ORIGINAL STUDY

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Unilateral versus simultaneous bilateral total hip arthroplasty. The Belgian experience

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Bilateral hip osteoarthritis is frequent. The safety and patient selection of simultaneous bilateral total hip arthroplasty (SBTHA) is still debated. The purpose of this article was to share our experience and assess if performing SBTHA carries more risk than unilateral total hip arthroplasty (UTHA). Methods: A retrospective data analysis was performed on 468 patients who underwent either UTHA (418 patients) or SBTHA (50 patients) using a direct anterior approach between June 2016 and December 2020. Apart from SBTHA patients being significantly younger, there was no significant preoperative difference in demographics, comorbidities, surgical variables and biological values between the two groups. Primary outcomes were 90-days emergency room (ER) visit and readmission, as well as 90-days minor and major complications. Secondary outcomes were length of stay (LOS), operative time and blood loss. Results: 90-days ER visit (p=0.244), 90-days readmission (p=0.091), overall complications rate (p=0.376), minor complications (p=0.952) and major complications (p=0.258) were not statistically different between the two groups. Operative time and average LOS were significantly longer in the SBTHA group (p<0.001). Blood loss was significantly higher (p<0.001) in the SBTHA group. However, no difference in the transfusion rate between the two groups was observed (p=0.724). Conclusion: Complication rate, 90-days hospital readmission and 90-days ER visit were similar between the two groups. This study shows that performing SBTHA is a safe, effective, and doesn't carry additional risks for patients with bilateral symptomatic osteoarthritis.

Keywords: bilateral arthroplasty , complication rate, simultaneous surgery, and total hip arthroplasty.

INTRODUCTION

Described as the "operation of the century" by Coventry in 1991, total hip arthroplasty (THA) is one of the biggest success in orthopaedic surgery[1].

Nowadays, approximately one million THA are done worldwide each year and it is estimated that by 2030 the demand for THA will grow by 173%[2,3]. Accounting for 90% of all THA, the prevalence of primary osteoarthritis is 3.1% in the general population and affects both hips in 42% of the patients[2,4,5]. According to the national Swedish registry, 17% of the patients with a primary unilateral THA, will at some point in their life suffer from symptomatic coxarthrosis on the non-operated side, requiring contralateral THA surgery[6].

One-stage or simultaneous bilateral total hip arthroplasty (SBTHA) was first described in 1971 by Jaffe and Charnley[7] and adopted by many surgeons since then.

A recurrent debate is the safety of SBTHA and the criteria for patient selection[8,9].

The aim of this retrospective study was to share our experience and to compare the differences between SBTHA and unilateral total hip arthroplasty (UTHA) in terms of postoperative complications, 90-days emergency room (ER) visit and 90-days hospital readmission as well as operative time, blood loss, transfusion rate, length of stay (LOS).

MATERIAL AND METHODS

After obtaining approval from institution's ethic committee (PM 26/01/2015, B403201523492), one author (BG) performed a retrospective data collection and identified 468 patients operated on for THA by one surgeon (MVC) between June 2016 and December 2020.

All patients met the inclusion criteria of being between 18 and 95 years old and having undergone either SBTHA (50 patients) or UTHA (418 patients).

The selection excluded all patients with THA for hip fractures, dysplasia >grade I of Crowe's classification,

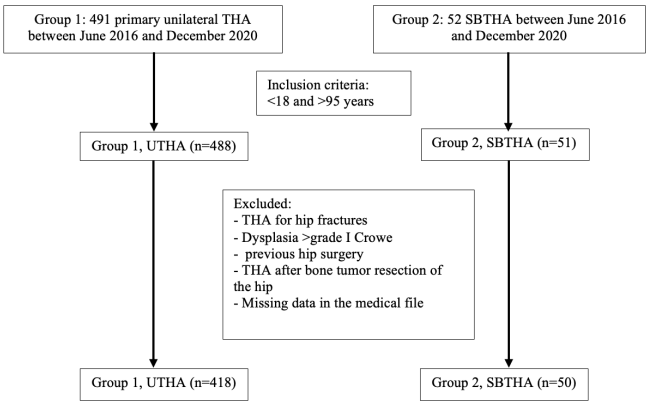

Figure 1. — Flowchart showing patient selection.

previous hip surgery, THA after bone tumor resection and missing data in the medical file (Figure 1).

This study was conducted at a university hospital.

All THA were performed using a direct anterior approach without positioning table (Hueter) under general anesthesia.

Postoperative blood tests were done at day 2 after THA and were compared with preoperative values done in the month preceding the surgery.

All patients received 1g of IV tranexamic acid (TXA) 30 minutes prior to the incision and 500mg 3x/day for 24 hours after the surgery. No suction drain was used.

A restrictive transfusion strategy (Hemoglobin <7g/dl or symptomatic anemia with hemoglobin level >7g/dl) was applied for allogeneic red blood cell transfusion.

Patients baseline characteristics were compared between the two groups. Demographics included age and gender. Comorbidities comprised body mass index (BMI), diabetes, hypertension, and American Society of Anesthesia scores (ASA). Laboratory values included pre- and post-operative hemoglobin (Hb), hematocrit (Hc) and preoperative Albumin (Alb). Operative variables were surgical indication, and administration of TXA.

