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Ana Mafalda dos Reis Duarte

Orientado por:

Professor Doutor Paulo Rego

julho'2018

RESUMO PORTUGUÊS EXTENSO

INTRODUÇÃO: A Artroplastia Total da Anca (ATA) é uma das cirurgias do aparelho locomotor mais realizadas a nível mundial, com grande impacto na qualidade de vida dos doentes. A artroplastia total da anca é uma intervenção cirúrgica do foro ortopédico que implica a excisão da cabeça e colo proximal do fémur e a remoção tanto da cartilagem acetabular, como do osso subcondral, sendo estes elementos substituídos posteriormente por material protésico. A ATA surgiu, pela primeira vez, na década de 60 com a criação da artroplastia de baixa fricção de Charley por Sir John Charley e foi uma revolução no campo da patologia da anca, nomeadamente ao nível da osteoartrose grave da anca, que constitui 70% das causas da realização da cirurgia. Para a ATA existem diferentes abordagens cirúrgicas, nomeadamente a Abordagem Anterior Direta (AAD) e pela Abordagem Lateral Direta (ALD), entre outras, tendo cada uma as suas vantagens e desvantagens.

A AAD foi inicialmente descrita por Smith-Peterson em 1917, que realizou a primeira ATA segundo esta mesma abordagem em 1949, o que contribuiu para que esta abordagem seja também conhecida como abordagem de "Smith-Peterson". Ao longo dos anos, esta abordagem tem vindo a ser aperfeiçoada e otimizada, permitindo um acompanhamento progressivo da evolução da Medicina e da biomecânica, sendo atualmente a terceira abordagem cirúrgica mais utilizada na ATA a nível mundial e constituindo a única abordagem comum minimamente invasiva que utiliza tanto um plano intermuscular como um plano internervoso.

A ALD foi inicialmente descrita por Hardinge em 1982, sendo também conhecida como abordagem "Hardinge" ou "Transglútea", como foi posteriormente descrita por Bauer. A nível mundial é a segunda abordagem cirúrgica mais utilizada na ATA. Esta abordagem evita a necessidade de osteotomia trocantérica e permite a preservação do músculo glúteo médio, apresentando também uma exposição adequada do fémur.

OBJETIVOS: Este trabalho pretende estudar, compreender e descrever cirurgicamente a abordagem anterior direta e a abordagem lateral direta da ATA; comparar os resultados a curto prazo após Artroplastia Total da Anca realizada pela Abordagem Anterior Direta e pela Abordagem Lateral Direta Modificada (ALDM); identificar diferenças nos resultados funcionais obtidos, diferenças no tempo e perdas hemáticas cirúrgicos e diferenças quanto ao posicionamento dos diferentes componentes da prótese.

MÉTODOS: Este estudo é retrospetivo e os doentes selecionados foram submetidos à cirurgia pelo mesmo cirurgião no Hospital Beatriz Ângelo, que realiza a ATA segundo as duas abordagens: AAD e ALDM. A ALDM basicamente consiste nas ALD com uma pequena diferença ao nível da disseção profunda, aquando a divisão do quarto anterior e dos três quartos posteriores das fibras do músculo médio glúteo, é realizada uma incisão ómega que consiste na desinserção das fibras do próprio que se inserem no grande trocânter. Os critérios de inclusão foram: diagnóstico de coxartrose primária; eligibilidade para AAD e pelo menos 24 meses de follow up. Os critérios de exclusão foram: coxartrose secundária ou não eligibilidade para AAD segundo um dos seguintes critérios: Índice Massa Corporal (IMC) >35, altura < 155cm, coxartrose grave, coxa profunda, dysplasia ou verismo. Os doentes responderam a uma entrevista telefónica de follow up para colheita de dados clínicos e epidemiológicos. Os processos clínicos e relatos cirúrgicos foram consultados para recolha de diversos parâmetros, e a última radiografia anteroposterior da anca foi consultada para se efetuarem medições radiográficas. O processo clínico do doente foi consultado para averiguar dados clínicos tais como: idade, sexo, peso e altura, IMC, fumador, lateralidade, data de admissão e data da alta clínica, data do último follow up e ainda a presença de infeção, luxação, lesão neuro-vascular, fratura periprotésica ou falência de componentes da prótese. O processo será ainda utilizado para consultar detalhes da intervenção cirúrgica, tais como a sua data, duração, contexto (eletivo/urgente), lateralidade (direita/esquerda), eventuais complicações cirúrgicas intra-operatórias e perdas hemáticas (número de unidades de concentrado eritrocitário utilizadas e valores de hemoglobina pré e pós cirurgia), bem como para averiguar o seguimento pela Medicina Física e Reabilitação. Relativamente à radiografia antero-posterior, foram identificadas e calculadas as seguintes medidas: Diferença do comprimento do membro (mm), diferença no centro horizontal de rotação (mm), diferença no centro vertical de rotação, inclinação acetabular (º), posição da haste femoral (Central/Medial/Lateral), calcificação heterotópica (Sim/Não), descolamento dos componentes (Não/Falência da Haste/Falência da cup), desgaste polietileno (Sim/Não), anteversão acetabular perfil e anteversão acetabular AP (D1+D2). Foi ainda calculada a anteversão acetabular através do Método de Lewinnek. A entrevista telefónica consistiu num conjunto de perguntas com o objetivo de obter informações específicas: fumador (sim/não), VAS pré-cirurgia e VAS atual (1-10), satisfação com a cirurgia ("Voltava a realizar a cirurgia? Sim/Não"), uso de auxiliar de marcha (sim/não), sensação de dismetria

