



Original Article

Limited benefits of the direct anterior approach in primary hip arthroplasty: A prospective single centre cohort study



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ABSTRACT

Background: Since years a discussion is held on the best approach to perform total hip replacement (THR). Risk of dislocation, abductor weakness and a possible difference in rehabilitation are mentioned. We performed this study to objectify that the use of the direct anterior approach (DAA) results in a faster rehabilitation after THR compared to the non-DAA (posterolateral and anterolateral) approach.

Methods: A single centre prospective cohort study was conducted. Pre- and 16-weeks postoperative completed PROMs like the VAS, PSC, GPE and HOOS were analyzed. A leg press and power test were performed. Functional capacity was determined by the TUG and the 6MWT.

Results: A total of 119 patients were included for analysis: 87 in the DAA group, 32 in the non-DAA group. There were no differences in general baseline characteristics. The length of stay was significant ($p = .000$) shorter in the DAA group. At 16 weeks, the DAA group showed a significant greater improvement with respect to the VAS and HOOS. Also significant differences for all strength, power and functional capacity parameters between the pre- and postoperative measurements were found. A subgroup analysis at 6-weeks postoperative showed significant improvements in the TUG ($p = .009$) and 6MWT ($p = .009$) in the DAA group, but not in the non-DAA group.

Conclusion: PROMs, strength, power and functional capacity tests show significant improvement in all approaches after THR. There seems to be a small advantage in favour of the DAA, in particular directly postoperative and the first postoperative weeks.

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1. Introduction

Total hip replacement (THR) is one of the most common orthopaedic interventions.^{1,2} According to the Dutch registry, 28,026 primary THRs were performed in The Netherlands in 2014.³ The indication to perform a THR is most often osteoarthritis (87%).³ THR is a very successful intervention to decrease the amount of pain and to restore range of motion.^{2,4} Since years a discussion is held on the best surgical approach to the hip joint.^{1,5} The direct lateral approach (DLA) is losing popularity (20.2%)³ because often a Trendelenburg gait due to damage to the gluteus medius muscle exists after surgery.^{1,6} The anterolateral approach (ALA) is

currently used in 5.4% of THRs, but is losing popularity as well.³ Mostly used worldwide is the posterior or posterolateral approach (PLA). This approach does not damage the hip abductors.^{1,5,7} In The Netherlands, 61.9% of the primary THRs are placed using the PLA.³ Recently, the direct anterior approach (DAA) gains more popularity.⁸ In 2007, 0.1% of the THRs were placed using the DAA, increasing to 12.3% in 2014.³

The DAA is popular because of the low risk of dislocation. Soft-tissue tension is one of the factors which reduces the risk of dislocation. This tension is maintained with the anterior approach.⁹ In current literature dislocation after DAA was found in 0.0–1.5%.⁹ While PLA was found to have a risk of 1–5%, depending on capsule reconstruction.^{10–12} A 2% risk of dislocation was found by Sköldernberg et al. using ALA, while Tsai et al. reported no dislocations in 1077 patients.^{13,14} In accordance, Sheth et al. reported significant less dislocations using the DAA or ALA compared to the PLA.¹⁵

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In addition to the low risk of dislocation there are reports showing that the rehabilitation of THR using DAA is faster, because no damage is done to the tendons and muscles.^{4,6} Abductor weakness and the risk of a Trendelenburg gait, is a complication which occurs regularly after DLA or ALA. Meneghini et al. showed that 6 weeks after THR with minimal invasive ALA, patients have a walking pattern revealing abductor weakness.¹⁶ Abductor weakness occurs in 4–20%.¹⁷ In contrast, the DAA is a so-called minimal invasive technique, using an interval between muscles.⁴ We performed this study to objectify that the use of the DAA results in a faster rehabilitation after THR compared to the other approaches.

2. Patients and methods

A single centre retrospective cohort study was conducted. In our hospital all patients scheduled for primary THR were asked to undergo measurements on a voluntary basis, performed by an independent physiotherapist (BLINDED) preoperative and 16-weeks postoperative. All patients who underwent primary THR in 2014 were included if the indication for THR was osteoarthritis, avascular necrosis, dysplasia or a rheumatological condition. Patients who underwent THR after an intracapsular fracture, failure of osteosynthesis or hemiarthroplasty were excluded. When patients underwent the preoperative measurement, but not the postoperative measurement they were excluded as well.

2.1. Approaches

Two out of five orthopaedic surgeons use the DAA (modified Smith-Peterson or Hueter approach), two others the PLA (Moore or Southern) and one a minimal invasive ALA (modified Watson-Jones).

