Hip arthroplasty, changing trends in a national tertiary referral centre

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Abstract

Background Despite changes in techniques and management, little has been published comparing hip replacement surgery over a three-decade time span.

Aims To document change in the practice of hip arthroplasty in a large elective orthopaedic centre.

Methods A retrospective analysis of 100 patients in 1979 and in 1999 comparing demographics, surgical approaches, blood loss, transfusion requirements, morbidity and length of stay.

Results In 1999, males predominated, spinal anaesthesia had largely superceded general anaesthesia, the anterolateral approach had replaced the trans-trochanteric approach, osteoarthritis remained the main aetiology and the Charnley prosthesis remained the implant of choice. Average blood loss was higher in 1999 compared to 1979 (1,378 vs 1,225ml) but all patients in 1979 were transfused with an average of 2.8 units while in 1999 one-third of patients were transfused with an average of 1.6 units ($p<0.0001$). Length of stay had fallen from 30.5 days in 1979 to 16.2 days in 1999 ($p<0.0001$). Thromboembolic complications fell from 13% to 2% ($p=0.0083$).

Conclusion The incidence of deep venous thrombosis (DVT), pulmonary embolus (PE) and length of hospital stay has fallen. Blood loss had changed little but fewer patients receive blood transfusion.

Introduction

The last 20 years has seen dramatic changes in both the surgery and management of hip arthroplasty patients. Today's multidisciplinary approach involves a dedicated team of surgical, medical, nursing, physiotherapy, pain management, occupational care as well as tailored convalescence and follow-up protocols.

Surgically there have been many modifications in hip arthroplasty since Charnley's lateral trans-trochanteric description.[1] The majority of these involve surgical management of the greater trochanter as described by Glassman and Engh,[2] McLaughlin[3] and Dall.[4,5] Other approaches include the posterior approach pioneered by Moore,[6,7] the anterolateral approach pioneered by Smith Peterson and popularised by McKee[8] and Müller.[9]

Other advances have included clean laminar air flow in the operating theatre,[10] exhaust suits, pulsatile lavage systems,[11] and antibiotic impregnated cement.[12] Spinal anaesthesia offers a hypotensive field to the surgeon[13] as well as being a safe alternative for an elderly and medically compromised patient group.

Transfusion practice has also changed with a greater emphasis on blood conservation and autogenous transfusion in the past 10 years. This drive coupled with increased awareness of disease transmission in blood products and economic factors have forced a change in the utilisation of blood and blood products in arthroplasty practice.[14]

This study investigated the impact of these changes in an Irish orthopaedic setting.

Methods

A comparative analysis of 120 patients chosen at random from theatre log books undergoing primary total hip replacement surgery in 1979 and 1999. Ten patients being chosen from each month, giving a sample group of 120. Difficulties were encountered in recovering charts but 100 fully detailed charts were used in both groups.

Data analysis

Patient details were transferred to Excel spreadsheets for analysis and statistics. Details sought included operating surgeon, patient demographics, indication for surgery, surgical approach, prosthesis used, measured blood loss, blood transfused, blood group, length of stay and any postoperative morbidity or mortality. The two time periods were compared using the Student's t test for parametric data and the Mann-Whitney U test for non-parametric data.

Results

Patient and surgical details

Patient's age and gender are shown in Table 1. Age distribution is illustrated in Figure 1. The number of surgeons operating increased from seven in 1979 to 16 in 1999. Surgical indications for hip arthroplasty are presented in Table 1. Type of anaesthesia used showed all patients undergoing general anaesthesia in 1979 as opposed to only 8% in 1999 while 92% underwent spinal anaesthesia in 1999. Surgical approaches are shown in Table 2. The anterolateral approach or modifications predominated in 1999 compared to the trans-trochanteric approach in 1979. Table 2 also demonstrates the variety of implants used in 1999.

