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One stage bilateral total hip arthroplasty with direct anterior approach and fast-track protocols: A prospective study

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Abstract

Background: Simultaneous bilateral total hip arthroplasty could represent a reasonable option in patients affected by end-stage bilateral arthritis of the hip. One-stage bilateral total hip arthroplasty (1-SBTHA) includes a single hospital stay, a shorter rehabilitation time, and decreased management costs per patient. However, there are concerns regarding the possible increase of intraoperative e postoperative complications. The purpose of this study was to investigate whether the advantages associated with the direct anterior approach (DAA) in combination with the application of Enhanced Recovery After Surgery (ERAS) pathway, could ensure the efficacy and safety of simultaneous bilateral total hip arthroplasty (THA).

Method: A prospective single centre clinical study was conducted on 46 patients (30 men and 16 women) who underwent one-stage bilateral THA through the DAA between May 2019 and March 2023 at our institution. The mean age was 61.8 years (range 50 to 74 years) and the mean last follow-up was 6 months (range 5 to 7 months). Hospital length of stay, surgical time, blood transfusions and complications were documented. Functional outcomes and pain were assessed using Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Oxford Hip Score (OHS), Forgotten Joint Score (FJS) and Numeric Pain Rating Scale (NRS).

Results: The mean hospital length of stay was 6.4 days (range 5 to 10 days), and the mean surgery time was 135.5 minutes (range 86 to 185 minutes). Mean blood Hb levels were 14.5 ± 1.1 g/dL before the surgery and 10.4 ± 1.0 g/dL 72 hours after the surgery. Only 8 patients (17.4%) received allogenic blood transfusion. No perioperative deaths were recorded. No thromboembolism or other systemic complications occurred.

The functional and pain scores improved statistically from preoperatively to the last follow-up.

Conclusions: Our results suggest that simultaneous bilateral THA performed using a tissue-sparing approach (DAA) and a fast-track pathway for optimisation of perioperative management with multidisciplinary approaches, can be considered a safe and effective method of treatment in well selected patients with severe bilateral hip arthritis

Keywords: Simultaneous bilateral total hip arthroplasty; THA; Direct anterior approach; DAA; Fast-track perioperative protocol

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Introduction

Total hip arthroplasty (THA) is considered one of the most successful orthopaedic treatments for improving quality of life in patients affected by severe hip arthritis [1,2]. Studies suggest a rising trend in the number of THAs during the last decade with a high economic burden on health-care systems [3,4].

It is estimated that approximately 15-20% of patients requiring THA are considered for bilateral hip diseases, and satisfactory function could not be entirely regained until both hips received surgical procedures [5,6].

Conditions such as avascular necrosis, rheumatoid arthritis, ankylosing spondylitis, femoro-acetabular impingement (FAI) and developmental dysplasia can affect both hips and may potentially require bilateral THA surgery.

Since Charnley and Jaffe in 1971 introduced simultaneous THA for bilateral hip arthritis, there has been an ongoing discussion regarding the benefits and disadvantages of one-stage versus two-stage procedures [7]. Potential risks for patient candidates to a single stage procedure include higher intraoperative blood loss, perioperative medical complications and prolonged hospitalisation. Therefore, some surgeons are still concerned regarding the safety of one-stage bilateral hip arthroplasty (1-SBTHA), limiting the single procedure only in young and healthy patients [8].

Minimally invasive surgery and enhanced recovery after surgery (ERAS) are considered the latest important advances in orthopaedic surgery in the twenty-first century [9-11].

Utilisation of the direct anterior approach (DAA) has increased rapidly over the past 10-15 years, in the effort to perform hip replacement through tissue sparing means, minimizing the surgical trauma. Being a true inter-nervous and inter-muscular surgical approach, DAA can decrease the perioperative pain and the intraoperative blood loss, attaining a faster recovery [12,13]. Moreover, the DAA allows the patient to assume a supine position throughout the whole procedure, does not require position change during 1-SBTHA and thus minimises the mean surgery time.

On the other hand, the systematic implementation of evidence-based perioperative care protocols, known as "enhanced recovery pathway" or "fast-track", has shown that hospital length of stay (LOS) and perioperative complications can be effectively reduced [14,15].

