual amount of primary and revision arthroplasty work performed by each surgeon and their standard practice. The SSTQ is now distributed on an annual basis.

In this study, we compare variations in current surgical technique and postoperative care across the North West Region and correlate this to the BOA/BHS guide to best practice.

Methods

From 1997, a questionnaire regarding consultant, standard, surgical technique has been distributed to all consultants specialising in adult orthopaedics in the North West Region as part of the NWAR. It contains general questions relating to theatre environment and patient management details for all forms of large, joint arthroplasty with specialised questions pertaining to surgical details for each individual joint. This has allowed a detailed database of year-to-year arthroplasty practice to be collated. The database is kept at Wrightington Hospital.

The BOA/BHS guide to best practice contains 15 sections on the subject of THA ranging from the indications for surgery and the out-patient consultation to the follow-up of patients. Sections 8 (required theatre resources), 11 (choice of implant), 12 (venous thrombosis and pulmonary embolism

prophylaxis), 13 (infection prophylaxis) and 14 (surgical technique) specifically deal with patient management, theatre environment and variation in surgical practice and are directly comparable to data subsets collected in the NWAR questionnaire. We analysed SSTQ data collected in 2002 corresponding to the sections mentioned above in order to compare this to best practice. Results of variation in practice are quoted as a percentage of the whole.

Results

For the year April 2001 to April 2002, 144 consultant orthopaedic surgeons were contacted with the SSTQ: 12 surgeons were subsequently found to not be performing any primary joint arthroplasty and were, therefore, excluded. In all, 96 completed replies were received (a 72.2% response rate) of which 86 included details of primary total hip arthroplasty practice.

Demographics

The 86 replies were from a total of 26 hospitals across the North West Region. The mean average number of years as a consultant of the responders as of 1 April 2002 was 8.2 years (median, 6 years; mode, 3 years). The mean number of primary THAs performed per annum was 45.3 (median, 40; mode, 50).

Required theatre resources

A mean of 93.3% (range, 50–100%) of operations were performed in the surgeon's usual theatre. All of these theatres had vertical laminar air flow systems. Of alternative theatres that were used, 75% had no laminar air flow systems. Of respondents, 31.3% routinely used Charnley hose-type exhaust suits and 11.3% used internally powered exhaust suits. Of the respondents, 68.1% routinely used

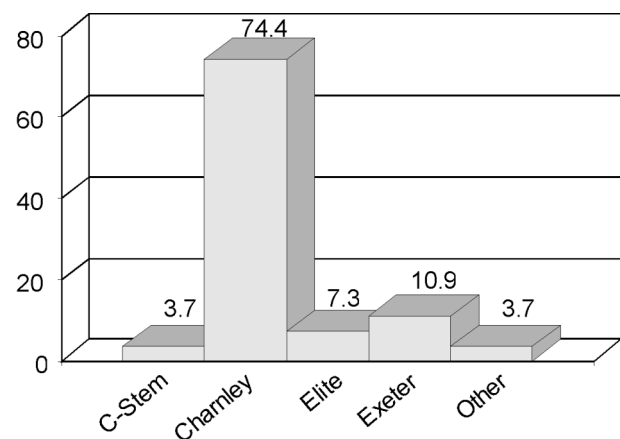


Figure 1 Percentage first choice femoral stems.

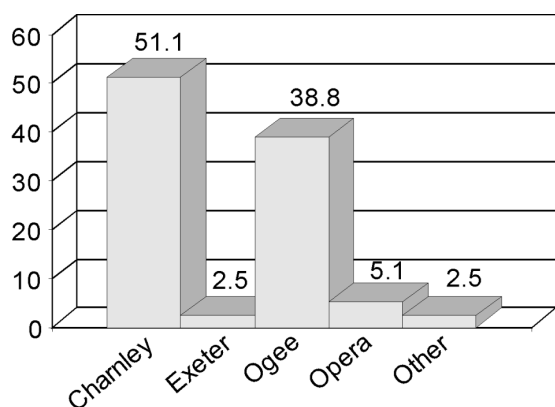


Figure 2 Percentage first choice acetabular cups.

impermeable disposable gowns, 26.1% used impermeable re-usable gowns and 5.8% used neither. In addition, 14.1% solely used disposable drapes, 32.1% solely used impenetrable re-usable drapes, 51.3% used a combination of both, and 2.5% used neither.

Choice of implant

Figures 1 and 2 document first-choice femoral and acetabular prostheses. Interestingly, all first-choice implants were cemented, but 6 surgeons used uncemented THA in special or unusual circumstances such as young, active patients.

