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ORIGINAL PAPER

Patient's perspective on direct anterior versus posterior approach total hip arthroplasty

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Abstract

Purpose Total hip arthroplasty approach comparison focused on patient's perspective. The direct anterior approach (DAA) has gained immense popularity in the last decade and is widely advocated as a superior approach in terms of quicker recovery and better overall outcome. However, the question if the level of DAA promotion is justified seems to be rarely posed.

Methods A single-surgeon consecutive series of patients who underwent bilateral THA, one in DAA and the other in posterior approach (PA). The same implant design and same component sizes were used for the both sides. All the operations were performed by a single surgeon under the same pre- and post-operative care protocol.

Results Twenty-one patients underwent bilateral THA, mean age 60.09 years. Oxford Hip Score (OHS) was used for functional outcome assessment. There were no statistically significant differences between two approaches in terms of functional outcome (mean OHS for DAA series was 42.95 and that for the PA was 43.38, p 0.07 at an alpha level of 0.05). Fifteen patients gave the advantage to PA, and six patients favoured DAA.

Conclusion By study design, we tried to reduce the biases and acquire approach appraisal from patient's perspective. We anticipated the outcome in favour of DAA, but the results favoring PA came as a surprise. Future prospective randomized studies on evaluation of DAA and other approaches not only from surgeon's or industry's point of view, performed on a larger and more uniform groups, are warranted to further explore the subjective differences between DAA and PA.

Keywords Direct anterior approach · Patient's perspective · Total hip arthroplasty approach

Introduction

Recent publications, industry seminars, professional meetings, and online discussions among interested orthopaedic surgeons have shown increased popularity and utilization of DAA. The knowledge of DAA-related anatomy, technical tips and tricks of the trade, and specialized instrumentation and implants have advanced considerably, and there is no doubt that DAA has passed a long way from hype to ripe and has gained a foothold in the orthopaedic mainstream, in line with PLA and other approaches [1–4].

Yet, there is little evidence for improved kinematics or better long-term outcomes following the use of the DAA for THA; additionally, many authors reported a steep learning curve and mean operating times significantly longer with the DAA [5]. Proponents of DAA widely advocate it as a superior approach in terms of quicker recovery, decrease of hospital stay, and reduced dislocation risk [6–8]. Improved earlier functional outcome during the first 6 weeks to 6 months with DAA THA when compared to PA THA seems to be one of the most exploited DAA features [9–11], even though there are studies that are not so unanimous [12, 13].

The DAA is intensively being promoted, by surgeons, especially the podium regulars, or by industry, yet the question if the level of DAA promotion is justified seems to be rarely posed. Concerns regarding possible complications, particularly wound complications, neural injury, periprosthetic/greater trochanter fractures, and longer operative time, are somehow readily neglected, mentioned as non-contributory, or assigned to the steep part of the learning curve period [6, 14].

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In most of the studies that compare DAA to PA, there were always two distinct groups of patients and THAs were performed by different surgeons in different patients, often under different pre- and post-operative care protocols.

We present a single-surgeon consecutive series of patients who underwent bilateral staged total hip arthroplasty, one THA done in DAA and the other in PA. We would like to highlight that to our knowledge, this is the first DAA/PA THA approach comparison focused on patient's perspective.

We hypothesized that DAA THA will show better patient satisfaction over PA THA.

Material and methods

This study is a single-surgeon consecutive series of patients with bilateral symmetrical hip osteoarthritis, who underwent bilateral staged total hip arthroplasty. Each patient had one THA done using DAA and other side THA through posterior approach. The decision on which approach will be used first was made according to the patient wish.

Inclusion criteria are as follows: bilateral symmetrical hip osteoarthritis; each patient underwent staged bilateral THA, one hip operated on via DAA and the other via a posterior approach; time between two operations not longer than six months; the same implant design used for both sides; and all surgery performed by a single surgeon. The surgeon was well outside of the learning curve performing independently more than hundreds of DAA and PA total hip replacement surgeries prior to this study. Additional eligibility requirements were absence of any major comorbidities, besides bilateral osteoarthritis otherwise healthy patients with uneventful pre-, intra-, and post-operative courses.

All THAs, regardless of the approach, were cementless, in all the cases same implant type, produced by a major global orthopaedic company, highly porous multi-hole acetabulum with highly cross-linked polyethylene, head diameter 32 mm, and porous femoral taper collarless hip stems (normal variant not short).

All of the patients were operated in the tertiary government hospital and in the private surgical hospital, under the same THA pre- and post-operative care, pain control and rehabilitation protocol. DAA THAs were performed in supine position using the smallest incision possible, and PA THAs were performed in lateral decubitus, with minimally invasive approach also taking care about incision length. Our surgical technique utilized widely accepted standard DAA and PA approaches and is consistent with descriptions available elsewhere [6, 7]. No drains were used in either approach. The same diet, immediate post-operative full weight bearing, antibiotics, thrombosis prophylaxis, pain management using opiate analgesics only while hospitalized, discharge planning, and identical physical therapy protocol was administered to all the patients. Standard precautions to prevent dislocation were explained (DAA, no hyperextension and external rotation; PA, no hyper-flexion and internal rotation) and patients were discharged when estimated completely able to independently and safely ambulate.