The purpose of this study is to present our own preliminary clinical outcomes of simultaneous bilateral hip replacement with direct anterior approach, performed by a single surgeon. We hypothesized that in appropriately selected patients, simultaneous bilateral THA via DAA with implementation of fast-track protocols can be performed more safely and effectively.

Materials and Methods

The present prospective single-centre clinical study assessed the outcomes of 46 consecutive patients, including 30 men (65.2%) and 16 women (34.8%), who underwent simultaneous bilateral THA through the DAA between May 2019 and March 2023 at our institution (GVM Saint Mary Hospital Bari) with an average of 6 months follow-up (range 5 to 7 months).

The local ethical committee of the authors' Institution approved the clinical study proposal (ref 5999/2019).

Patient selection followed a set of defined inclusion and exclusion criteria. The inclusion criteria were as follows: severely symptomatic bilateral degenerative joint disease of the hip (grade 2,3 according to Tönnis classification), body mass index (BMI) < 35, ASA I to III, patients well motivated to undergo a single stage procedure. The exclusion criteria were as follows: patients suffering from major cardiopulmonary and metabolic diseases (symptomatic despite medical treatment), level of preoperative blood haemoglobin less than 12 g/dL and BMI > 35.

The surgeries were performed by a single lead surgeon with the same team that started their experience with DAA in May 2018.

Preoperative factors were recorded for each patient, including age, gender, diagnosis, x-rays and grade of arthrosis according to Tönnis classification (0-3), body mass index (BMI), preoperative comorbidities, American Society of Anaesthesiologists (ASA) grade, and pre-intervention blood haemoglobin level.

Blood levels of ferritin and % transferrin saturation are also assessed. If they are lower than the standard, they will be corrected a few weeks before the procedure and then the haemoglobin will be re-evaluated preoperatively.

Based on inpatient medical records and pre-postoperative outpatient clinical charts we recorded the details of the procedure, including operating time (incision to skin closure), transfusion support, hospitalization length of stay. All intraoperative complications, systemic and local postoperative complications were documented.

The mean BMI value at surgery was 22.7 Kg/m^2, with 12 patients (26.1%) classified as overweight (25≤ BMI ≥30), and 5 patients (10.8%) classified as obese class I (BMI ≤35). According to Tönnis classification 36 patients had a grade 3 bilateral hip arthrosis, 8 patients had grade 3 osteoarthritis on one side and grade 2 osteoarthritis on the other side, 2 patient had a grade 2 bilateral hip arthrosis while, according to ASA grade, 25 patients were classified as ASA I (54.3 %) and 21 (46.6 %) as ASA II. Participants were evaluated preoperatively and at 15 days, 50 days, 3 months and 6 months postoperatively following THA.

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The Numerical Pain Rating Scale (NRS), from 0 ("no pain") to 10 ("severe pain"), was used to assess patient pain. Primary outcome measures were the Western Ontario and McMasters Arthritis Index (WOMAC), Oxford Hip Score (OHS) and the Forgotten Joint Score (FJS) questionnaires [16-18] A low WOMAC score and high OHS score are indicative of better hip function. The Forgotten Joint Score (FJS) is based on the concept that the ultimate goal of THA is for the patients to forget their artificial joint. It assesses joint awareness during various activities of daily living following joint replacement. It consists of 12 questions and is scored on a 0-100 scale. Higher satisfaction and better outcomes are indicated by higher scores.

The data thus obtained were recorded on a database built on Microsoft Excel.

The results of the analyses were presented in tabular and graphical form. Continuous quantitative variables were expressed as the mean ± standard deviation and range, while categorical ones were expressed as proportions. All the variables examined did not have a normal distribution, requiring the use of non-parametric tests for the study. To analyse the statistical significance of the associations, the Chi-square test, the Wilcoxon test and the Mann-Whitney test were therefore used. The p-value <0.05 was considered significant. Stata MP17 software was used for statistical analyses.

