Staged bilateral hip or knee arthroplasties

FR Hashmi, K Barlas, CF Mann, FR Howell
Department of Orthopaedics, Diana Princess of Wales Hospital, Scartho Road, Grimsby, North East Lincolnshire, United Kingdom

ABSTRACT

Purpose. To compare the operating time, amount of blood transfused, length of hospital stay, and early complications (within 6 months) between 2-week staged bilateral arthroplasties and matched randomised controls undergoing unilateral arthroplasties.

Methods. From October 1992 to October 2000, 90 patients who underwent bilateral hip or knee arthroplasties with a 2-week interval were compared with matched randomised controls undergoing unilateral arthroplasties. A single surgeon performed all procedures.

Results. After the match-up process, 30 pairs of patients were included in the analysis. There were no significant differences in the operating times, amount of blood transfused, and early complication rates. The mean difference in length of hospital stay was significant ($t = -3.552$, df=29, $p<0.001$).

Conclusion. Compared to staged procedures with an interval months apart, staged sequential arthroplasty with a 7- to 10-day interval during one hospital admission is more efficient, as it facilitates earlier rehabilitation without higher complication rates, and entails shorter hospital stays.

Key words: arthroplasty, replacement, hip; arthroplasty, replacement, knee

INTRODUCTION

Arthropathy of the hip or knee is often bilateral. It is a common practice to treat bilateral procedures separately, with an interval of several weeks to months. One-stage bilateral arthroplasties (either simultaneously or sequentially/synchronously) are indicated when severe deformity, symptomatology, patient requests, or social pressures are present.\(^1\)\textsuperscript{-15} Simultaneous bilateral arthroplasties have shown excellent results, with complication rates no higher, or even lower, than staged procedures.\(^1\)\textsuperscript{-12,14} However, these studies had no clear exclusion criteria, and
patients considered too infirm for simultaneous bilateral surgery were excluded.

Scheduling for major surgery may be complex and require additional personnel and equipment. Surgeries can be staged months apart with separate admission, or weeks apart with a single or 2 combined admissions. Our practice has been one admission with an interval of 10 days to 2 weeks. Its advantages include: (1) prevention of recurrent contracture of the first operated joint due to existing deformity of the other joint; (2) rehabilitation not being hindered by the unoperated joint; (3) facilitation of operative scheduling and planning to allow efficient use of resources; (4) no increase in complication rates; (5) patients and families having to deal with social factors such as a home care package once only.

We compared the operating time, amount of blood transfused, length of hospital stay, and early complications (within 6 months) of our patients with matched randomised controls undergoing unilateral procedures.

MATERIALS AND METHODS

From October 1992 to October 2000, 90 patients underwent bilateral primary total hip or knee arthroplasties within an interval of 10 days to 2 weeks—sufficient for wound healing and recovery. Each patient was matched to a control undergoing the same unilateral procedure during the same period. All bilateral and unilateral arthroplasties were performed by a single surgeon. The criteria for matching in descending order of importance were: (1) type of arthroplasty (e.g. cemented Charnley THA [DePuy, Leeds, UK], cemented Insall-Burstein II TKA [Zimmer, Swindon, UK], or uncemented ABG THA [Howmedica, London, UK]), (2) diagnosis (e.g. osteoarthritis, rheumatoid arthritis, or psoriatic arthropathy), (3) age (±2 years), and (4) sex. Data were collected from multi-disciplinary hospital notes.

A supine position and an anterolateral approach were used for all hip arthroplasties; a standard medial parapatellar approach without a tourniquet was used for all knee arthroplasties. The first wound was covered by an occlusive dressing during the second procedure. The prostheses were implanted with cephalosporin prophylaxis. Standard instrumentation and techniques were used and Palacos cement with gentamicin (Schering-Plough, Welwyn Garden City, UK) was used. The patella was not resurfaced. Wounds were closed and suction drains removed within 48 hours. Dressings were changed on the second postoperative day, and thereafter when required. Culture swabs were taken if appropriate. No chemical thromboprophylaxis was used. Below-knee compression stockings were worn throughout. Patients were mobilised within 48 hours and followed up at 6 weeks, 3 months, and 12 months after discharge.

We hypothesised that there were no differences between the 2 groups in operating time, amount of blood transfused, and length of hospital stay; the values in the bilateral group were expected to be twice those in the control group. A ratio of bilateral:unilateral (R) would be equal to 2 in each case. The actual ratio values were compared against a hypothesised mean R value of 2 using a t test. The occurrence of complication in the 2 groups was compared using McNemar’s test (applicable to dichotomous data), while the number of complications was tested using Wilcoxon matched pairs.

RESULTS

The patients’ ages, diagnoses, and operations were similar in the 2 groups. After the match-up process, 30 pairs of patients were included in the analysis. In the bilateral group, surgeries were undertaken at a mean interval of 10.3 (range, 7–19) days. 72 patients were 10 days apart, 18 were scheduled around public holidays (9 days apart [n=6], 11 days [n=5], 13 days [n=4], and 14 days [n=3]). In the bilateral group, 54 patients received epidural anaesthesia, 21 received general anaesthesia, and 15 had an epidural for one side and general anaesthesia for the other. In the control group, 39 patients received epidural anaesthesia and 51 received general anaesthesia.

