

COST EFFECTIVENESS OF BILATERAL SIMULTANEOUS VERSUS STAGED KNEE ARTHROPLASTIES

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ABSTRACT

Objective: To evaluate the cost effectiveness of bilateral simultaneous knee arthroplasty in experienced hands.

Material and Methods: This descriptive study was done in the Shotley Bridge General Hospital county Durham England from 2000-2003 on 26 patients undergoing bilateral simultaneous knee arthroplasty. Patients were randomized in two equal groups. Group A included 13 patients and had staged knee arthroplasty i.e. they had the same procedure in two hospital admissions under different anesthetic session. Group B comprised of 13 patients, underwent simultaneous knee arthroplasty. Same type of knee prosthesis was used in all cases and were operated by same surgeon in same institution.

Results: In group A, 9 (69.2%) patients had osteoarthritis and 4 (30.8%) had rheumatoid arthritis while in group B twelve patients had osteoarthritis and one had rheumatoid arthritis. Only one patient had transient ischemic attack in group A while there was one case of deep vein thrombosis in group B. Average hospital stay for both groups was 15 days. The average cost for group A was Sterling £ 8950/- (Rs.1163500/-) and for group B was Sterling £ 5265/- (Rs.684450/-).

Conclusion: This study shows that bilateral simultaneous arthroplasty is cost effective in experienced hands and do not have increased rate of complications.

Key Words: Arthroplasty, Knee, Simultaneous, Staged.

INTRODUCTION

Arthritis of the knee due to degenerative or rheumatoid involvement is quite common and often bilateral¹. According to one survey in UK in three health authorities 15 out of 63 orthopedic surgeons who performed regular knee replacement would consider bilateral knee replacement under the same anesthetic session². Currently, more than 315,000 total knee replacements are performed annually in the United States in the Medicare population alone³.

It is a common practice to treat bilateral procedures separately, with an interval of several weeks to months¹. One-stage bilateral arthroplasties (simultaneously) are indicated when severe deformity, symptomatology, patient requests, or socio-economic pressures are present. Its advantages include: (1) prevention of recurrent contracture of the first operated joint due to existing deformity of the other joint;⁴ (2) rehabilitation not being hindered by the unoperated joint;⁵ (3) facilitation of operative scheduling and

planning to allow efficient use of resources;⁶ (4) no increase in complication rates⁷ (5) patients and families having to deal with social factors such as a home care package once only.^{1,8}

According to an early study there were increased rate of complications associated with simultaneous procedure. These concerns are not substantiated by other recent studies.^{9,10}

In an era when the government is under increased social and economic pressures and clinical decisions are being made under these pressures, this procedure focuses on economic costs, patient satisfaction, and quicker return to function as compared with bilateral staged total knee arthroplasty¹¹. Our study focuses mainly on the cost effectiveness of bilateral simultaneous knee arthroplasty as compared to stage knee arthroplasty.

MATERIAL AND METHODS

A total of 26 patients were studied prospectively in the Shotley Bridge General Hospital county Durham England. They had

bilateral joint arthritis and had their joint replacement done between 2000 and 2003.

Group A included 13 patients and had staged knee arthroplasty i.e. they had the same procedure in two hospital admissions under different anesthetic session. Group B comprised of 13 patients, underwent simultaneous knee arthroplasty.

Patients were admitted a day before operation. They were given Dextran infusion for thromboprophylaxis and three doses of intravenous cephalosporin antibiotic perioperatively. The operative time was calculated from the case notes by difference in time patient was brought in theatre to the time patient was transferred from the recovery room to ward.

The knee replacement operation was done by standard midline approach under tourniquet. In case of simultaneous knee operations both knees were prepared and draped at the same time. The surgical team re-scrubbed for the second operation, although same instruments tray were used. All knee arthroplasties were cemented. Same type of knee prosthesis (A.G.C. Biomet) was used in the entire study. All the knee operations were done by the same surgeons in the same institution.

Standard post operative physiotherapy sessions were arranged. Data regarding age, primary condition, number of days in hospital, blood transfused, theatre time, complications if any was collected.

Total cost of the operation in both categories was calculated. As our study was mainly to assess the cost and operative complications, we did not record the follow up, which has been documented by others⁹.

RESULTS

Both groups had equal number of patients (n=13 each). The mean age in both groups was 69 years. There were 21 patients with osteoarthritis and 5 patients with rheumatoid arthritis.