2.2. Prosthesis

Cementless prosthesis of two different systems are used. The surgeons performing THR with the DAA use a hydroxyapatite coated stem (CORAIL Cementless, Depuy, Johnson & Johnson) with three different options: 'standard', 'coxa vara' and 'high-offset'. The acetabular component is a cementless, porous cup (Pinnacle[®] Duofix[®] HA Acetabular Shell Cementless, Depuy, Johnson & Johnson). A polyethylene or ceramic insert is used (28 mm–32 mm–36 mm). The other surgeons use a proximally coated stem (Symax Cementless, Stryker). A cementless hydroxyapatite coated cup (Trident Cementless, Stryker) with a polyethylene insert (36 mm) is used.

2.3. Pre- and postoperative policy

A 6-hour drain is used after DAA. In the other approaches a drain is used until the first morning after surgery when the patient is on any type of anticoagulants. All patients received the same standardized postoperative care. This consists of 24 h intravenous antibiotics, 6 weeks of antithrombotic prophylaxis (Dalteparin 5000 IE 1 dd 1) and physical therapy as of the first day after surgery. Patients were allowed to bear weight as tolerated. Discharge criteria were normal X-rays, tolerable pain, an unremarkable wound and independent, save mobilization. All patients were advised to continue physical therapy in outward-clinic for at least 6 weeks postoperative.

2.4. Outcome

Pre- and postoperative completed Patient-Reported Outcome Measures (PROMs) were analyzed for every approach. With the Visual Analogue Scale (VAS) patients are asked to mark the average

pain they felt in the involved hip during the previous week. The score ranges from '0' (no pain at all) to '10' (unbearable pain). We asked for the amount of complaints after 30 min of walking (Patient Specific Complaints, PSC), whereby '0' means no problem at all to complete the activity and '10' means impossible to complete the activity. The 'Hip disability and Osteoarthritis Outcome Score' (HOOS) was used to examine the opinion of the patients about their THR. The score will be expressed in a scale ranging from 0 to 100 whereby a low score indicates symptoms. The Global Perceived Effect (GPE) was used to measure the patient's opinion about the recovery on a 7-points scale. To determine strength and power in the involved leg, a leg press test and power test (concentric/eccentric) were performed. Functional capacity was determined by the 'Timed-up-and-Go-Test' (TUG) and the '6 minute walk-test' (6MWT) both pre- and postoperative.

2.5. Statistical analysis

Data was analyzed using SPSS 22. Differences between pre- and postoperative parameters were compared by approach and between the anterior and non-anterior approach. A subgroup analysis was performed in patients who chose to rehabilitate with independent physiotherapy. This subgroup underwent an extra measuring moment at 6 weeks postoperative. Independent Sample *t*-tests and repeated-ANOVA tests were performed.

3. Results

In 2014 a total of 262 hip replacements were performed in our hospital. Of these, 96 patients were excluded based on the exclusion criteria. A total of 166 patients performed the first measurement. Of these, 46 did not return for the second measurement and were excluded consequently. A total of 119 patients were included for analysis. Of these patients, 87 were operated with the DAA and 32 with a non-DAA of which 25 with the PLA and 7 with the ALA (Fig. 1).

The study population counted slightly more women (53.8%). The mean age between the DAA and non-DAA group was comparable: 66.7 ± 10.4 years vs 67.9 ± 9.7 years. With respect to

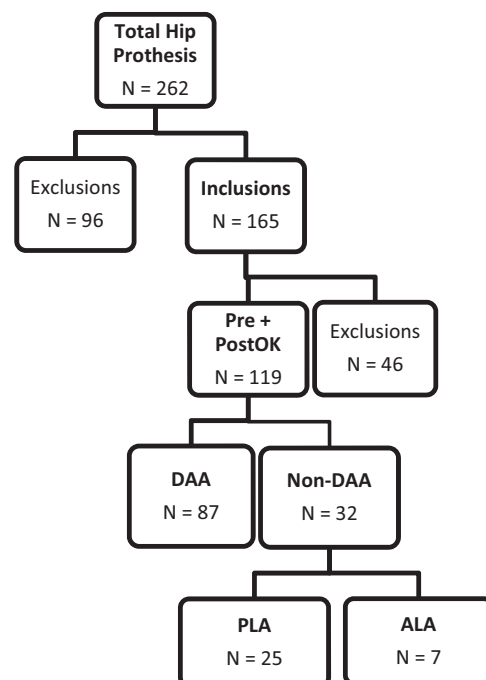


Fig. 1. Flowchart.

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