The 2 groups were matched for 3 variables: age (Student’s t test= –0.45, p=0.65), gender (χ²=0.069, df=1, p=0.79), and type of arthritis (osteoarthritis/rheumatoid or other; χ²=0.093, df=1, p=0.76). The proportion of patients having epidural versus general anaesthesia in the 2 groups was not significantly different (first procedure, p=0.119; second procedure, p=0.067). By design, the type of operation was not a matched variable.

The mean operating time in the bilateral and control groups were 100 minutes (50 minutes each) and 56 minutes, respectively. The R was 1.85 (95% confidence interval [CI], 1.66–2.05); the mean difference was -0.15 (95% CI, -0.22–0.07), which was not significant (t=-1.564, df=29, p=0.129).

The mean amounts of blood transfused in the bilateral and control groups were 4.5 units (2.25 per procedure) and 2.57 units, respectively. The R was 1.88 (95% CI, 1.64–2.13); the mean difference was
The mean hospital stay in the bilateral and control groups were 28.0 (median, 26; range, 14–53) days and 12.2 (median, 11; range, 7–36) days, respectively. The \( R \) was 2.54 (95% CI, 2.24–2.85); the mean difference was 0.54 (95% CI, 0.23–0.85), which was significant \( (t = -3.552, df=29, p<0.001) \). Even when a case of unusual long stay of 53 days in the bilateral group was excluded, a significant difference remained \( (R=2.53; 95\% \text{ CI}, 2.21–2.85) \); the mean difference was 0.53 (95% CI, 0.21–0.85; \( t = -3.358, df=28, p=0.002) \).

The minimum follow-up period was 6 months, maximum being 8 years; there was no significant difference between the 2 groups. The null hypothesis held—both in terms of patients with or without complications (McNemar’s test, \( p=1.00 \)) and in terms of number of complications (Wilcoxon matched pairs signed ranks test, \( p=0.83 \)). In the bilateral group, 8 patients had 10 complications, which amounted to 17% of procedures. There were no deaths, suspected deep venous thromboses or thromboembolic events, and no deep-seated wound infections. One patient developed a mechanical complication associated with her first knee replacement. The prosthesis dislocated in flexion and the tibial tray was replaced for a larger size 4 months after the operation. Three patients encountered superficial wound problems; 2 had leaking wounds without microbiological infection and were treated with dressing only, and one developed pulmonary basal lung collapse and pyrexia after the first procedure, which resolved following intensive physiotherapy without antibiotic use. An 83-year-old woman developed a single pressure sore on the heel. One patient developed acute-on-chronic renal failure after the second arthroplasty, which resolved without dialysis and another had an episode of postoperative urinary retention.

In the control group, 9 patients encountered 9 complications during hospital stay, which amounted to 30% of procedures in 30% of the patients. One patient developed mild symptoms suspected to be due to pulmonary embolism, the ventilation-perfusion scan being consistent with this diagnosis. She was immediately anticoagulated and discharged 14 days postoperatively (taking warfarin for the next 3 months). Another developed a deep wound infection in her uncemented hip replacement and ultimately required a 2-stage revision. She stayed in hospital for 36 days. There were no deaths.

**DISCUSSION**

Simultaneous bilateral arthroplasties under a single anaesthesia has been associated with a higher mortality than unilateral arthroplasty.\(^1\)\(^-\)\(^3\)\(^,\)\(^5\) Blood loss is greater in bilateral procedures, so is the risk of fat and bone marrow embolism.\(^7\)

Bilateral arthroplasties with a 2-week interval were not significantly different from unilateral arthroplasties in terms of complications (among patients with or without complications and with respect to the number of complications).

Hypercoagulability is known to persist 2 weeks following major surgery, but this did not translate into a higher thromboembolic rate in the bilateral group. It is difficult to compare early complication rates for bilateral lower limb arthroplasties (simultaneous or staged), because of different study designs and criteria. The rates vary from 9 to 58% for simultaneous procedures and from 9 to 83% for staged procedures.\(^1\)\(^-\)\(^3\)\(^,\)\(^5\)\(^-\)\(^15\)

Hospital stay is a major contributing factor in the overall costs of joint replacement.\(^14\) The mean hospital stay for simultaneous and staged procedures varies widely. There has been a cost-driven trend towards shorter hospital stay. The median and range of hospital stay may be more informative than the mean value. The mean hospital stay was reported to be between 10 and 33 days for simultaneous procedures, whereas it was 20 to 53 days in total for staged procedures.\(^1\)\(^-\)\(^3\)\(^,\)\(^5\)\(^-\)\(^15\)

Our 10-day staging did lead to longer hospital stays than the matched unilateral procedure (28 vs 24.4 [12.2x\(2\) days). Nonetheless, when additional financial and social costs associated with an extra admission and discharge and additional community support for convalescence are taken into account, 10-day staging is not considerably more expensive than traditional staging of bilateral surgery in 2 admissions.

Compared to staged procedures with an interval months apart, our patients benefit from coming into hospital and being discharged only once. Rehabilitation after the first procedure is not held up by existing deformity of the opposite side awaiting a second procedure. Our findings support the practice of staged sequential arthroplasty with a 7- to 10-day interval during one hospital admission.

**REFERENCES**