Twenty-one patients who underwent staged bilateral THA via two distinct surgical approaches were selected according to study criteria.

Eight patients in total were excluded, six of which due to loss of follow-up, one due to lateral femoral cutaneous nerve palsy, and one due to prolonged wound-healing time.

Clinical and X-ray follow-ups were performed on regular basis as per common THA follow-up protocol. The Oxford Hip Score (OHS) was used for functional outcome assessment [15, 16]. The patients were interviewed at the post-operative period of six months for each THA. At the same time, all patients were asked to answer additional questions, not covered by OHS score, but of particular interest for the study.

What approach was the better one and why (provide explanation if possible)? Which approach would they recommend/or choose if they had to undergo THA?

We hypothesized that DAA THA will show better patient satisfaction over PA THA. For statistical analyses, descriptive statistics and Student's *t* test (paired two sample for means) were used. The study started on February 2014, the last surgery in the series being done on March 2017.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Results

Twenty-one patients, mean age 60.09 years were selected. Fourteen patients had first THA in DAA manner, and seven patients had the first THA in PA fashion. Hip osteoarthritis was bilaterally symmetrical in all the cases. There were two case of bilateral hip arthritis with otto-pelvis (ankylosing spondylitis but the primary Bechterew was already self-limiting established condition and the patients had no active rheumatologic treatment), three cases of secondary hip arthritis post DDH, two patients were in stage II DDH, and one patient was in stage III of DDH according to Crow's classification. The rest of 15 cases were primary hip OA.

Mean Oxford Hip Score, the assessment tool used for functional outcome six months after each THA, for DAA series was 42.95 (SD = 4.522), and that for the PA series was 43.38 (SD = 3.815). There was no statistically significant difference between two approaches in terms of functional outcome (p

0.07 at an alpha level of 0.05, *t* test: paired two sample for means).

There were no statistically significant differences in the length of hospital stay (p 0.329, at an alpha level of *0.05*). DAA group mean post-operative hospital stay was 5.71 days (SD 1.93), and mean length of stay for the PA series was 5.48 days (SD 1.78).

No infections, no dislocations, no periprosthetic fractures, and no nerve injuries or post-operative neuralgias were noted in DAA nor PA series. All patients underwent X-ray post-operative review and all the cups and stems were positioned within recommended range of implant positioning. In DAA procedures, intra-operative X-ray component position evaluation was done as well. We have considered cup position anteversion of 15–25° and inclination of 35–50° as acceptable. Angle measurement was performed on post-op X-rays.

When it comes to patient's perspective, the majority, 16 (76.19%) of 21 patients answered that they believed/thought/found/experienced that posterior approach THA was better than THA done by DAA approach. The explanations they provided are presented in Table 1. Additionally, when asked which procedure would they recommend/or choose if they had to undergo THA and the patients provided answers that were in line with their first response. Among those 14 patients who underwent DAA THA procedure as first procedure, 4 of them have stated that DAA was better.

Discussion

During our work, we have noticed that some of the patients have better experience and are more satisfied with THA performed in PA fashion.

The direct anterior approach (DAA) has gained immense popularity in the last decade, experiencing spectacular adoption and growth. Nevertheless, in the orthopaedic community, there is still no consensus on the best approach for THA, and it could be a long time before it may be reached.

DAA as a muscle sparing technique is supposedly offering optimized implant position, restoration of leg length and offset, decreased dislocation risk, better functional outcomes, and high patient satisfaction [17, 18]. Besides more rapid functional recovery, advocates of minimally invasive techniques have noted advantages such as decreased soft tissue trauma and diminished blood loss and pain [19].

Early postoperative data show that DAA may produce less pain and better mobility in the period immediately following surgery, (without significant differences between groups at

Table 1 Patent's gender/age and answers to questions which approach did they prefer and why

Patient (gender, age)	DAA better/explanation as given by patient	PA better/explanation as given by patient
M, 75 years old	Less pain with DAA	
M, 64 years old	I was crossing my legs few days after surgery and nothing happened, and was warned not to do that with PA hip	
F, 63 years old	Better DAA, faster recovery	
M, 37 years old	During sports, I think DAA is my stronger leg	
M, 70 years old	Do not know exactly why but DAA is better	
F, 60 years old	Less pain and better looking scar	
F, 52 years old		Do not know exactly, it just felt better after PA
F, 72 years old		Recovered faster than DAA
F, 55 years old		Smaller PA incision, had some low back pain after DAA
M, 73 years old		Cannot explain just a feeling that PA was easy
F, 75 years old		Had more deep muscle pain with DAA
F, 58years old		Overall, better PA and do not like the scar on the front
M, 62 years old		Started driving sooner, less pain with PA
F, 40 years old		The scar on the back is better looking
M, 71 years old		Used less painkillers and discarded crutches sooner
F, 53 years old		Better recovery used a cane just for a couple of days
M, 64 years old		Less pain after PA surgery, had sex earlier
F, 75 years old		Had some other side knee pain after DAA, and not after PA
F, 51 years old		Think it was better with PA, no specific reason
F, 67 years old		Better with PA but I think I had a better therapist after PA
F, 51 years old		More satisfied with PA, do not know why but during sex I have some concerns for DAA hip, maybe because of the place of skin incision.