(sim/não), realização ou não de fisioterapia pós cirurgia e se sim a sua duração e realização do "Harris Hip Score (HHS)" modificado pré cirurgia e atual.

RESULTADOS: Foram incluídos no estudo um total de 72 doentes. 42 doentes foram operados pela AAD e 34 pela ALDM. Foram identificadas diferenças no tempo de internamento, que foi mais curto na AAD vs a ALDM, e no tempo da cirurgia, que foi mais curto no grupo da AAD do que no grupo da ALDM (p=0,003, p=0,025, respetivamente). Não encontrámos diferenças na taxa de complicações cirúrgicas (p=0,224). Em relação às medições radiográficas, a anteversão acetabular foi significativamente diferente, com a AAD sendo superior à ALDM (3,2 ± 1,23 (0,75-5,66) graus, p=0,01). No que diz respeito ao período de follow up, a duração da fisioterapia foi significativamente mais curta no grupo da AAD comparativamente ao grupo da ALDM (p=0,019) e, nem a melhoria da VAS (Visual Analogue Scale), nem o HHS (Harris Hip Score) após a cirurgia, foram significativamente diferentes em ambas as abordagens (p=0,569, p=0,923, respetivamente).

DISCUSSÃO: No nosso estudo, encontrámos um tempo de internamento e um tempo de cirurgia inferior no grupo da AAD. Não encontrámos diferenças significativas ao nível de perdas hemáticas entre os dois grupos. Além disso, identificámos diferenças na anteversão acetabular, com uma tendência para uma anteversão acetabular inferior com a ALDM, que associamos à noção espacial específica de cada uma das abordagens. Não foram identificadas diferenças significativas na melhoria da Visual Analogue Scale (VAS) ou no Harris Hip Score (HHS) após a cirurgia, nem diferenças quanto ao tempo de uso de auxiliaries de marcha, coxeio pós operatório ou diferença no comprimento entre membros. Apesar disto, a duração da fisioterapia no grupo da ALDM foi superior face ao grupo da AAD.

O nosso estudo tem algumas limitações que necessitam de ser referidas. O número limitado de pacientes pode falhar em revelar complicações menos frequentes tais como a infeção e a falência protésica. Os critérios de seleção e o facto de apenas um cirurgião tenha realizado as cirurgias também pode influenciar os resultados. Os critérios de seleção foram aqueles que considerámos que iriam resultar numa amostra mais uniforme e homogénea. O estudo é retrospetivo, portanto tem as limitações inerentes a este tipo de estudo quanto à recolha de dados, nomeadamente ao nível de aplicação de escalas funcionais tais como a VAS e a HHS ("recall bias"). Para calcular a anteversão acetabular

utilizámos um método matemático, que apesar de ter demonstrado ser adequado e fiável, é uma medida indireta. Uma medida direta através duma radiografia “cross-table” seria mais fiável.