Surgical technique

Standardized preoperative and postoperative treatment protocols, including multimodal pain management, opioid free therapy and rapid rehabilitation, were utilized for all subjects. All patients received spinal anaesthesia and prophylactic therapy with intravenous Cefazolin and 1g of Tranexamic acid before skin incision.

The first side to undergo the operation was the more symptomatic one; if the procedure concluded rapidly and uneventfully, and hemodynamic stability was confirmed by anaesthetist, the second procedure was performed. Only 1 patient required postponement of the second side procedure, due to increased operation time of the first hip replacement for intraoperative difficulties due to poor bone quality and morphology of the acetabulum and femur.

The patient was positioned in a supine position on a standard orthopaedic table. Once both lower extremities were sterilely draped, the anterior superior iliac spine was marked and the skin incision was made approximately two finger-breadths distal and 3 finger-breadths lateral to this landmark, aiming towards the lateral margin of patella, as described by Heuter et al [19]. The fascia of the tensor muscle was identified and incised. The muscle was swept digitally, and a retractor was placed over the superior aspect of the femoral neck. The lateral circumflex femoral artery (LCFA) was ligated or coagulated if found to go across the Heüter interval. The capsule was opened in an L-shaped incision. Retractors were placed intracapsular and the femoral neck osteotomy was performed inside. For acetabular preparation, three bent retractors were placed separately in the direction of 3, 7 and 12 o'clock of the original acetabulum. The acetabular reaming was performed to maintain an abduction angle of 40~45° and an anteversion angle of 15~20° with an offset instrumentation. After acetabular reaming was satisfactory, cementless acetabular components (Pinnacle Depuy Synthes) were implanted into the reamed acetabulum. A sequential capsular release was performed, involving the pubo-femoral and ischio-femoral ligaments as needed for femoral exposure. For femoral procedure, the operative extremity was hyperextended approximately 30°, externally rotated and adducted and a bent retractor was placed under greater trochanter to elevate the proximal part of the femur. Then, after full exposure, broaching commenced with sequentially increasing broaches been sure to adequately lateralize until adequate fit is established from medial to lateral cortex. The surgical implantation of the femoral implant trial (Tri-lock Depuy Synthes) was followed by trial reduction. The correct femoral size, offset and leg length were evaluated fluoroscopically. Hip stability was finally evaluated with manual manipulation of the lower limb. As aforementioned, the contralateral replacement was performed, and care was exercised to make sure that the two legs were of equal length. At the end of surgical procedure, all patients received 1g of intravenous tranexamic acid and 1g was locally administered for each hip joint, before skin incision.

Oral postoperative opioid sparing analgesia including paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs) or Cox-2 inhibitors was administered according to hospital protocols to promote a faster recovery. Opioid analgesics were used only as rescue medication. Dexamethasone was administered in the first 2 days postoperative to reduce pain, nausea and vomiting. A standard venous thromboembolism prophylaxis using low-molecular-weight heparin was used for all patients. Weight-bearing was allowed at patients' tolerance with the aid of crutches. Patients were encouraged to sit as soon as possible. The patient was followed in the first 4/5 days postoperatively in the ward by a physical therapist. When their general conditions were considered stable, the patients were discharged home or transferred to an inpatient rehabilitation facility.

Results

All 46 patients completed the average of 6 months of follow-up. The mean length of hospital stay was 6.4 days ± 1.1 (range 5 to 10 days), including the day before surgery and the mean operative time was 135.5 minutes ± 37.7 (range 86 to 185 minutes). These data were affected by the first period of the learning curve of the surgeon, so in the last 20 cases,

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the operative time decreased to approximately 100.2 minutes ± 10.1 (range 86 to 118 minutes) (Figure 1). The mean preoperative haemoglobin levels were 14.5 g/dL ± 1.1 (range 12.0 to 16.5) and decreased to 10.4 ± 1.0 g/dL (range from 8.5 to 12.8) 72 hours after the surgery. Figure 2 shows the trend of haemoglobin before the surgery and 24 h, 48 h and 72 h after the surgery.