All demographics and clinical characteristics are pooled in table I.

The primary outcomes were:

– 90-days ER visit
– 90-days readmission
– 90-days major complications
– 90-days minor complications

Secondary outcomes were:

– LOS
– Operative time (skin incision to wound closure).
– Blood loss

Postoperative Hb as well as the difference between pre- and postoperative Hb and Hc, named delta-Hb and delta-Hc, were used to evaluate blood loss.

Statistical analysis

Descriptive analyses were first performed in order to verify the groups homogeneity. To compare pro-

Table I. — Demographic and clinical characteristics of the studied population

Variable	Unilateral THA	Simultaneous Bilateral THA
Patients (n)	418	50
Age (years)	66±14.1* [range 18–92]	59.5±13.6* [range 19–83]
Gender (F:M)	240F (57.4%) : 178M (42.6%)	21F (42%) : 29M (58%)
Side (R:L)	527R (52.7%) : 473L (47.3%)	NA
Body mass Index, (kg/m^2)	27.2±5.5* [range 16–49.5]	26.7±4.5* [range 18.3–36.8]
ASA score: ASA1: ASA2: ASA3: ASA4:	 48 (11.5%) 314 (75.1%) 54 (12.9%) 1 (0.2%)	 3 (6%) 43 (86%) 4 (8%) 0
Diabetes	52 (12.4%)	8 (16%)
Hypertension	204 (48.8%)	20 (40%)
Preoperative anemia	99 (23.7%)	14 (28%)
Preoperative hemoglobin	13.5±1.5* [range 8.6-17.4]	13.8±1.4* [range 10.6-15.8]
Preoperative albumin	44.8±3.2* [range 27-52]	45.6±4.6* [range 32-52]
Surgical Indication	384OA (91.9%) : 34 ON (8.1%)	39OA (78%) : 11ON (22%)
TXA	357 (85.4%)	45 (90%)

*The values are given as the mean and the standard deviation. THA, total hip arthroplasty ; n, number; F, female ; M, male; R, right ; L, left ; NA, not applicable; OA, osteoarthritis ; ON, osteonecrosis ; Tranexamic acid, TXA.

portions of both groups, Z-tests were used for qualitative or discrete quantitative variables. T-tests permitted to compare means of continuous quantitative variables. Normality and variances equality were primarily checked using QQ plots and Shapiro-Wilk test, and Levene's test respectively. If normality was not verified, a Mann-Whitney non-parametric test was used. Chi-squared test was used to compare both groups through contingency tables. All inference tests were two-tailed and p-value below 0.05 was always considered as significant.

RESULTS

Apart from SBTHA patients being significantly younger (59.5 ± 13.6 vs 66 ± 14.1, p = 0.002), there was no significant difference in demographics, comorbidities, operative values and preoperative laboratory values between both groups.

Primary outcomes (table II)

90-days ER visit (p = 0.244) and 90-days readmission (p=0.091) were not statistically different between the two groups.

There were 16/418 (3.8%) versus 2/50 (4%) minor complications and 7/418 (1.7%) versus 2/50 (4%) major complications in the UTHA and SBTHA groups respectively.

If all complications were considered together, there was no significant difference in their 90-days occurrence (p = 0.376) between UTHA and SBTHA groups. Neither the occurrence of minor complications alone (p = 0.952) nor the occurrence of major complications (p = 0.258) were statistically different between the two groups.

Secondary outcomes (table III):

Average LOS (4.1 ± 2.5 vs 5.4 ± 1.6 days) and operative time (60.8 ± 16.6 vs 102.7 ± 21.8 minutes) were significantly longer in the SBTHA group (p < 0.001). Post-operative Hb and Hc were significantly lower and delta-Hb, reflecting blood loss was significantly higher (p<0.001) in the SBTHA (3.8g/dl ± 1.5) compared to the UTHA group (2.56g/dl ± 1.05). However, no difference in the transfusion rate between the two groups was observed (p = 0.724).

Table II. — Primary outcomes

Variables	UTHA (n=418)	SBTHA (n=50)	*P values*
90-days emergency room visit	29 (7%)	6 (12%)	0.244
90-days readmission	13 (3.1%)	4 (8%)	0.091
90-days overall complications	23 (5.5%)	4 (8%)	0.376
90-days minor complications: – Hematoma – Confusion – Vesical globe – Transfusion	16 (3.8%) 2 (0.5%) 1 (0.2%) 2 (0.5%) 11 (2.6%)	2 (4%) 0 0 0 2 (4%)	0.952
90-days major complications: – Traumatic dislocation – Prosthetic joint infection – Myocardial infarction – Traumatic periprosthetic fracture	7 (1.7%) 1 (0.2%) 1 (0.2%) 1 (0.2%) 4 (1%)	2 (4%) 1 (2%) 1 (2%) 0 0	0.258
UTHA, unilateral total hip arthroplasty; SBTHA, simultaneous bilateral total hip arthroplasty, n, number.			