Blood loss and transfusion

The blood loss both in theatre and postoperatively was recorded from the nursing and medical notes. Each patient's total blood loss (TBL) was then calculated. This is the sum of intra-operative blood loss and the blood loss collected over the

Table 1. Patient demographics and preoperative conditions

	1979	1999
Gender as a % male:female ratio	3:7	5.5:4.5
Mean age (years)	65.4	66.7
Range	36-90	38-87
Patients <50 years	6%	11%*
Diagnosis		
Osteoarthritis	85%	90%
Rheumatoid	6%	4%
Avascular necrosis	2%	4%
Dysplastic	-	2%
Slipped upper femoral epiphysis	2%	-
Paget's disease	2%	-
Perthes disease	1%	-
Previous fracture	2%	-

*p=0.0018, unpaired t test

Table 2. Surgical operative approaches and types of prosthesis

	1979	1999
Trans-trochanteric	90%	12%
Anterolateral	-	78%
Posterior	10%	10%
Prosthesis		
Charnley[a]	100%	67%
FC2 system[b]	-	15%
Sheehan[c]	-	13%
Elite[d]	-	5%

a Standard monobloc cemented femoral component; b Modular (Howmedica); c Monobloc (Howmedica); d Modular ceramic head Charnley (De Puy).

following 48 hours in the Redivac drains. Both years used the same drainage principles and the same time frame for drain removal. The average measured blood loss for both years is shown in Table 3. The transfusion statistics for both years are also shown. The number of unit distribution is shown in Figure 2.

Hospital length of stay

In 1979 the average length of stay was 30.5 days (range 16-111 days) while in 1999 the average stay was 16.2 days (range 9-38 days) (p<0.0001, Mann-Whitney test).

Postoperative complications

Postoperative complications are illustrated in Table 4. No patient had deep-seated wound infection. The infections listed are superficial cellulitis with inflammatory changes and all settled prior to discharge.

Discussion

The average age of patients has not changed nor has the affected side. The male to female ratio was 3:7 in 1979 compared with 5.5:4.5 in 1999. The number of patients □50 years of age undergoing arthroplasty has increased from 6% to 11% reflecting a worldwide trend. Younger patients are now considered acceptable candidates for arthroplasty surgery.[15] The reasons for this include improved range of implants and advances in cementing techniques. Today revision arthroplasty is a less daunting task in the hands of specialist revision surgeons. Hip arthroplasty can now be performed with confidence in younger patients, in the knowledge that survival

Table 3. Measured blood loss and transfusion patterns

	1979	1999
Measured blood loss average and range (ml)	1,225 465-2,910	1,378* 280-3,170
Blood transfusion		
% of patients transfused	100	33
Average units transfused	2.82	1.66^
% Autologous donation	-	36
(% of these transfused)	-	15
% Patients cross-matched for 2 units or more	100	63
(% of these transfused)	100	18
Group and hold	-	1
Total blood units available	282	191
Total blood units used	282	55

* p=0.0118, Mann-Whitney U test; ^ p<0.0001, Mann-Whitney U test.

Table 4. Postoperative complications

Complications	1979 %	1999 %
Deep venous thrombosis	7	1
Pulmonary embolism	6	1
Thromboembolic complications	13	2*
Superficial wound infection	4	5
Urinary tract infection	3	4
Dislocation in-patient	2	2
Medical	5	4

*p=0.0083, Unpaired t test

figures predict that one or two revision procedures will last the patient a lifetime.

The indications for surgery have changed little with osteoarthritis predominating. Modes of anaesthesia have changed, however, with 92% of patients receiving spinal anaesthesia in 1999. The approaches to surgery has also changed with almost 78% of hip arthroplasty now being performed via the anterolateral approach as opposed to 90% trans-trochanteric 20 years ago. The posterior approach is only used by 10% of surgeons and the Charnley trans-trochanteric approach in 12% of cases in 1999. There was no change in early dislocation rates despite the shift towards an anterolateral approach. The reason for the shift in approach is more difficult to assess. Despite the variety of implants in current use, the Charnley prosthesis is still the most popular (67%). The cost of the prosthesis has changed little from €204 (IR£161) in 1979 to €490 (IR£386) in 1999.[16]

The average blood loss was almost 150ml less in 1979 despite modern advances in hypotensive and dry field surgery. Friedman reported a transfusion rate of 81% in 1979 with an average of 2.8 units per patient.[17] More recently Benjamin[18] reported that 61% of US patients pre-donate autologous blood, which is almost double this study's rates but almost 50% of autologous blood was not used, a finding mirrored in this study.