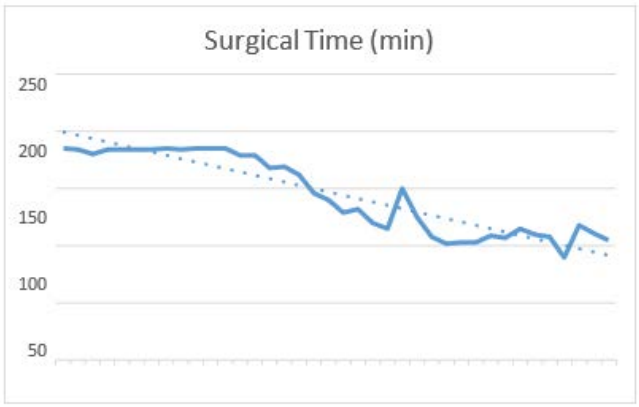

Figure 1: Mean surgical time among all procedures.

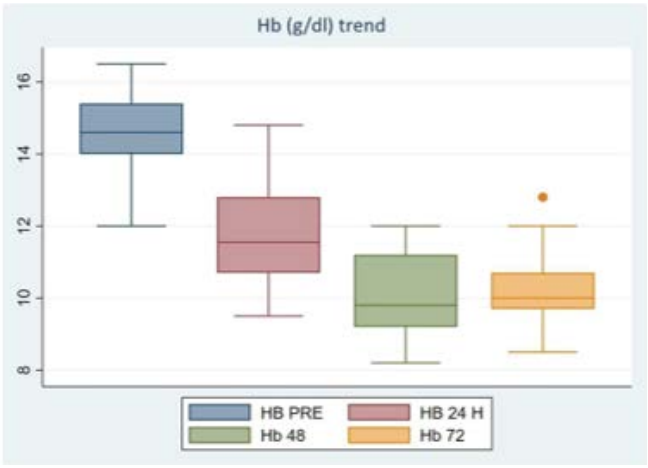

Figure 2: Trend of haemoglobin level from the day of admission, to the 24th, 48th and 72nd postoperative hours.

Only 8 patients (17.4%) received allogenic blood transfusion with an average of 1,5 units per patient: one with cardiac disease, 3 with assumption of anticoagulants and 1 with a low haemoglobin concentration related to Thalassemia. Transfusion was performed for hemoglobin levels less than 8.5 mg/dL.

No thromboembolism, medical complications, or deep infections occurred. There was no in-hospital or postoperative mortality recorded during the study period. Three cases of tight hematomas, that did not require surgical intervention, were documented. Finally, no cases of wound dehiscence were registered and there were no dislocations.

Patients started using only one crutch after 20.7 days (range 5 to 36 days) and did not need crutches after 45.5 days (range 10 to 60 days).

The functional and pain scores at different times were analysed by comparing the data obtained before surgery with the postoperative follow-up at 15 days, 50 days, 3 months and 6 months postoperatively.

The mean WOMAC score was 69.0 ± 16.8 (range 36 to 94.8) preoperatively, improved significantly at 15 days postoperatively (mean 37.7 ± 13.5, range 18 to 59.4) ($p<0.05$), and progressed to 4.9 ± 3.3 (range 0 to 9.4) at the last follow-up at 6 months. This indicates an almost total reduction of pain, stiffness, and functional limitations (Figure 3).

Figure 3: Preoperative and postoperative trend of the mean WOMAC score.

Clinically, pain intensity evaluated through the NRS decreased drastically in the first 15 days after surgery, from a mean NRS score of 7.6 ± 1.8 (range 5 to 10) before surgery to a mean NRS score of 2.7 ± 2.83 (range 0 to 7). The improvement in the NRS score was already statistically significant after 15 days ($p<0.05$). Fifty days after surgery, 33 out of 38 patients (86,8%) reported being free of any pain sensations. At 6 months after the surgery, the mean NRS score reached 0.18 ± 0.5 (range 0 to 2) (Figure 4).

The mean OHS score was 16.6 ± 6.8 (range 4 to 29) preoperatively, showing a statistically significant improvement at 15 days postoperatively (mean 30.3 ± 5.4, range 23 to 39) ($p<0.05$) and improving progressively to a mean OHS score of 46.5 ± 2.0 (range 42 to 48) at the last follow-up. (Figure 5).