later time points) but authors also note that these benefits are obtained with a procedure that required a longer operative time with greater blood loss (this is, in part, explained by the additional steps associated with the DAA which include the use of a fracture table for operative leg manipulation and intra-operative fluoroscopy, which does expose the patient and surgeon to additional radiation) [20].

On the other side, authors expressing doubts in the DAA superiority seem to be outvoted. Graves et al. [21] found that the DAA can be performed with expected results similar to those of the posterior approach, but in regards to some DAA disadvantages, any benefits that accrue to the patients who had the DAA are transient and modest.

Compared to PA, depending on surgeons experience, preferences and hospital settings DAA may be burdened with the need for specialized operating table, use of C-arm consequent fluoroscopy exposure, and longer operating time. The most commonly reported drawbacks to the anterior approach are its long operative time, high rate of lateral femoral cutaneous nerve neuropraxia, and risk of iatrogenic fracture [6, 22]. Despite that the possibility that patients may not like DAA and would prefer the PA, it does not occur as a possible disadvantage anywhere in the literature.

Despite the recent surge in DAA, only few authors have expressed concerns on potential disadvantages in comparison to PA. Such is the case with a significantly greater number of wound complications with DAA that required re-operation than the posterior approach (1.4 vs 0.2% $p = 0.007$) [9], and that DAA is burdened with high persistent wound-healing complication rate and a high early rate of trochanteric injuries and femoral perforations [23]. Thera are no definitive evidence of clinical superiority and that DAA is certainly not an approach without complications. This particular approach is not immune to dislocations and there is a significant risk of fractures, wound complications, and revision surgery within the first 12 months; surgeons considering switching to DAA should benchmark their personal complication rates against published reports [20].

As hip joint-specific outcome measure tool, we chose to use the Oxford Hip Score (OHS). OHS assesses pain (six items) and function (six items) of the hip in relation to daily activities such as walking, dressing, and sleeping. Scoring was revised in 2007: 0–4 (worst to best) with overall scores ranging from 0 to 48 where 48 represents the best score [24]. It has been found to be easier to administer and achieve a higher compliance rate and a much higher follow-up rate than that of the Harris Hip Score [25]. We did not explore the early functional outcome results, since the series is too small to allow meaningful insight, and almost all available data on the subject uniformly agrees that DAA has some advantages when it comes to early post-operative period. Since the main goal of the study was to assess subjective patient's perspective, the OHS administered six months post-operatively was estimated to be sufficient to verify unbiased objective functional outcome in both DAA and PA.

In this single-surgeon consecutive series, the surgery was beyond any substantive learning curve effect with both approaches, as reflected by low rates of complications and the highly reproducible outcomes.

Inclusion criteria were devised to limit the biases and provide as accurate and unbiased results as possible. Small sample size deserves an explanation. The primary intention was to conduct the research on at least 50 patients. Although the research was conducted in high-volume arthroplasty centre hospitals, finding candidates for the research has proven to be a somewhat difficult task. No matter which approach was done first, either DAA or PA, the patients were reluctant to have the other hip operated with different approach (especially when the first surgery/recovery went well and without complications). Additionally, the number of patients with symmetrical bilateral hip osteoarthritis and without significant comorbidities that might interfere with the patient's condition in the time between surgery, in the single-surgeon practice, has proved to be limited, hence the relatively small series.

This study has some limitations: firstly, small sample size and the fact that outcome was reported on single-surgeon series additionally limit the strength of the evidence and secondly, the limitations inherent to any retrospective study. Blood loss and subsequent blood transfusion rate, and the operating time, as well as the difference in the overall costs for both approaches were not analyzed. An additional limitation was that due to design of the study, the results could not be compared with those of the other surgical THA approaches. Furthermore, early functional outcome was not evaluated, since it was not of primary concern and ultimately, as all previously mentioned limitations, did not significantly influence outcome results related to patient's opinion on preferable approach.

Due to small sample size, the study is statistically underpowered, to demonstrate conclusive results, but hopefully, current rate of DAA implementation will probably lead to more significant number of patients who underwent bilateral THA via DAA and PA and higher quality results should be obtained.

When it comes to patient's perspective, we anticipated the outcome in favor of DAA, but the results favoring PA came as a surprise. Future prospective randomized studies on evaluation of DAA and other approaches not only from surgeon's or industry point of view, performed on a larger and more uniform groups, are warranted to further, more definitively, explore the subjective differences between DAA and PA.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval Institutional review board approval was obtained prior to starting this research.

All procedures performed in this study were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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