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ORIGINAL RESEARCH

Cardiac morbidity in patients undergoing hip arthroplasty

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Abstract

Aim

The purpose of this study is to evaluate the risks and perioperative cardiac morbidity connected with bilateral hip arthroplasty in individuals with arthritis brought on by inflammatory arthropathy.

Methods

Data of patients who underwent BHA between June 2015 to June 2022 for inflammatory arthritis were extracted from a database, for peri-operative complications and functional improvement. BHA for other causes was excluded.

Results

Data from 84 consecutive patients were analysed, with a mean age of 34.5 years. A median follow-up of 2.4 years was used. 14% of patients had rheumatoid arthritis, whereas 66% had ankylosing spondylitis. 50% of the patients had bilateral hip fusion, and 34% had flexion deformity greater than 30 degrees. None of the patients experienced cardiac or pulmonary problems following surgery. 2.4% of patients experienced per-operative hypotension (PCV36% had a noticeably decreased probability of receiving >1 unit of blood transfusion; p=0.02). 6% of patients required ICU admission, largely for post-operative monitoring. There were no infections, dislocations, or deaths in these patients, however one required a wash-out due to a local hematoma. From a mean of 26.5-85, the modified Harris hip score increased. Following surgery, the mean hip flexion increased from 32° to 92°.

Conclusions

In a multidisciplinary context, BHA for inflammatory arthritis can be carried out with the least amount of difficulties. To lower transfusion rates, PCV of >36 is indicated prior to surgery.

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Keywords Stiff hip, Bilateral hip arthroplasty, Ankylosing spondylitis, Infammatory arthritis, Morbidity

Introduction

Polyarticular inflammation arthritis typically results in severe functional impairment. Early diagnosis and treatment of the arthropathy can reduce the need for surgical intervention. Many people delay seeking therapy because they don't know enough about the condition, and when they do, they often have severe bilateral hip arthritis that needs to be treated surgically. Despite conflicting findings on the safety profile of bilateral sequential arthroplasty, major potential benefits, such as a single anaesthesia, a shorter hospital stay, fewer overall expenses, and a single rehabilitation phase, have been documented [1–5].

Other research, however, has indicated a higher risk of complications with bilateral sequential total joint arthroplasty; the most frequently mentioned complications are an increased need for blood transfusions, a higher risk of pulmonary embolism, cardiac complications, and other systemic complications [6, 7]. The drugs used to treat the condition represent an extra danger to individuals with inflammatory arthritis, including an increased risk of infection and perioperative haemorrhage [8]. Additionally, the bones are severely osteoporotic and the hips are frequently fused or severely malformed. Critics claim that the hazards would be excessive under such circumstances. Many surgeons choose to err on the side of caution and offer a phased approach in inflammatory arthritis due to this variation in reported safety.

We have been executing bilateral sequential hip replacements for patients with inflammatory arthritic hips over the past few decades, including those with fused hips and flexion abnormalities in the same sitting. At a multidisciplinary team meeting, all patients are discussed with input from the rheumatologist, anaesthesiologist, orthopaedist, and the rehabilitation unit. The goal of this study was to evaluate the postoperative and cardiac morbidity risks of hip arthroplasty in these complicated hips.

Materials and methods

This report describes 84 patients who received bilateral sequential total hip arthroplasty for infammatory arthritis between 2021 and 2022 at a tertiary care facility in India. Patients who underwent a staged surgery under two different anaesthetics, as well as those who underwent sequential arthroplasty for arthritis attributable to other diseases such infection, dysplasia, or avascular necrosis due to other reasons, were excluded from the study. All information was recorded into a database along with parameters for functional and clinical improvement, transfusion rates, and perioperative local and systemic problems. Following a review of every patient every day for the first 12 to 14 days, follow-up information was gathered after six months. The Institutional Review Board granted the retrospective study ethical permission. The anaesthetist chose between spinal-epidural and general anaesthesia based on the pre-operative evaluation and ASA grading.

There were intra-operative problems such as desaturation (SpO2 90%), arrhythmias, and hypotension (mean arterial pressure (MAP) 50 mmHg for more than 5 min) [9]. There

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have been reports of peri-prosthetic fractures and dislocations, haemorrhage, wound breakdown, infections, and peri-prosthetic complications. Deep vein thrombosis and systemic problems like pulmonary embolism, myocardial ischemia, cerebrovascular damage, urinary retention, pneumonia, paralytic ileus, and electrolyte imbalance were observed during the perioperative period. Perioperative blood loss, ICU admission rates, blood transfusion rates, readmission rates, and mortality rates were among the other factors evaluated. Patients only received blood transfusions after surgery if their packed cell volume (PCV) was 22% or 24% and they were exhibiting symptoms. Based on perioperative blood loss and the clinical condition, the anaesthetist decided whether to do a per-operative transfusion.