The mean FJS score was already 59.4 ± 37.1 (range 10 to 100) 15 days after the surgery; the score showed a significant improvement at last follow-up (mean 83.0 ± 15.4, range 59 to 100) (Figure 6).

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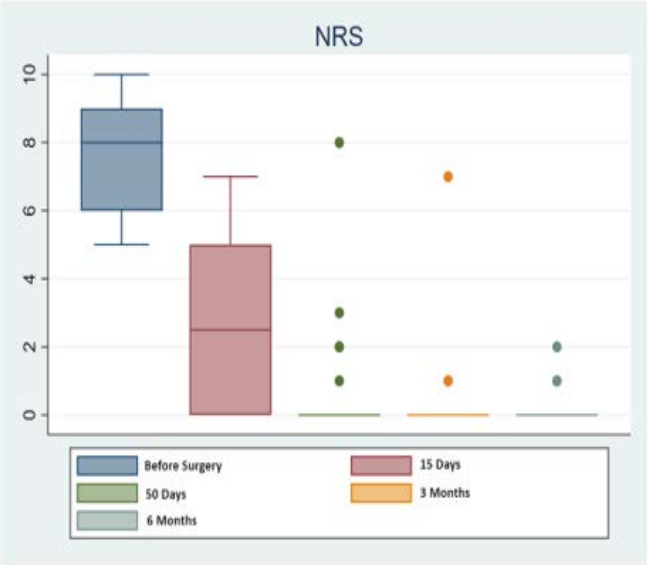

Figure 4: Perioperative Numerical Pain Rating Scale (NRS) (mean and 95% CI) measurement.

Figure 5: Preoperative and postoperative mean Oxford Hip score.

Figure 6: Mean value of Forgotten Joint score at 15 and 50 days, and 3 and 6 months after surgery.

Discussion

Considering that one-third of patients with primary osteoarthritis of the hips would need contralateral surgery within 10 years and that optimal function can be entirely regained until both hips have been replaced, appropriate management of this population is critical in addressing increased hip replacement demand. Simultaneous bilateral THA might pose potential risks, including those associated with longer operative/anaesthesia time, more blood loss, and a higher likelihood of thromboembolism. Therefore, some surgeons might refrain from performing simultaneous bilateral THA, especially, since the safety of one-stage bilateral THA has not definitively been proven to be equivalent to that of staged THA [20].

Several studies report many disadvantages of simultaneous operation, or at least similar results of one-stage versus two-stage procedures, so there is not yet a consensus about the best practice in the management of severe bilateral hip arthritis [21,22]. For example, a recent study, using a large national database, the analysis of approximately 3000 1-SBTHA procedures performed between 2015 and 2021, matched to unilateral THAs on age, sex and pertinent comorbidities, demonstrated that even if the single stage procedure was performed in younger and healthier patients, there was an increased risk of thromboembolism, blood loss anaemia, acute renal failure and blood transfusion [23]. Berger et al found three-fold increase in major complications in a prospective trial of hybrid arthroplasties comparing one and two stage bilateral THA [24]. In turn, Marcos et al. in a similar study, did not find an increase in the risk of major complications or 30-day readmissions [25]. Similarly, Macaulay et al. concluded that one-stage bilateral hip replacement is a safe procedure when performed in dedicated centers and in patients with few comorbidities [8]. More recently, Aghayev et al. in a prospective study including 1819 patients and 5801 follow-ups from the International Documentation and Evaluation System (IDES), compared simultaneous bilateral THA with early (within 6 months) and delayed (between 6 months and five years) two-stage bilateral THA. There was no difference regarding intra e postoperative complications between the different procedures, with one-stage replacement showing the advantages of a single anaesthesia, one period of hospitalization, a shorter rehabilitation period and a more efficient use of financial resources [26]. Finally, a large meta-analysis, including 29551 patients undergoing one-stage bilateral THA and 74600 patients undergoing two stage THA, revealed that both groups had similar 90-day mortality, dislocation and periprosthetic joint infection (PJI) rates, while one-stage bilateral THA was associated with lower total blood loss, length of stay, and total surgery cost. A statistically significant risk reduction was identified in deep vein thrombosis (DVT), pulmonary, systemic and local complications in the 1-SBTHA group [27].