Table III. — Secondary outcomes

Variables	UTHA (n=418)	SBTHA (n=50)	*P values*
Operative time (min)	60.8±16.6* [range, 23-153]	102.7±21.8* [range, 67-168]	< 0.001
LOS	4.1 ±2.5* [range, 1-32]	5.4 ±1.6* [range, 3-11]	< 0.001
Postoperative hb	10.9 ±1.6 [range, 5.6-14.9]	10 ±1.5 [range, 6.8-13.9]	< 0.001
Postoperative hc	32.6 ±4.5 [range, 19-44]	29.4±4.5 [range, 21-42]	< 0.001
Delta Hb	2.6 ± 1.1* [range, 0.3-8.2]	3.8 ±1.5* [range, 1.1-7.3]	< 0.001
Transfusion	11 (2.6%)	2 (4%)	0.724
*The values are given as the mean and the standard deviation. UTHA, unilateral total hip arthroplasty; SBTHA, simultaneous bilateral total hip arthroplasty;, n, number ; Min, minutes ; LOS, length of stay ; hb, hemoglobin ; hc, hematocrit.			

DISCUSSION

The purpose of this study was to compare the complication rate, 90-days ER visit and 90-days readmission as well as LOS, operative time and blood loss in 468 patients undergoing either SBTHA or UTHA.

Safety of SBTHA is still debated. For some, it is as safe as staged procedure with no higher risk for the patient[9-14]. This conclusion is not supported by others, for whom SBTHA is associated with increased postoperative complications[15-17].

Primary outcomes

Based on the California Office of Statewide Health Planning and Development discharge database on approximately 200,000 patients, a report showed that other than a higher rate of sepsis for the bilateral THA group, there is no difference in other complications, 30 day readmission and revision surgery[17]. This study found readmission rate for SBTHA of 8% compared to 3.6% in Stavrakis et al's. paper, which could be explained by the longer follow-up in our study (90 days versus 30). ADD REF

Likewise, there was no significant difference for 90-days ER and readmission rate nor for overall, minor and major complication rates.

The current study's results are similar to the prospective matched study by Parvizi et al. in 2006 that showed the absence of statistically significant differences in 90-days mortality, minor or major individual complications between UTHA and SBTHA[18].

These findings are not supported by other who found that SBTHA was associated with higher transfusion requirements, adverse events and complications[15,16].

Some authors have reached more nuanced conclusions that SBTHA is an effective and safe procedure for low risk patients with appropriate comorbidities[9].

In 2020 Morton et al. compared SBTHA and UTHA[19]. Patients who had SBTHA were younger and had less comorbidities than those who had UTHA. However, despite this difference in the groups, transfusion and deep infection rates were significantly higher for SBTHA[19].

In this study, any patient with bilateral symptomatic hip osteoarthritis was eligible for simultaneous bilateral surgery. Even if patients in SBTHA group were younger, no difference in ASA scores and comorbidities was observed between the two groups. This study's results suggest that SBTHA is safe regardless of the patients comorbidities.

Secondary outcomes

The growing pressure to provide quality of care at a lower cost pushed practitioner to analyze the differences in costs of the various treatments. From an economic point of view, SBTHA is attractive.

As discussed earlier, the safety of SBTHA is still debated and most authors agree on the economic benefits. For some, SBTHA reduces total hospitalization length, rehabilitation time, recovery, absence from work for younger patients and cost of care by 27% compared to staged bilateral THA without increasing postoperative complications[4,20-22].

As expected and in agreement with other published results, we found that the LOS was 1.3 times longer (4.1 ± 2.5 vs 5.4 ± 1.6 days) and the operative time 1.7 times longer (60.8 ± 16.6 vs 102.7 ± 21.8 minutes) in the SBTHA. Based on those results, we could extrapolate that the overall surgical time and LOS are shorter for SBTHA compared to staged bilateral THA.

Blood loss was significantly higher in the SBTHA group. However, because no statistically significant difference in the transfusion rate was observed, its clinical relevance is limited.

This study has several limitations

The mean age in the UTHA group was significantly lower than in the SBTHA group. Some authors have reported a higher risk of postoperative complications in patients >75 year old who underwent SBTHA[23]. In this study the age difference could underestimate the complication rate of the SBTHA group.

We compared UTHA and SBTHA. A comparison between SBTHA and staged bilateral total hip arthroplasty would allow a better comparison of the overall complication rate to which the patient would be exposed if bilateral surgery was necessary.

Pre-operative anemia is a risk factor for many complications, However, in our setting, it was not addressed. Even though there was no impact on the transfusion rate, blood loss is higher for SBTHA. The resulting potential more severe anemia may contribute to a higher complication rates.

The use of a retrospective cohort also implies that the search for adverse events was carried out from a file review. It is likely to minimize the number of real events.

Minor complications were recorded, however their intensity or duration and economic impact were not.

CONCLUSION

The overall, minor and major complication rate, 90-days ER visit and hospital readmission were not statistically different between the two groups. Blood loss and surgical time are significantly higher in SBTHA. However it is not associated with a higher rate of transfusion.

SBTHA is a safe and reasonable treatment for patients with bilateral symptomatic osteoarthritis.

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