PALAVRAS-CHAVE: Artroplastia Total da Anca; Abordagem Direta Anterior; Abordagem Direta Lateral; Anteversão Acetabular.

RESUMO

INTRODUÇÃO: A Artroplastia Total da Anca (ATA) é uma das cirurgias do aparelho locomotor mais realizadas a nível mundial, com grande impacto na qualidade de vida dos doentes e para o qual existem diferentes abordagens cirúrgicas, nomeadamente a Abordagem Anterior Direta (AAD) e pela Abordagem Lateral Direta (ALD). Cada uma destas abordagens apresenta as suas especificidades, problemas e vantagens associadas.

OBJETIVOS: Este trabalho pretende estudar, compreender e descrever cirurgicamente a abordagem anterior direta e a abordagem lateral direta da ATA; comparar os resultados a curto prazo após Artroplastia Total da Anca realizada pela Abordagem Anterior Direta e pela Abordagem Lateral Direta Modificada (ALDM); identificar diferenças nos resultados funcionais obtidos, diferenças no tempo e perdas hemáticas cirúrgicos e diferenças quanto ao posicionamento dos diferentes componentes da prótese.

METODOLOGIA: Este estudo é retrospetivo e os doentes selecionados foram submetidos à cirurgia pelo mesmo cirurgião no Hospital Beatriz Ângelo, que realiza a ATA segundo as duas abordagens: AAD e ALDM. Os critérios de inclusão foram: diagnóstico de coxartrose primária; eligibilidade para AAD e pelo menos 24 meses de follow up. Os critérios de exclusão foram: coxartrose secundária ou não eligibilidade para AAD segundo um dos seguintes critérios: Índice Massa Corporal (IMC) >35, altura < 155cm, coxartrose grave, coxa profunda, dysplasia ou verismo. Os doentes responderam a uma entrevista telefónica de follow up para colheita de dados clínicos e epidemiológicos. Os processos clínicos e relatos cirúrgicos foram consultados para recolha de diversos parâmetros, e a última radiografia anteroposterior da anca foi consultada para se efetuarem medições radiográficas.

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Score) após a cirurgia, foram significativamente diferentes em ambas as abordagens (p=0,569, p=0,923, respetivamente).

CONCLUSÕES: No nosso estudo, encontrámos um tempo de internamento e um tempo de cirurgia inferior no grupo da AAD. Além disso, identificámos diferenças na anteversão acetabular, com uma tendência para uma anteversão acetabular inferior com a ALDM, que associamos à noção espacial específica de cada abordagem. Não foram identificadas diferenças significativas na melhoria da VAS ou no HHS após a cirurgia, embora a duração da fisioterapia no grupo da ALDM tenha sido superior.

PALAVRAS-CHAVE: Artroplastia Total da Anca; Abordagem Direta Anterior; Abordagem Direta Lateral; Anteversão Acetabular.

ABSTRACT

INTRODUCTION: The Total Hip Arthroplasty (THA) is one of the most common surgical orthopaedic procedures performed all over the world and it has an enormous relevance in the treatment of severe hip osteoarthritis. This technique can be performed through several approaches, like the direct anterior and the lateral anterior approaches, two of the most used approaches worldwide.

OBJETIVES: This work aims to study, comprehend and describe the Direct Anterior Approach (DAA) and the Direct Lateral Approach (DLA) of THA; to compare the short-term results after THA performed by the Direct Anterior Approach and by the Modified Direct Lateral Approach (MDLA): differences in the functional results, surgery length, blood loss and in the positioning of the prosthetic's components.

METHODS: This study followed a retrospective design, and the patients selected for this study were submitted to surgery by the same surgeon at Hospital Beatriz Ângelo, that performs the THA by the two approaches: DAA and MDLA. The inclusion criteria were a diagnosis of primary coxarthrosis, eligibility to a DAA approach and at least 24 months of follow-up. Patients were excluded if they had a secondary coxarthrosis or were not deemed eligible to a DAA approach by a combination of factors such as Body Mass Index (BMI) >35, height < 155cm, severe coxarthrosis, *coxa profunda*, dysplasia or varism. The patients answered a follow up telephonic interview in order to collect clinical and epidemiologic data. The patient clinical file and the surgical procedure report were consulted to assess several parameters, so as the last available anteroposterior hip radiography to perform radiographic measurements.