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Most of the unsatisfactory clinical outcomes and the high incidence of perioperative medical complications reported in many of the aforementioned studies could be related to use of traditional approaches with patient in lateral position in performing one-stage THA, without implementation of the recent multimodal ERAS pathway [28-32].

Recently, few studies have demonstrated promising results in simultaneous bilateral hip arthroplasty performed with an anterior minimally invasive approach (AMIS) and fast-track protocols. Kolodzie et al. reported their preliminary experience with 30 cases of simultaneous bilateral THA using the AMIS technique and ERAS protocol, with only 4 patients requiring blood transfusion and no cases of medical complications [33]. Chen et al. retrospectively compared the functional outcomes of two groups of patients who underwent one-stage bilateral THA via DAA or posterolateral approach (PL), with a follow-up minimum of 1 year. They found that the incision length, operation time, intraoperative blood loss, blood transfusion volume and LOS were significantly less in the DAA group than in the PL group. The Harris Hip Score (HHS) and VAS score improved significantly in both groups, with better results in the DDA group. No difference was found regarding the rate of complications [34]. More recently, Tamaki et al. retrospectively assessed 325 consecutive patients who underwent one-stage bilateral THA through the direct anterior approach. Only 1 patient required allogenic blood transfusion, even though 74.2% of patients donated 1 or 2 units of autologous blood before the operation that was administered on the postoperative day 1. No systemic major postoperative complications were detected. They concluded that the low rate of complications was due to minimally aspect of DAA and that the approach is therefore a reasonable choice for 1-SBTHA [35].

The results of our study are quite similar to the most recent studies of 1-SBTHA performed through the direct anterior approach and implementation of fast-track protocols. We recorded no systemic major postoperative complications. No patient donated autologous blood before surgery. The postoperative pain and functional outcome impressionably improved rapidly, with the ability to walk with one aid after few days. Surprisingly the last 2 patients of the study, 66 and 68 years old, both physicians, returned to work 25 days after surgery. The rate of satisfaction of our patients was so high, that more than 95% stated at last follow-up that they would choose the same operation again and they would recommend it to a family member. However, the results reported are conditioned by our initial experience with the DAA and with the management of bilateral procedure. In fact, in the last 20 patients, the time of procedure decreased significantly, from 135 to 100 minutes, with only 3 patients requiring allogenic blood transfusion. Despite an increased risk of postoperative peri-prosthetic fracture, migration of components or dislocations is reported in the literature [36,37] and we did not record any major orthopaedic complications.

Undoubtedly the DAA is an advantageous surgical approach in one stage bilateral THA. Firstly the supine positioning, associated with the use of modern bilateral dressing, enables no need to reposition or re-drape the patient during the surgery, thus contributing to reduce the time of procedure. Secondly, as an intermuscular and tissue sparing approach, avoiding cutting muscles or tendons around the hip, DAA can reduce the perioperative blood loss and explain the reduced postoperative pain and the faster recovery. Furthermore, the implementation of recent evidence-based medicine perioperative management protocols, with multidisciplinary approaches, which involve accurate selection of patients, preoperative and postoperative administration of tranexamic acid with advanced anaesthesia technologies has enabled to reduce the operative stress and to expedite postoperative recovery.

A statistically significant improvement in all functional and pain scores was noted between the first preoperative measurement and all successive measurements up to the last follow-up.

The present study presents a few weaknesses the lack of a control group with a two-stage procedure, the short follow-up and the improvement of skill on the procedure of the team during the study.

However, the limitations of the study are inherent to its strengths: the prospective design of the study, and the fact that all surgeries were performed by a single centre and by a single surgical team.