The Rheumatologist, Orthopaedist, and Physical Medicine and Rehabilitation department all reviewed every patient daily for the first 12 to 14 days, and then at six months, they checked in to see how they were doing. The modified Harris Hip Scores [10] were used for the functional assessment, and at each subsequent outpatient clinic appointment, the improvement in range of motion and residual deformity were evaluated.

The complication rate was compared to categorical variables using the chi-square test. For the result of complications with confounding variables, logistic regression was utilised. Odds ratios without adjustment were presented along with a 95% confidence interval. Statistical significance was defined as a p value 0.05. Data were examined using SPSS version 23's statistical software.

Results

Between September 2021 and September 2022, 117 patients underwent sequential bilateral total hip arthroplasty procedures at our facility. Of these, 84 patients (168 joints) exhibited infammatory arthropathy-related arthritis. The patients' average age was 34.5 years (range 16–76). All patients—all but one—were under the age of 70. Preoperative P.C.V. was 34.8 on average (IQR 28–48). Table 1 displays the types of infammatory arthritis and the comorbidities that go along with it. Table 1 also displays the ASA risk assessment and the type of anaesthesia administered.

Of the patients in the study, 42 (or 50%) had bilaterally fused hips. One hip was fused in 11 (13%) individuals, while the other had painfully restricted flexion (range 20–70°). Although the remaining 31 (37%) patients' preoperative hip motion ranged from 20° to 80° of flexion, bilateral hip replacement was done because both hips were uncomfortable and severely impaired their ability to function. 29 (34%) patients had a permanent flexion deformity of greater than 30 degrees, of whom 15, or more than 50 degrees, in 15 individuals. Preoperative hip flexion was on average 32 degrees, while postoperative hip flexion was 92 degrees (range 45–110). At the time of operation, 4 (2.5%) hips required femoral shortening osteotomies for reduction due to considerable preoperative limb shortening, and 16 hips (9%) required bone grafting for the protruding acetabulum. Patients with advanced rheumatoid arthritis had the last four hips.

12 patients (14.3%) had concomitant knee flexion abnormalities; 7 had bilateral and 5 had unilateral deformities. These 12 patients had a mean flexion deformity of 21.57°. None of them needed surgery because the knee abnormalities were reduced to less than 10° post-

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operatively with physiotherapy and casting. All patients with fused hips experienced an overall incidence of intra-operative complications of 3.5%. One patient experienced a desaturation of SpO2 90% during surgery, while two (2.4%) patients experienced hypotension (MAP 50 mmHg for >5 min). There were no perioperative cardiac arrhythmias in any of the patients.

Following surgery, the mean haematocrit decreased by 9.3%. The post-operative PCV was 26.5%, while the median pre-operative PCV was 34.8% (IQR 28-48). (IQR 24.4–29.8). Only 26 out of the 84 patients (about 33%) needed blood during the perioperative phase. Seven patients (8%) and 30 (35%) patients, respectively, each required the transfusion of more than one unit of blood and more than two units of blood during surgery. More than one blood unit was needed by 18 of the 53 patients (34%) who had ankylosed hips, compared to 12 of the 31 patients (39%) who did not have fused hips. In this series, the occurrence of bone fusion did not affect the transfusion rates, as evidenced by the difference's lack of statistical significance (95% CI 0.32-2.04, p=0.66) (Table 2). The transfusion rates were unaffected by the existence of a flexion deformity, with 20 of 55 patients without flexion deformities needing more than one unit of blood, as opposed to 10 of 29 patients with flexion deformities greater than 30° (95% CI 0.35-2.3, p=0.86). The beginning PCV had a significant impact on the transfusion rates. Those with a beginning PCV of less than 36% had 3.28 times the likelihood of having more blood than a unit.

Systemic side effects such perioperative pulmonary embolism, pneumonia, myocardial infarction, urine retention, paralytic ileus, or cerebrovascular events were not experienced. The study's total incidence of HDU admission was 6%. As the length of the surgery increased, two patients were admitted for monitoring. One patient was admitted for a delay in extubating after surgery and the other patient was admitted for monitoring of aberrant metabolic indicators after surgery. None needed ventilation after surgery. A Modified Harris Hip Score was applied at each review to evaluate the patients' functional outcomes, both before and after surgery [10]. The post-operative hip score was 85 while the mean Modified Hip Score prior to surgery was 26.5 (within a range of 4-6). (Range-71–92). None of the patients required revision or experienced radiological loosening during this brief follow-up.

