

Elective Total Hip Arthroplasty: Which Surgical Approach Is Optimal?

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Background: For decades, the total hip arthroplasty procedure of choice has been a standard posterior approach. In the past several years, modified muscle-sparing surgical approaches have been introduced, including the mini posterior and direct anterior approaches. However, the optimal surgical approach is still being debated.

Case Presentation: This case report describes a patient with right

hip end-stage degenerative joint disease, a comparison of the mini posterior and direct anterior approaches, and the patient's choice of procedure.

Conclusions: The final decision for total hip arthroplasty approaches should be dependent on the patient-surgeon relationship and informed decision making.

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Total hip arthroplasty (THA) is one of the most successful orthopedic interventions performed today in terms of pain relief, cost effectiveness, and clinical outcomes.¹ As a definitive treatment for end-stage arthritis of the hip, more than 330,000 procedures are performed in the United States each year. The number performed is growing by > 5% per year and is predicted to double by 2030, partly due to patients living longer, older individuals seeking a higher level of functionality than did previous generations, and better access to health care.^{2,3}

The THA procedure also has become increasingly common in a younger population for posttraumatic fractures and conditions that lead to early-onset secondary arthritis, such as avascular necrosis, juvenile rheumatoid arthritis, hip dysplasia, Perthes disease, and femoroacetabular impingement.⁴ Younger patients are more likely to need a revision. According to a study by Evans and colleagues using available arthroplasty registry data, about three-quarters of hip replacements last 15 to 20 years, and 58% of hip replacements last 25 years in patients with osteoarthritis.⁵

For decades, the THA procedure of choice has been a standard posterior approach (PA). The PA was used because it allowed excellent intraoperative exposure and was applicable to a wide range of hip problems.⁶ In the past several years, modified muscle-sparing surgical approaches have been introduced. Two performed frequently are the mini PA (MPA) and the direct anterior approach (DAA).

The MPA is a modification of the PA. Surgeons perform the THA through a small in-

cision without cutting the abductor muscles that are critical to hip stability and gait. A study published in 2010 concluded that the MPA was associated with less pain, shorter hospital length of stay (LOS) (therefore, an economic saving), and an earlier return to walking postoperatively.⁷

The DAA has been around since the early days of THA. Carl Hueter first described the anterior approach to the hip in 1881 (referred to as the Hueter approach). Smith-Peterson is frequently credited with popularizing the DAA technique during his career after publishing his first description of the approach in 1917.⁸ About 10 years ago, the DAA showed a resurgence as another muscle-sparing alternative for THAs. The DAA is considered to be a true intermuscular approach that preserves the soft tissues around the hip joint, thereby preserving the stability of the joint.⁹⁻¹¹ The optimal surgical approach is still the subject of debate.

We present a male with right hip end-stage degenerative joint disease (DJD) and review some medical literature. Although other approaches to THA can be used (lateral, anterolateral), the discussion focuses on 2 muscle-sparing approaches performed frequently, the MPA and the DAA, and can be of value to primary care practitioners in their discussion with patients.

CASE PRESENTATION

A 61-year-old male patient presented with progressive right hip pain. At age 37, he had a left THA via a PA due to hip dysplasia and a revision on the same hip at age 55 (the polyethylene liner was replaced and the cobalt chromium head was changed to

ceramic), again through a PA. An orthopedic clinical evaluation and X-rays confirmed end-stage DJD of the right hip (Figure). He was informed to return to plan an elective THA when the “bad days were significantly greater than the good days” and/or when his functionality or quality of life was unacceptable. The orthopedic surgeon favored an MPA but offered a hand-off to colleagues who preferred the DAA. The patient was given information to review.

DISCUSSION

No matter which approach is used, one study concluded that surgeons who perform > 50 hip replacements each year have better overall outcomes.¹²

The MPA emerged in the past decade as a muscle-sparing modification of the PA. The incision length (< 10 cm) is the simplest way of categorizing the surgery as an MPA. However, the amount of deep surgical dissection is a more important consideration for sparing muscle (for improved postoperative functionality, recovery, and joint stability) due to the gluteus maximus insertion, the quadratus femoris, and the piriformis tendons being left intact.¹³⁻¹⁶

Multiple studies have directly compared the MPA and PA, with variable results. One study concluded that the MPA was associated with lower surgical blood loss, lower pain at rest, and a faster recovery compared with that of the PA. Still, the study found no significant difference in postoperative laboratory values of possible markers of increased tissue damage and surgical invasiveness, such as creatinine phosphokinase (CPK) levels.¹⁵ Another randomized controlled trial (RCT) of 100 patients concluded that there was a trend for improved walking times and patient satisfaction at 6 weeks post-MPA vs PA.¹⁶ Other studies have found that the MPA and PA were essentially equivalent to each other regarding operative time, early postoperative outcomes, transfusion rate, hospital LOS, and postoperative complications.¹⁴ However, a recent meta-analysis found positive trends in favor of the MPA. The MPA was associated with a slight decrease in operating time, blood loss, hospital LOS, and earlier improvement in Harris hip scores. The meta-analysis found no significant decrease

FIGURE Anterior-Posterior Pelvis X-ray



Right hip degenerative joint disease and previous left total hip arthroplasty is demonstrated.

in the rate of dislocation or femoral fracture.¹³ Studies are still needed to evaluate long-term implant survival and outcomes for MPA and PA.