Conclusion

Our study, although limited by the sample size and by the learning curve of the first cases, reveals that 1-SBTHA, performed with the direct anterior approach, implemented with more recent enhanced recovery after surgery perioperative protocols, is associated with low postoperative medical and surgical complications, low blood loss and rapid recovery, with high patient satisfaction. Therefore, the single-stage procedure compared to two-stage may offer superior benefits including overall shorter period of hospitalisation and disability, a single surgical and anaesthetic procedure and a shorter postoperative rehabilitation period. Besides patient-reported benefits, the single stage procedure may have economic impact, saving hospital resources. These results may inform the patient-surgeon discussion regarding the decision whether to perform simultaneous versus staged THA.

Declararations

Compliance with ethical standards

The Authors state that the patients gave the informed

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consent prior being included into the study; the study was authorized by Regional Ethical Committee "Puglia" (Reference 5999/2019) and was performed in accordance with the Ethical standards of the 1964 Declaration of Helsinki and its later amendments. Patients signed an informed consent regarding publishing their data and photographs.

Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contribusions

Conceptualization, G.V..; data curation, G.M and A.M..; writing—original draft preparation, G.V. and G.P..; writing—review and editing, G.D.C. and F.F.; supervision, B.M. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

References

1. Laupacis A, Bourne R, Rorabeck C, et al. The effect of elective total hip replacement on health-related quality of life. J Bone Jt Surg 11 (1993): 125.
2. Learmonth ID, Young C, Rorabeck C. The operation of the century: Total hip replacement. Lancet 11 (2007): 111.
3. Kurtz S, Ong K, Lau E, et al. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. J. Bone Joint Surg Am 89 (2007): 780-785.
4. Sloan M, Premkumar A, Sheath NP. Projected volume of primary total hip arthroplasty in the US. J Bone Joint Surg Am 100 (2018): 1455-1460.
5. Otte KS, Husted H, Ørsnes T, et al. Bilateral simultaneous total hip arthroplasty in a fast-track setting. HIP Int 21 (2011): 336-339.
6. Huang L, Xu T, Li P, et al. Comparison of mortality and complications between bilateral simultaneous and staged total hip arthroplasty: A systematic review and meta-analysis 98 (2019): 235.
7. Jaffe WL, Chranley J. Bilateral Charnley low friction arthroplasty as a single operative procedure. A report of fifty cases. Bull Hosp Joint Dis 32 (1971): 198-214.
8. Macaulay W, Salvati EA, Sculco TP, et al. Single stage bilateral total hip arthroplasty. J Am Acad Orthop Surg 10 (2002): 217-221.
9. Kehlet H, Dahl JB. Anaesthesia, surgery, and challenges in postoperatice recovery. Lancet 362 (2003): 1921-1928.
10. Kehlet H. Fast-track colonrectal surgery. Lancet 371 (2008): 791-793.
11. Kehlet H. Fast-track hip and knee arthroplasty. Lancet 381 (2013): 1600-1602.
12. Bhandari M, Matta JM (2009). Anterior total hip Arthroplasty Collaborative Investigators, Outcomes following the single incision anterior approach tototal hip arthroplasty: A multicenter obesrvational study. Orthop Clin North Am 40 (2009): 329.
13. Meneghini RM, Pagnano MW, Trousdale RT. Muscle damage during MIS total hip arthoplasty: Smith-Petersen versus posterior approach, Clin Orthop Relat Res 453 (2006): 293.
14. Ljunggren O, Scott M, Fearon KC. Enhanced Recovery after surgery: A review. JAMA Surg 152 (2017): 292-298.
15. Lindberg L, Sjostrand LO. The future needs of hip surgery. Prognosis for Lund 1972-1980. Lakartidningen 69 (1972): 4109-4112.
16. Bellamy N, Buchanan WW, Goldsmith CH, et al. Validation study of WOMAC: A health status instrument for measuring clinically important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. J Rheumatol 158 (1988): 1833.
17. Dawson J, Fitzpatrick R, Carr A, et al. Questionnaire on the perceptions of patients about total hip replacement. J Bone Joint Surg Br 78(1996): 185.
18. Adriani M, Malahias MA, Gu A, et al. Determining the Validity, Reliability, and Utility of the Forgotten Joint Score: A Systematic Review. J Arthroplasty 12 (2020): 56.
19. York PJ, Smarck CT, Judet T, et al. Total hip arthroplasty via the anterior approach: tips and tricks for primary and revision surgery. Int Orthop 10 (2016): 36.
20. Houdek MT, Wyles CC, Watts CD, et al. Single-anesthetic versus staged bilateral total hip arthroplasty a matched cohort study. Journal of Bone and Joint Surgery - American 11 (2017): 92.
21. Berend KH, Lombardi Av Jr, Adams JB. Simultaneous vs staged cementless bilateral total hip arthroplasty: Perioperative risk comparison. J. Arthroplasty 22 (2007): 111-115.
22. Shevenell BE, Mackenzie JA, Tanasijevic K, et al.