Thromboembolism prophylaxis

All surgeons used some form of prophylaxis to counter thromboembolic complications. The majority (66.2%)

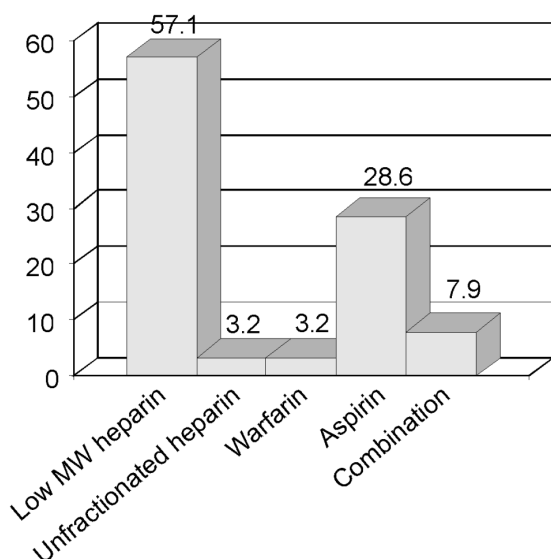


Figure 4 Percentage use of chemical thromboprophylaxis.

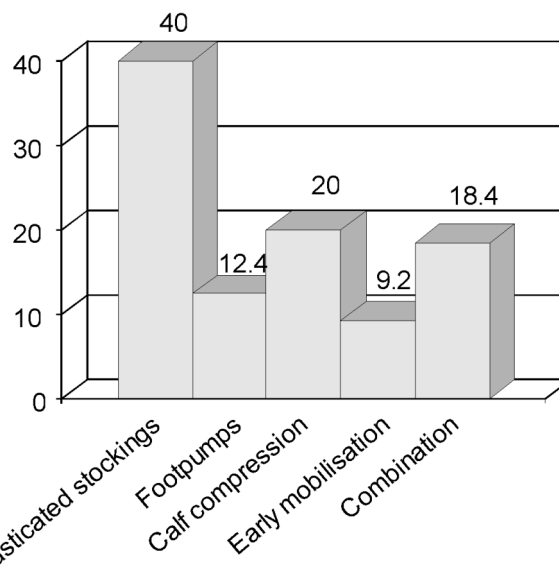


Figure 3 Percentage use of mechanical thromboprophylaxis.

used a combination of mechanical and chemical means. Mechanical means only was favoured by 18.2% and solely chemical means by 15.6%. Figures 3 and 4 demonstrate the variations in thromboprophylaxis regimens used by surgeons.

Prophylaxis against infection

Antibiotic prophylaxis was used by all surgeons. The most popular choice was a cephalosporin (88% routinely used Cefuroxime and 4% used Cephadrine); however, 4% used either Flucloxacillin or Co-amoxiclav. Only single antibiotic regimens were used. A 3-dose regimen was the most popular (70.7%) followed by a single dose at induction (26.7%); 2.6% of surgeons continued antibiotic prophylaxis for 48 h after surgery and 93.7% of surgeons routinely used antibiotic-loaded cement.

Surgical technique

All surgeons routinely cleaned, irrigated and dried the acetabulum and femur before cement insertion. Of these surgeons, 71.7% used Palacos cement, 21.2% used CMW and 7.1 used Simplex; 11.8% of surgeons used low viscosity cement (60% Simplex and 40% CMW3). Figure 5 documents the variation in acetabular cementation technique.

Only one surgeon did not use an intramedullary block whereas 69.4% used an intramedullary bone block. Retrograde filling of the femoral shaft by means of a cement gun was practised by 65.1%, but only 30.2% made use of additional pressurisation devices other than the thumb.

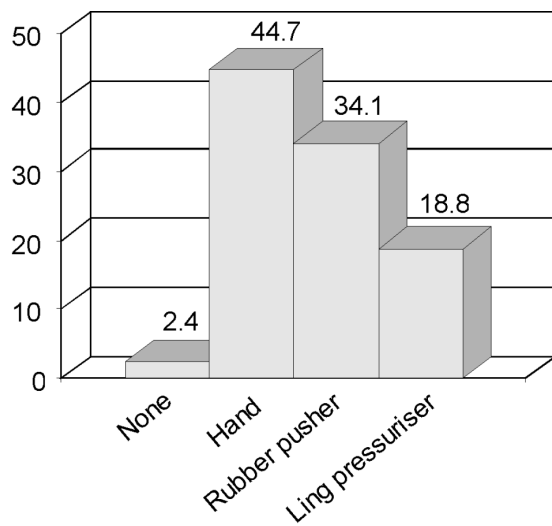


Figure 5 Percentage use of different techniques of acetabular pressurisation.