The theatre time in each category was about 1:20 hours in group A and 2:50 hours in group B. There was no statistically significant difference in the operating time in the two groups. The amount of blood transfused was recorded in each group. The amount transfused was more in simultaneous group (group B) than staged group (group A). The numbers of days spent in hospital were 14.4 in group A per knee while it was 15 in group B per two knees which is significantly lower in the group B and consequently the cost involved was also significantly low. The average cost for group A was Sterling £ 8950/- (Rs.1163500/-) and for group B was Sterling £ 5265/- (Rs.684450/-). (Table 1)

The complications were also assessed separately in each group. One patient in the group A had episode of Transient Ischemic Attack (TIA) which resolved spontaneously (Table 2). There was one case in group B who had proven thromboembolism on venogram that was heparinized by standard regimen and was successfully managed.

TOTAL COST PER OPERATION PER PATIENT (STERLING POUNDS)

Item	Staged arthroplasty (Group A)	Bilateral simultaneous arthroplasty (Group B)
Cubicle	708	354
Ward	4186	2093
OPD/Visit	340	170
Hb	5.72	2.86
Cross Match	8.44	4.22
U & E	6.52	3.26
Microbiology	36.64	18.32
X-rays	336	168
ECG	9.86	4.93
> 1 hour	900	450
Prosthesis	1580	1580
Physiotherapy	456	228
Occupational Therapy	376	188
TOTAL	8950	5265

Table 1

DISCUSSION

Simultaneous bilateral knee arthroplasty is cost effective because it reduces hospital stay, cost and complications¹². Patient is mobilized early¹. While in staged knee arthroplasty, the cost is doubled apart from the stress of another operation and complication of prolonged hospital stay¹. A study done by Stubbs G et al, showed that statistically there is no difference in the incidence of surgical and medical complications in any group¹³. In our study it is also evident that complication in both groups is the same. The complication rate in each group in our study was 7.69% while it is 6.9% in Feinglass J et al¹⁴ study and 10% in Hadjianastassiou et al¹⁵ study. Patients with age more than 70 years had many complications with bilateral simultaneous knee arthroplasty¹⁶, but in our study average age of the patients were 69 years and this may be the reason of low complication rate.

According to Radmer Setal¹⁷ simultaneous bilateral total knee arthroplasty under one anesthesia session in patients with rheumatoid arthritis facilitates a much quicker rehabilitation, while the overall perioperative risk is not increased. No increase in the frequency of operative and postoperative complications was found as only one of our patients had got deep venous thrombosis in simultaneous group (group B) and another one had TIA in staged group (group A) while Hashmi et al¹ document ten complications in seven patients. Shah K et al¹⁸ is of the opinion that bilateral simultaneous knee replacement using a cementless mobile-bearing implant is as safe as a unilateral knee replacement. Some studies suggest that the absence of established patient selection criteria, thresholds for assessment of the increased risks¹⁶, the patient having simultaneous bilateral replacement faces an increased risk of perioperative mortality and morbidity on a random basis^{19, 20}.

The mean hospital stay in our study was 15 days while it was 28 days Hashmi FR et al¹ study. The blood transfusion required for group B is double as compared to group A and this is also substantiated by the study of Walmsley Pet al²¹.

With appropriate patient selection, bilateral total knee replacement performed under a single anesthetic is a safe and cost effective method to treat bilateral arthritis of the knee⁸.

CONCLUSION

Simultaneous bilateral total knee arthroplasty has the benefit of single anesthetic, reduced costs and decreased total recovery time when compared to a staged bilateral procedure.

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COMPLICATION IN STAGED JOINT REPLACEMENT AND BILATERAL SIMULTANEOUS JOINT REPLACEMENT

PARAMETERS	GROUP A (STAGED JOINT REPLACEMENT)	GROUP B (SIMULTANEOUS JOINT REPLACEMENT)
No of Patients	13	13
Average age	70	69
Disease	OA = 9 RA = 4	OA = 12 RA = 1
Average days in hospital	15	14.4
Average Preoperative Hemoglobin	12.8	13.5
Average Postoperative Hemoglobin	11.6	11.6
Average Blood Transfusion	2	4.5
No. of cases with Complications	1 TIA = 1	1 DVT = 1

OA: (Osteoarthritis), RA: (Rheumatoid Arthritis), TIA: (Transient Ischemic Attack), DVT: (Deep Vein Thrombosis)

Table 2

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