Bilateral Total Hip Arthroplasty: Outcomes of Staged Versus Simultaneous Procedures Performed Using an Anterior-Based Muscle-Sparing Approach. J Arthroplasty 39 (2024): 979-984.

23. Liu KC, Richardson MK, Mayfield CK, et al. Increased complication risk associated with simultaneous bilateral total hip arthroplasty. A contemporary, matched cohort analysis. The J Arthroplasty 10 (2003): 12.

24. Berger RA, Curran A, Uyen V, et al. Complications of simultaneous verus staged bilateral total hip arthroplasty. Proc 67th Ann Meet AAOS 21 (2000): 504.

25. Marcos MW, Hart A, Antoniou J Huk OL, et al. No difference in major compication and readmission rates following simultaneous bilateral vs unilateral total hip arthroplasty. J. Arthroplasty 33 (2018): 2541-2545.

26. Aghayev E, Beck A, Staub LP, et al. Simultsneous bilateral hip replacement reveals superior outcomeand fewer complications than two-stage procedures: A prospective study including 1819 patients and 5801 follow-ups from a total joint replacement registry. BMC Musculoskeletal disorders 11 (2010): 245.

27. Ramezani A, Ghaseminejad RA, Sharafi A, et al. Simultaneous versus staged bilateral total hip arthroplasty: a systematic review and meta-analysis. Journal of Orthopaedic Surgery and Research 112 (2022).

28. Hallert O, Li Y, Brismr H, et al. The direct anterior approach: Initial experience of a minimally invasive technique for total hip arthroplasty. J Orthop Surg Res 7 (2012): 1015.

29. Howell JR, Masri BA, Duncan CP. Minimally invasive versus standard incision anterolateral hip replacement: a comparative study. Orthop Clin North Am 35 (2004): 153-162.

30. Graves SC, Benjamin M, Dropkin MD, et al. Does surgical approach affect patient-reported function after primary THA? Clin Orthop RelatRes 474 (2016): 971-981.

31. Barrett WP, Turner SE, Leopold JP. Prospective randomized study of direct anterior vs postero-lateral approach for total hip arthroplasty. J Arthroplasty 28 (2013): 1634-1638.

32. Restrepo C, Parvizi J, Pour AE, et al. Prospective randomized study of two surgical approaches for total hip arthroplasty. J Arthroplasty 25 (2010): 671-679.

33. Kolodziej L, Bohatyrewicz A, Jurewicz A, et al. Simultaneous bilateral minimally invasice direct anterior approach total hip arthroplasty with fast-track protocol. Ortopedia Traumatologia Rehabilitacja 22 (2020) 17-24.

34. Chen C, Yin Y, Juncai L, et al. The direct anterior approach for simultaneous bilateral hip arthroplasty: a short-term efficay analysis. Arthroplasty 21 (2020): 2-8.

35. Tamaki T, Oinuma K, Miura Y, et al. Perioperative complication rate of one-stage bilateral total hip arthroplasty using the direct anterior approach. Journal of Orthopaedic Science 2016 (21): 658-661.

36. Sariali E, Leonard P, Mamoudy P. Dislocation after total hip arthroplasty using Hueter anterior approach. J Arthroplasty 2 (2008): 266-272.

37. Barton C, Kim PR. Complications of direct anterior approach for total hip arthroplasty Orthop Clin North Am 40 (2009): 371-375.

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