Discussion

Reports of early failure of certain hip prostheses^{5,13} have heightened professional, public and political awareness of potential problems with THA. Attention has focused on improving surveillance of THA outcome and surgical practice. A recent UK Department of Health press release announced the placement of a contract to establish the National Joint Registry for Hip and Knee Replacements.¹⁴ Current surgical practice in the UK has only previously been reported on a regional basis,^{8,15} and has not been compared to published best practice or has focused only on specific points of technique.¹⁶ This study is the first to compare regional data from a SSTQ with the BOA/BHS statement of best practice directly.

Required theatre resources

The use of ultraclean air theatres dedicated to elective orthopaedic surgery is considered to be best practice as numerous authors have demonstrated their effect in reducing bacterial contamination and subsequent deep infection.^{17,18} Possibly due to historical reasons of the local development of such systems, all dedicated arthroplasty theatres had clean-air flow and the vast majority of THAs were performed in these theatres. A shared facility with other clean surgical disciplines is regarded as acceptable practice only if using ultraclean air. We would highlight that three-quarters of operations performed in shared theatres had no clean air system available.

Impenetrable clothing and drapes, such as those of the disposable variety, are also essential as there is strong

evidence to support their use as opposed to using permeable gowns.^{19,20} The vast majority of surgeons in this study routinely used such drapes.

Choice of implant

The BOA/BHS document recognises that many factors such as trainers, colleagues, manufacturers and perceived outcomes of existing devices determine surgeon preference for an individual implant. Use of a hip prosthesis should normally be based on evidence published in peer-reviewed journals. A clinical follow-up of more than 10 years with a published life table and survivorship curve are recommended criteria in support of the use of a particular hip prosthesis. In the absence of such evidence, use must be subject to on-going surveillance and preferably as part of a controlled prospective trial.

Encouragingly, the majority of surgeons use femoral and acetabular prostheses with well-documented follow-up in peer-reviewed journals.^{21–24} Other, less commonly used prostheses in the North West Region such as the C-stem,²⁵ Elite femoral stem,²⁶ and Opera cup (personal communication) are subject to continued surveillance.

Thromboembolism prophylaxis

Debate continues as to the actual incidence of this complication following total hip replacement because of varying methods of definition and detection.^{27,28} There is no good evidence to suggest that the use of chemical prophylaxis reduces either overall mortality or fatal pulmonary embolism. Strong evidence exists for the use of such prophylaxis in reducing the rate of occurrence of radiological venous thrombosis, but death from other causes may be increased.²⁹ Concern remains regarding possible bleeding complications. As such, the use of aspirin, heparin, low molecular weight heparin or warfarin is not considered mandatory in the guide to best practice. Early mobilisation and mechanical methods of prophylaxis are strongly recommended, even though scanty scientific evidence is available to support their use,^{30,31} as they are generally free of side effects.

All surgeons in our study used some form of thromboembolic prophylaxis. Almost 20% rely solely on mechanical means. Given the doubt surrounding the benefit of chemical prophylaxis, its use is not considered mandatory.

Prophylaxis against infection

A combination of systemic broad-spectrum antibiotics, gentamicin-impregnated cement, ultraclean air systems and ventilated suits are recommended as the most

effective form of infection prophylaxis.¹² Antibiotic prophylaxis is the single most important prophylactic measure,³² and it is re-assuring to find that all surgeons prescribe an antibiotic at induction with over 70% continuing doses at least 24 h after the operation as suggested by the BOA/BHS document. The vast majority used antibiotic impregnated cement in addition. Overall, 42.6% of surgeons used an exhaust suit system. This figure is much higher than the 18% described in the results from The Royal College of Surgeons of England's Total Hip Replacement Outcome Project.⁸ This difference may be due to local influences and the development of the Charnley exhaust suit at Wrightington Hospital. Even though exhaust systems have been demonstrated to be effective in reducing infective complications in THA surgery, 42.6% represents less than half of the number of surgeons who used the other methods of reducing deep infection. Whether this represents lacks a lack of comfort³³ when using such systems is not known.

Surgical technique

For cemented THA, the BOA/BHS document recommends introduction of cement when viscous and pressurisation before introduction of the implant. For the femur, an intramedullary block should be securely inserted before retrograde cement injection with a gun. A lack of consistency in cementing technique has been previously demonstrated,^{16,34} and is again reflected in our results even though 'third generation' cementation techniques have been shown to be preferable.³ Of surgeons in this survey, 34.9% still finger-pack cement into the femur.

Conclusions

This study has demonstrated considerable variation of practice in THA across the North West Region and significant divergence from the statement of best practice approved by the BOA and BHS. The introduction of a properly funded national hip register will surely help to clarify the effect of such diverse practice on patient outcome. We would recommend that all trusts locally audit their practices and correlate them with these nationally agreed guidelines.

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