The DAA has received renewed attention as surgeons seek minimally invasive techniques and more rapid recoveries.⁶ The DAA involves a 3- to 4-inch incision on the front of the hip and enters the hip joint through the intermuscular interval between the tensor fasciae latae and gluteus medius muscles laterally and the sartorius muscle and rectus fascia medially.⁹ The DAA is considered a true intermuscular approach that preserves the soft tissues around the hip joint (including the posterior capsule), thereby presumably preserving the stability of the joint.⁹ The popularity for this approach has been attributed primarily to claims of improved recovery times, lower pain levels, improved patient satisfaction, as well as improved accuracy on both implant placement/alignment and leg length restoration.¹⁷ Orthopedic surgeons are increasingly being trained in the DAA during their residency and fellowship training.

There are many potential disadvantages to DAA. For example, DAA may present intraoperative radiation exposure for patients and surgeons during a fluoroscopy-assisted procedure. In addition, neuropraxia, particularly to the lateral femoral cutaneous nerve, can cause transient or permanent meralgia paresthetica. Wound healing may also present problems for female

and obese patients, particularly those with a body mass index > 39 who are at increased risk of wound complications. DAA also increases time under anesthesia. Patients may experience proximal femoral fractures and dislocations and complex/challenging femoral exposure and bone preparation. Finally, sagittal malalignment of the stem could lead to loosening and an increased need for revision surgery.¹⁸

Another disadvantage of the DAA compared with the PA and MPA is the steep learning curve. Most studies find that the complication rate decreases only when the surgeon performs a significant number of DAA procedures. DeSteiger and colleagues noted a learning curve of 50 to 100 cases needed, and Masonis and colleagues concluded that at least 100 cases needed to be done to decrease operating and fluoroscopy times.^{19,20} Many orthopedic surgeons perform < 25 THA procedures a year.²¹

With the recent surge in popularity of the DAA, several studies have evaluated the DAA vs the MPA. A prospective RCT of 54 patients comparing the 2 approaches found that DAA patients walked without assistive devices sooner than did MPA patients: 22 days for DAA and 28 days for MPA.²² Improved cup position and a faster return of functionality were found in another study. DAA patients transitioned to a cane at 12 days vs 15.5 days for MPA patients and had a negative Trendelenburg sign at 16.7 days vs 24.8 days for MPA patients.²³

Comparing DAA and MPA for inflammatory markers (serum CPK, C-reactive protein, interleukin-6, interleukin-1 β and tumor necrosis factor- α), the level of CPK postoperatively was 5.5 times higher in MPA patients, consistent with significantly more muscle damage. However, the overall physiologic burden as demonstrated by the measurement of all inflammatory markers was similar between the MPA and the DAA. This suggests that the inflammatory cascade associated with THA may be influenced more by the osteotomy and prosthesis implantation than by the surgical approach.²⁴

Of note, some surgeons who perform the DAA recommend fewer postoperative precautions and suggest that physical therapy may not be necessary after discharge.^{25,26} Nevertheless, physiotherapeutic rehabilita-

tion after all THA surgery is recommended as the standard treatment to minimize postoperative complications, such as hip dislocation, wound infection, deep venous thrombosis, and pulmonary embolism, and to maximize the patient's functionality.²⁷⁻²⁹ RCTs are needed to look at long-term data on clinical outcomes between the MPA and DAA. Dislocation is a risk regardless of the approach used. Nevertheless, rates of dislocation, in general, are now very low, given the use of larger femoral head implants for all approaches.

CONCLUSIONS

THA is one of the most successful surgical procedures performed today. Patients desire hip pain relief and a return to function with as little interruption in their life as possible. Additionally, health care systems and insurers require THA procedures to be as efficient and cost-effective as possible. The debate regarding the most effective or preferable approach for THA continues. Although some prospective RCTs found that patients who underwent the DAA had objectively faster recovery than patients who had the MPA, it is also acknowledged that the results were dependent on surgeons who are very skilled in performing DAAs. The hope of both approaches is to get the individual moving as quickly and safely as possible to avoid a cascade of deterioration in the postoperative period. Factors other than the surgical approach, including patient selection, surgical volume and experience, careful preoperative assessments, attentive pain management, and rapid rehabilitation protocols, may be just as important as to which procedure is performed.³⁰ The final decision should still be dependent on the patient-surgeon relationship and informed decision making.

In this case, the patient reviewed all the information he was given and independently researched the 2 procedures over many months. Ultimately, he decided to undergo a right THA via the DAA.

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Disclaimer

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Ethics and consent

The patient has provided written informed consent.

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