Table 1: Patient demographics

Number of patients (hips)	84 patients (168 hips)
Male: female	69:25
Mean age (range)	34.5 years (16–76)
Diagnosis	
Ankylosing spondylitis	55 (66%)
Rheumatoid Arthritis (RA)	12 (14%)
Psoriatic arthropathy	5 (6%)
Juvenile infammatory arthritis	3 (4%)
Systemic lupus erythematosus	2 (2.5%)
Other undifferentiated infammatory arthritis	7 (8%)

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

Other Comorbidities	
Diabetes	3 (4%)
Hypertension	12(15%)
Ischemic heart disease	2 (2.5%)
Asthma	2 (2.5%)
Chronic kidney disease	2 (2.5%)
No other comorbidity	67 (80%)
Type of anaesthesia	
GA	72 (86%)
Spinal/epidural	12 (14%)
ASA grading	
ASA 1	13 (16%)
ASA 2	65 (77%)
ASA 3	6 (7%)

Table 2: Logistic regression analysis for risk of transfusion of more than one unit of blood

Variables	>1 unit (n=30)	≤1 unit (n=54)	Odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Ankylosed hips (yes)	18 (60.0%)	35 (64.8%)	0.81 (0.3–2.0)	0.81 (0.3–2.2); p=0.66
Flexion deformity (≥30°)	10 (33.3%)	19 (35.2%)	0.92 (0.4–2.4)	1.07 (0.4–3.1); p=0.86
Starting PCV (≤36)	23 (76.7%)	27 (50.0%)	3.28* (1.2–8.9)	3.29 (1.2–8.9); p=0.02

Discussion

There is a substantial body of research that shows single-stage bilateral hip arthroplasty is a safe operation when carried out on a small number of patients [1–5]. The risk of complications during a single-stage procedure was found to be reduced in patients under the age of 75, those without risk factors including cardiovascular disease or respiratory impairment, and those with low comorbidities (ASA 1 and 2) [1–5]. However, nothing is known about the effectiveness and safety of bilateral sequential hip replacements in individuals with infammatory arthritis.

Even though the average age of the participants in our study was young, 34 years old, the majority of them had complicated hip diseases. 35% of the patients had a fixed flexion deformity greater than 30°, and 66% of the patients had fused hips. This is a group of people who have a higher chance of developing complications following surgery. Additionally, there is a higher risk of bleeding and infection with the drugs used to treat inflammatory arthritis. Therefore, in this situation, it was vital to assess the safety of bilateral sequential hip surgery.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

With the anterior method to osteotomized the neck and the posterior approach to ream and implant the cup, Li et al. and Bhan et al. adopted a dual strategy to treat the fused hips in ankylosing spondylitis [11, 12]. Since the osteotomy and cup implantation could be done through the same procedure, we discovered the anterolateral approach to the hip to be simpler. The dual technique may be more suitable for surgeons who have only had training in the posterior approach since the hips are frequently fused in a flexed, abducted, and externally rotated posture, making it challenging to osteotomized from the posterior. With the modified anterolateral technique, none of our patients experienced dislocations, in contrast to Bhanet al who reported a 4% dislocation rate with the dual method [11].

There is a higher risk for dislocation in patients with fused hips because they frequently have restricted spino-pelvic mobility, which affects the anteversion of the cup [13, 14]. The challenge of getting the patient into the lateral posture introduces an extra risk. To lower the likelihood of dislocation, some surgeons recommend using dual mobility [15]. This study suggests, however, that in arthroplasty for hips fused as a result of inflammatory arthritis, this is not necessary. Given the altered spino-pelvic rotations, it is perhaps more crucial to position the cup and stem correctly.

In this trial, blood loss was a substantial morbidity, and 35% of patients needed more than one unit of blood. But only one-third of those getting bilateral hip replacements needed any blood transfusions. The fact that neither the presence of flexion deformities nor bone ankylosis affected the transfusion rates in this series suggests that surgery is generally safe when performed in a multidisciplinary environment. If the pre-operative PCV was less than 36%, there was a 3.3 times increased chance that more than one unit of blood would be needed during the healing process. These transfusion rates are consistent with previous bilateral hip replacement series that also include patients with additional diseases [6, 7]. In this study cohort, there was a minimal incidence of postoperative sequelae such hypotension and desaturation. There were also no post-operative cardio-pulmonary issues, which are frequently connected to such bilateral arthroplasty procedures.

Conclusion

The study's findings suggest that bilateral sequential hip arthroplasty in these patients can be safe when carried out in a multidisciplinary context, despite the hazards associated with inflammatory arthritis. Patients with a pre-operative PCV of less than 36% had a much-increased risk of transfusion, according to research. Furthermore, when performed in a suitable context, the risk of dislocations, infections, and other post-operative problems is low.

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ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

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