The volume of blood transfusion has dropped from 2.81 units per patient in 1979 to 1.66 units in 1999. The amount of autologous and allogeneic blood wasted in 1999 was 136 units for the group of 100 patients. This costs an average of 127 (IR£100) per unit in mismanaged blood. The haemovigilance officer now has responsibility for monitoring blood usage and it is hoped that this wastage of blood products can be reduced.

The average length of stay has almost halved in the 20-year period. Patients were commonly admitted for three to four

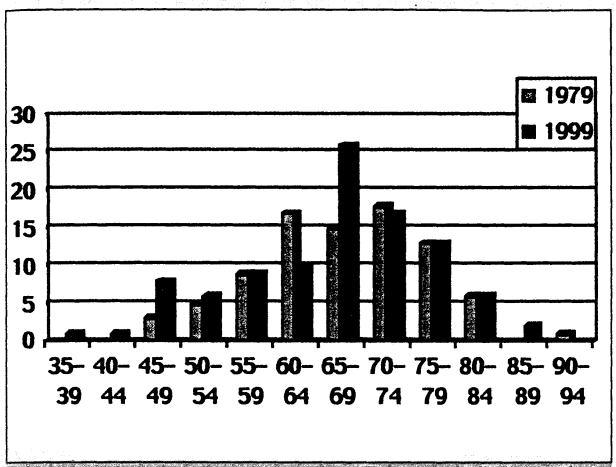

Figure 1. Age distribution

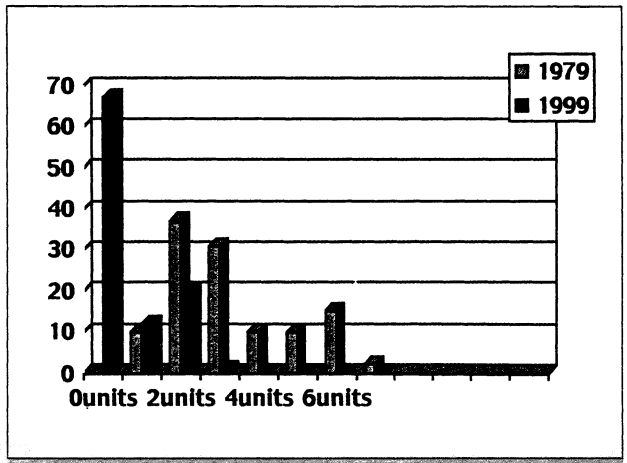

Figure 2. Percentage of patients receiving units

days prior to surgery in 1979 and were not mobilised until four or five days postoperatively. Mobilisation was highly dependent on nurse ratios and less so on subspecialties such as physiotherapists, whose availability was limited. Once patients were independently mobile with aids they were transferred to nursing homes for further convalescence. Now patients are admitted two days prior to surgery and mobilised at 48 hours postoperatively with the aid of a dedicated physiotherapy and occupational therapy department. Almost 75% of patients are now transferred to specialised convalescence centres for further care, all being fully mobile with walking aids prior to discharge from hospital. In 1979 patients began to be medically assessed two weeks prior to surgery. Now, any patients felt to have medical problems at initial booking consultation are referred to a preoperative anaesthetic or medical clinic based in the hospital for investigations and management.

There was a decrease in the incidence of thromboembolic complications over the 20-year period. The incidence of pulmonary embolism decreased from 6% to 1%, while the incidence of symptomatic DVT dropped from 7% to 1%. This reflects international data.[19,20] The diagnosis of thromboembolic events has remained essentially unchanged over the intervening period with pulmonary embolism being confirmed with ventilation/perfusion scanning and DVT diagnosed by ascending venography. Some patients in the latter series had DVT confirmed with Doppler ultrasound scanning.

In 1979, graduated compression stockings were the only form of prophylaxis used against thromboembolic complications. Advances in our understanding of this problem in the intervening time has not led to consensus on the optimal prophylactic regime for thrombosis prevention. Current modalities used in Cappagh include compression stockings, low molecular weight heparin, warfarin and venous foot pumps, used alone or in combination. Each surgeon has his or her own individual protocol. Improved operative and anaesthetic techniques have contributed to the reduction in the incidence of thromboembolism.[21]

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