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► To cite this version:

Philippe Henry, Mathias Blandeau, Philippe Pudlo, Laura Wallard. What is the impact of the surgical approach on functional recovery after total hip arthroplasty? a narrative review. Computer Methods in Biomechanics and Biomedical Engineering, 2023. hal-04267502v2

HAL Id: hal-04267502

<https://uphf.hal.science/hal-04267502v2>

Submitted on 20 Nov 2023

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What is the impact of the surgical approach on functional recovery after total hip arthroplasty? a narrative review

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1. Introduction

Osteoarthritis (OA) is the most common degenerative joint disease in the elderly, becoming a major public health problem. Osteoarthritis affects approximately 240 million people worldwide, including more than 10 million in France (Katz et al. 2021). Hip OA is characterized by severe musculoskeletal pain and limitation of joint movements that progressively decrease the autonomy and quality of life of these patients. For example, gait is exemplified by abnormal gait patterns associated with reduced walking speed, reduced hip muscle strength, and higher energy costs compared to asymptomatic adults (Wallard et al. 2017). Given all of these considerations, direct surgical treatment is advocated for hip OA. The surgeon approaching a hip faces a dilemma: expose himself extensively to implant a biarticular prosthesis and preserve the gluteal musculature to avoid instability of his arthroplasty. In order to do so, surgeons have devised three major technical approaches that combine ease of surgery with postoperative risks and recovery (Petis et al. 2015). The surgical approach for total hip replacement can be performed using three main methods: the anterior approach, the posterior approach and the lateral approach. The objective of this narrative study is therefore to quantify the different consequences of these approaches on the functional and motor capacities of patients. We hypothesize that the anterior approach allowed a better recovery of functional ability, in particular thanks to a better preservation of muscles and surrounding tissues during the operation.

2. Methods

This narrative review was conducted in these two databases: PubMed, ScienceDirect. The inclusion criteria were: articles written in English, articles published between 2010 and 2023. To collect the different studies, we used the following term selections: ('total hip arthroplasty' OR 'total hip replacement' OR

'Primary hip replacement') AND ('gait' OR 'locomotion' OR 'walk' OR 'functional recovery' OR 'functional capacity') AND ('approach' OR 'surgery approach') NOT ('fracture'). 94 articles were retrieved from the databases. Only articles on primary hip arthroplasty were selected. By cross-referencing, four relevant studies were also included.

All selected articles can be found on the corresponding author ResearchGate account.

3. Results and discussion

A total of 98 potentially relevant articles were identified, of which 72 met the inclusion criteria. We can note that the evidence for successful arthroplasty is based on the goals of pain alleviation, improved quality of life and restoration of function. (Learmonth et al. 2007). These assessments were often carried out through the use of questionnaires (e.g. HOOS, OHS, SF-36).

In this narrative review 30 articles compared the effects of the anterior versus posterior approach, 11 compared the anterior versus lateral approach and 1 compared the lateral versus posterior approach. 8 studied all 3 approaches. The remaining articles studied different techniques within a single approach.

The posterior approach involves an incision at the back of the hip, allowing the surgeon to access the joint by cutting through certain muscles. The advantages of this approach are easier visibility of the hip joint and better stability of the prosthesis. However, the posterior approach may result in more post-operative pain and an increased risk of hip dislocation due to greater post-operative muscle weakness. Indeed, abductor insufficiency is a common comparison between the posterior and lateral approaches. A 2018 systematic review suggested that the lateral approach has an increased incidence of abductor insufficiency after Total Hip Arthroplasty (THA) (Petis et al. 2018).

The lateral approach is a third option. This technique involves an incision on the side of the hip, allowing the surgeon to access the joint by moving certain muscles. The advantages of this approach are direct visibility of the hip joint and faster recovery than the posterior approach. However, the lateral approach can result in more postoperative pain, and abductor weakness (Waddell et al. 2010).

The most common approach and preferred by surgeons for hip replacement surgery is the anterior approach (Chechik et al. 2013). This technique involves an incision at the front of the hip, allowing the surgeon to access the joint while sparing the

musculature. This approach requires more experience on the part of the surgeon to be performed correctly (Ramadanov et al. 2021; Zhang et al. 2022). However, the benefits of this approach include reduced hospital stay, decreased postoperative pain, decreased risk of hip dislocation, and faster recovery. Patients who have undergone total hip replacement *via* the anterior approach tend to have a faster recovery of their ability to stand, walk and climb stairs than patients operated on *via* the posterior approach. Patients operated on with an anterior approach may have a faster, more energy-efficient gait, which can improve their quality of life in a very short time. They may also have more hip flexion, which may facilitate activities such as climbing stairs or playing certain sports (Kohnen et al. 2017).

In this sense, this narrative review notes that, for the anterior approach, some articles found a significant temporal effect for maximum hip extension between 3 days and 3 months postoperatively as well as on stride length (Böhm et al. 2016). Beyond 3 months, this difference disappears with the lateral approach (Reichert et al. 2018).

4. Conclusions

Most studies suggest that the direct anterior approach may be associated with greater early postoperative improvements than lateral and posterior approaches. The choice of approach will depend on the surgeon's preference and experience, as well as the specific needs of the patient. All three approaches are widely used and all have their advantages and disadvantages. However, the differences dissipated to give similar results one year after surgery. These results confirm that the direct anterior approach allows for more rapid restoration of function after arthroplasty. Post-surgery, patients present better motor and functional capacities, allowing them to practice physical activities quicker, safer and without presenting proven pain. Patients should discuss their options with their surgeon and ask all necessary questions before making an informed decision. Future works would be dedicated to the evaluation of rehabilitation efficiency depending on the surgical approach.

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KEYWORDS Total hip arthroplasty; surgical approach; functional recovery; locomotion; gait analysis

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