RESULTS: A total of 72 patients were included in the study. 42 patients were operated by the DAA and 30 by the DLA approach. We found significant differences in the length of hospital stay, that was shorter in the DAA vs the MDLA group and in the length of surgery, that was shorter in the DAA group vs the MDLA group surgeries (p=0,003, p=0,025, respectively). We found no differences in the rate of surgical complications (p=0,224). About the radiographic measurements, the acetabular anteversion was significantly different, with the DAA being greater than the MDLA (3,2 ± 1,23 (0,75-5,66) degrees, p=0,01). Concerning the follow up period, the duration of physiotherapy was significantly shorter in the DAA group compared to the MDLA group (p=0,019) and

neither the VAS improvement nor the HHS after surgery were significantly different in both approaches (p=0,569, p=0,923, respectively).

CONCLUSIONS: In our study we found a shorter length of hospital stay and length of surgery in the DAA group. We found significant differences in the acetabular anteversion, with a tendency to a lower acetabular anteversion with the MDLA, that we associate with the spatial view that each approach implies. There was no VAS improvement or HHS after surgery, although the duration of physiotherapy of the MDLA group was longer.

KEY-WORDS: Total Hip Arthroplasty; Direct Anterior Approach; Direct Lateral Approach; Acetabular Anteversion.

The Final Work expresses the authors' opinion, and not from FMUL.

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INTRODUCTION

Background

Total Hip Arthroplasty (THA) is among the most common surgical orthopaedical procedures and it implies the excision of the femoral head and the proximal neck of femur and the removal of the acetabular cartilage and subchondral bone. These elements are replaced by prosthetic material. This procedure was first described in the 60s, with the creation of the Charnley low-friction arthroplasty by Sir John Charley, which was a revolutionary discovery at the hip pathology field, specifically in the treatment of severe hip osteoarthritis. This condition is the main cause of THA with a prevalence about 70%. (1) This surgery results in lessening of pain and restoring, not just the function, but also the range of motion. (2)

The THA can be performed by several approaches such as the transtrochanteric, the posterior, the anterolateral, the direct anterior and the direct lateral approach. Among these approaches, the posterior, the direct anterior and the lateral anterior approaches are the ones most used worldwide. (3)

Over time, with scientific and clinical research and the evolution of the prosthetic's materials, different approaches have been developed. A few examples of these new adapted approaches are the modified direct lateral approach (4), the single incision anterior approach and the minimally invasive anterior approach (5). Each one of these surgical approaches have their own advantages and disadvantages, but all can be used successfully and safely. (3)

At the Orthopaedic Department of Beatriz Ângelo Hospital, the Direct Anterior Approach (DAA) and the Modified Direct Lateral Approach (MDLA), based on the Direct Lateral Approach (DLA), are the used approaches.

There are several studies comparing both approaches with variable results, but overall, the DAA is considered the approach with the longer surgery time (6) (7), and the DLA as the approach with the superior gluteal nerve as the most commonly injured structure (8) (9) (10). Recently, the interest in the variability of the cup anteversion according to the used approach and its consequences have been increasing.

Direct Anterior Approach (DAA)

This approach was first described in 1917 by Smith-Peterson, who did the first THA in 1949, following its own description. That is the reason why this approach it is also known as the "Smith-Peterson Approach" (11). This approach has been improved over time, with the concomitant development of Medicine and Biomechanics, and it is now the third most used approach all over the world (12) and it is the only approach minimally invasive that uses, not only, an intermuscular, but also, an internervous plan. (3)

This approach exploits the internervous plane between the sartorius and the tensor fasciae latae to penetrate the outer layer of the joint musculature. The patient is placed supine on the operating table. The incision extends about 10 cm over the tensor fasciae latae, starting 3 cm lateral and 2 cm distal to the anterior iliac superior spine and extending distally.

Figure 1 – The skin incision used to the DAA to THA.

The superficial dissection begins with rotation of the leg externally to stretch the sartorius muscle and, by palpation, identifying the gap between the sartorius and the tensor fasciae latae. Next, dissection through the subcutaneous fat follows, avoiding cutting the lateral femoral cutaneous nerve that pierces the deep fascia of the tight close to this interval. The fascia is incised on the medial side of the tensor fascia latae. The iliac origin of the tensor fasciae latae can be detached of the iliac to improve exposure and to help developing an internervous plane. The ascending branch of the lateral femoral circumflex artery may have to be ligated or coagulated as it crosses the gap between the sartorius and the tensor fascia latae.

The deep dissection begins by retracting the tensor fasciae latae and the sartorius muscle and identifying the plane between the rectus femoris and the gluteus medius. Then,

optionally detaching the rectus femoris from both its origins and/or retracting it medially along with the iliopsoas and retract the gluteus medius laterally exposes the hip capsule. Adducting and fully externally rotating the leg places the capsule on stretch. The hip joint capsule can be opened with a longitudinal or a T-shaped incision. An osteotomy of the femoral head is made along the posterior trochanteric line and the head is excised. Capsule detachment is completed as needed and the acetabulum is exposed with the hip with external rotation. (13)

Then, the acetabulum is cleaned and reamed until a trial shell prosthesis is well fixed. After that, the definitive acetabular prosthesis can be placed. After this, the femoral canal is reamed until the reamer is well fixed. Trial components are introduced and a trial reduction to assess height, stability and absence of neck-shell impingement is made with radiographic control before inserting the final femoral component. The surgical wound is finally closed, with closure of the tensor fasciae latae fascia and subcutaneous layer.

The DAA is also widely used at paediatric surgery, namely in the treatment of the hip congenital dysplasia, especially when the dislocated femoral head lies anterior and superior to the true acetabulum, and it has been more frequently used at femoroacetabular impingement and *hip resurfacing*. (13) (6)

Modified Direct Lateral Approach (MDLA)

The DLA was first described in 1982 by Hardinge (14), also known as “Hardinge” or “Transgluteal” approach, like it was after named by Bauer. Globally it is the second surgical approach more used at THA. (12)

This procedure avoids the need of trochanteric osteotomy, allows the preservation of gluteus medius muscle (6), and allows an excellent femoral exposure. The DLA is also very used to perform hemiarthroplasties. (13) (8)

The MDLA begins by positioning the patient in a lateral decubitus position. (8) The incision is longitudinal and centred over the union of the anterior third with the posterior two thirds of the greater trochanter extending over 18cm.

Figure 2 - The skin incision used to the DLA to THA.

The superficial dissection initiates with incising the fat and underlying deep fascia in line with the skin incision, splitting the fascia latae and retracting it anteriorly and the gluteus maximus posteriorly (Gibson interval). Fibers of gluteus medius that attach to the fascia latae can be dissected using sharp dissection. The trochanteric bursa is transposed anteriorly. The vastus lateralis and the gluteus medius are now exposed and the deep dissection begins with division of the anterior forth and the posterior ¾ of gluteus medius muscle fibers. To do this, an omega incision is made detaching the gluteus medius from its insertion on the great trochanter until the vastus lateralis (15). Then, the gluteus minimus is exposed and detached from the great trochanter trochanter anterior facet and articular capsulae (preserving a distal stump for later refixation) with preservation of the piriformis muscle. Finally, the capsule is exposed and incised as previously described for the anterior approach. Osteotomy of the femoral head, acetabular reaming and implant insertion, femoral canal preparation, trial and implant positioning follows as for the anterior approach. The wound is then closed, with special attention to reattachment of the gluteus minimus and medius muscles, in layers. The fascia latae and subcutaneous tissue are also closed in layers.

In Hospital Beatriz Ângelo, an Epi fit (Smith&Nephew®) cementless acetabular prothesis with a polyethylene insert and a PolarStem (Smith&Nephew®) cementless stem system are generally used. We aim for an acetabular anteversion of 10º, an acetabular inclination

of 45º and a femoral stem anteversion of 10-15º. It is our belief that, when using the DAA, cup anteversion tends to be higher than that of the DLA and that the functional recovery is faster with the DAA.

The objective of this study was to compare the short-term results after THA performed by the Direct Anterior Approach and by the Direct Lateral Approach, namely: intraoperative differences, complications, components positioning and functional recovery results.

METHODS

This study followed a retrospective design, and the patients selected for this study were submitted to surgery by the same surgeon at Hospital Beatriz Ângelo, that performs the THA by the two approaches: DAA and MDLA. The surgeon feels that the DAA is harder to perform in patients who are either short, obese or have severe coxarthrosis, *coxa profunda* or dysplasia, so, when the proposal to perform a THA is done, an eligibility to a DAA is assessed and registered. Even though, in these patients, a DAA is not always performed. So, for this study, the inclusion criteria were a diagnosis of primary coxarthrosis, eligibility to a DAA approach and at least 24 months of follow-up. Patients were excluded if they had a secondary coxarthrosis (secondary femoral head avascular necrosis) or were not deemed eligible to a DAA approach by a combination of factors such as Body Mass Index (BMI) >35, height < 155cm, severe coxarthrosis, *coxa profunda*, dysplasia or varism.

All the patients in conditions of allowing are included. All the patients that fulfilled the study's inclusion criteria were contacted for a follow up telephonic interview. In that occasion, the patient was interviewed in order to collect clinical and epidemiologic data. Every procedure was done by the researcher and by one of the collaborators of the study.

The patient clinical file was consulted to assess age, sex, weight and height, the hip intervened, the admission and discharge dates to access the length of hospital stay, the last appointment date, complications such as infection, hip dislocation, neurovascular lesions, periprosthetic fracture or prosthetic loosening. The surgical procedure report was also assessed to register the length of surgery, the laterality of the hip intervened, blood loss (haemoglobin values previous and posterior to surgery), red blood cell (RBC)

concentrate units used and intra-operative complications such as femoral and/or acetabular fractures, neurovascular lesion or dysmetria.

In detail, the telephonic interview accessed: smoking habits, Visual Analogue Scale (VAS) before and after surgery, satisfaction with the surgery, physiotherapy duration, crutches' use duration, limb length feeling and limping. It was also applied the Portuguese modified "Harris Hip Score" (HHS), before (recall) and after the surgery [see ANNEXES 1].

The last available anteroposterior hip radiography was consulted to assess: leg length, vertical and horizontal centre of rotation, lateral acetabular inclination, and femoral stem positioning, heterotopic calcification, prosthetic dislocation, polyethylene abrasion, acetabular inclination and to calculate the acetabular anteversion using the Lewinnek's method (16) (17).

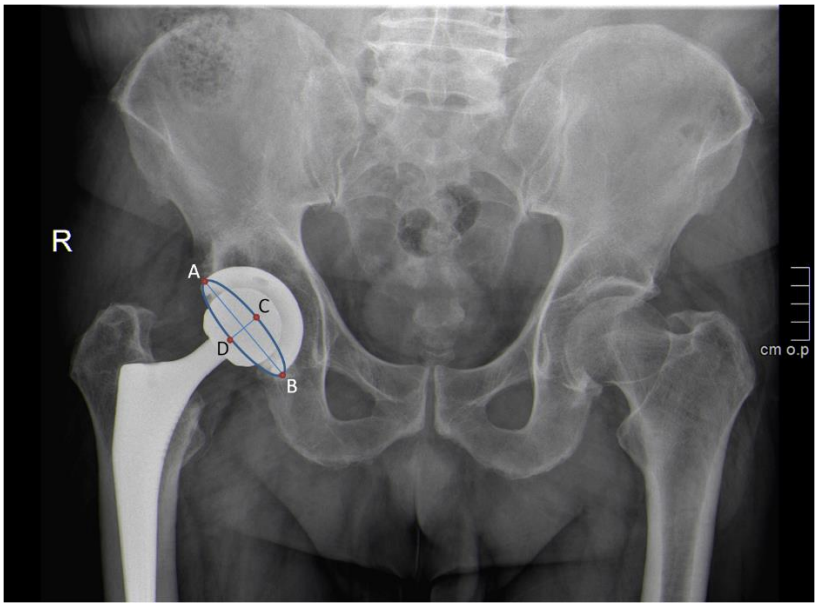

Figure 3 – Representation of Lewinnek's method: version = arcsin (AB / CD).

The BMI was calculated by the formula: [weight(kg)/height(mt)^2]. The VAS improvement was calculated by the formula: [VAS before surgery – VAS after surgery].

About the statistical analysis, the continuous variables were described as the mean (± Std Deviation). The proportions are expressed for the nominal variables. To compare nominal variables, it was used the Pearson Chi-Square test or the Fisher's Exact Test, as the data distribution. To variables with tables with more than 2x2 the Monte Carlo correction was applied. To compare continuous variables, it was used the t student for independent

samples, if the variable was normal, or the Mann Withney test, if the variable was not normal. A *p* value less than 0,05 will be significant for all the used tests. The statistical analysis was done with SPSS version 21, SPSS Inc., Chicago, EUA.

RESULTS

A total of 72 patients were included in the study. The study population included 49 men (68,1%) and 23 women (31,9%) and the mean age was 69,93 ± 8,29 years. The right hip was intervened in 37 (51.4%) patients. Only one patient smoked.

Forty-two were operated by the DAA and 30 by the MDLA approach. The 2 groups were similar in mean age, sex, BMI and laterality of the hip intervened (p=0,746, p=0,765, p=0,815, p=0,498, respectively).

The length of surgery was significantly shorter in the DAA group taking 100,5 ± 3,377 minutes vs the MDLA group surgeries, that took 118,22 ± 7,66 minutes (p=0,025). There was no significant difference in blood loss in the two groups, with blood loss of 685,71 ± 77,34 mL in the DAA group vs 681,25 ± 58,5 mL in the MDLA group (p=0,803).

The surgical complications included six intraoperative femoral fractures (8,3%), one intraoperative acetabular fracture (1,4%) and one neurovascular lesion (1,4%). These complications, specially the intraoperative fractures, were not significantly higher in either of the groups, even though five of the six intraoperative femoral fractures occurred in the DAA group (p=0,224). The only neurovascular lesion occurred in the DAA group. About the RBC units used during the procedure, there were two red blood cells concentrate units used (2,8%), without significant difference among both groups (p=0,791).

The length of hospital stay was also significantly shorter in the DAA group compared to the MDLA group: 5,9 ± 0,50 days vs 13,23 ± 3,12 days (p=0,003), respectively.

Regarding the post-operative follow-up period, there were one late infection (1,4%), two Vancouver AG periprosthetic fractures (2,8%) and two femoral prosthetic loosening (2,8%). Neither of these late complications: infection, periprosthetic fractures or prosthetic loosening, were significantly different in both groups (p=0,583, p=0,337, p=0,663, respectively). One of the prosthetic loosening occurred in the MDLA group,

having the others complications happened in the DAA group. There was only one hospital readmission and one surgical reintervention, that coincide in the same patient, that belongs to the DAA group.

Concerning the post-operative radiographic evaluation, only the acetabular anteversion was significantly different between the approaches (3,2 ± 1,23 (0,75-5,66) degrees, p=0,01), with 10,58 ± 0,74 degrees in the DAA group vs 7,37 ± 1,02 degrees in the MDLA group. The other parameters were similar between both approaches (Table 1).

Radiographic measurements	**DAA**	**MDLA**	**p value**
Leg length difference (mm)	5,83 ± 0,67 (4,48 – 7,19)	4,54 ± 0,62 (3,26 - 5,80)	0,178
Horizontal centre of rotation difference (mm)	3,21 ± 0,35 (2,50 – 3,92)	3,24 ± 0,36 (2,48 - 3,99)	0,842
Vertical centre of rotation difference (mm)	4,80 ± 0,60 (3,58 - 6,02)	4,74 ± 0,58 (3,54 - 5,94)	0,712
Acetabular inclination (º)	42,71 ± 0,730 (41,24 - 44,19)	41,53 ± 0,783 (39,93 - 43,13)	0,281
Acetabular anteversion (º)	10,58 ± 0,74 (9,074 - 12,08)	7,37 ± 1,02 (5,28 - 9,45)	0,01

Table 1 – Radiographic measurements results.

Regarding the follow up telephonic interview, the duration of physiotherapy was significantly shorter with the DAA group compared to the MDLA group: DAA 2,92 ± 0,82 vs MDLA 7,68 ± 2,84 (p=0,019) weeks, respectively. There was not a significant difference in both groups regarding the duration of crutches use, the limping and the feeling of limb length (p=0,303, p=0,604, p=0,411, respectively) (Table 2).

Parameters telephonic interview	Mean DAA	Mean MDLA	p value
VAS recalled before surgery	9,06 ± 0,20	9,09 ± 0,22	0,904
VAS after surgery	2,17 ± 0,28	1,91 ± 0,25	0,756
Physiotherapy duration	2,92 ± 0,82	7,68 ± 2,84	0,019
Crutches' use duration	6,67 ± 1,01	11,05 ± 2,85	0,303

Table 2 - Follow up telephonic interview results.

The VAS improvement was not significantly different in both groups, with a mean of 6,89 ± 0,29 in the DAA group and of 7,18 ±0,39 in the MDLA group (p=0,569). Ninety-six percent of patients would repeat the surgery.

The recalled HHS before surgery results were not significantly different (7,6 ± 3,85 (-0,12-15,32), p=0,053) in both groups. The HHS after surgery results were also not significantly different among both groups (p=0,923).

DISCUSSION

Regarding the surgical procedure, we found a difference in the length of surgery. It was significantly shorter in the DAA group taking 100,5 ± 3,377 minutes vs the MDLA group, that took 118,22 ± 7,66 minutes (p=0,025). Several studies, however, show that using the DAA implies a longer surgery (6) (7). We found no significant difference in the surgical blood loss in both groups. Others studies state that it is hard to exclusively correlate the blood loss with the surgical approach because there are several factors playing a role in fluids loss during surgery (6), although there are some studies that report less blood loss with the DAA (6) (18).

Intraoperative fractures can occur during THA and having an important part in the duration of surgery and postoperative mobilization and recovery (8). The intraoperative fractures were not significantly (p=0,224) higher in neither of the groups, although five

of the six intraoperative femoral fractures occurred in the DAA group. Data suggests that periprosthetic fractures occur more commonly around the femoral than the acetabular component. (16) (19) There are some studies that report an incidence of fractures about 1,4% and 2,3% (8) (20) with the DAA approach and some others studies report an incidence of 4% using the DLA approach (8) (21).

Although according to several studies, the length of stay is not related to the approach since there are several factors playing a role in the discharge time (18) (22), in our study the length of hospital stay was significantly shorter in the DAA group compared to the MDLA group.

The only neurovascular lesion occurred in the DAA group. In this case, it consisted of femoral cutaneous paraesthesia that resolved during the follow-up period. The main neurovascular complications associated with THA are the lesion of superior gluteal, lateral femoral cutaneous, sciatic and femoral nerves (8). Of all of those structures, the superior gluteal nerve is the most commonly injured, especially during DLA (8) (9) (10) what can be related with a postoperative limp. (9)

Infection is a relatively uncommon, but a well-known, complication of THA. It has an estimated prevalence between 0,2% and 1,2% (3) that seems to be higher in revision arthroplasties (1). Despite the importance of this complication, there are minimal data comparing infection rates between the several approaches (3). And in our study, we just had one late infection in the DAA group what correspond to a prevalence of infection of 1,4%.

Prothesis dislocation or loosening is the most common cause of failure in non-infected THA and can be early diagnosed by imagiologic studies even before the patient relate any pain (1). Although there are several studies that don't report difference of dislocation rates with different approaches (3), there is some data that favours DLA (3) (4) in proportion to DAA, although both of these approaches (DAA and DLA) have low dislocation rates (8). In our study we found no difference between both groups (p=0,663), although only one of the prothesis loosening occurred in the MDLA group, having all of the others complications happened in the DAA group. Besides these data, it is relevant to mention that there are also numerous studies that point the posterior approach as the approach with a higher prevalence of dislocations (3) (8) (23) (24).

In the *follow up* period several imagiologic exams can be performed to access the status of the arthroplasty and even though now there are more specialized exams such as MRI and CT scan, the postoperative hip radiograph remains the keystone and the commonly used exam in the follow up assessment, as it has a low cost, it is readily available and it has not metal artefacts (16) (17). Concerning the post-operative radiographs, only the acetabular anteversion was significantly different in both groups, being higher in the DAA group. Although there is not a lot of data concerning the acetabular anteversion variation according to the approach, a study showed a tendency to antevert the acetabular cup when performing THA using the DAA (25). The differences found in this study can probably be related with the spatial view that each approach implies and influences the prosthesis positioning and the acetabular anteversion of the cup. More importantly perhaps, is that the acetabular inclination and anteversion was within the clinically accepted parameters.

There are several scales that can be applied to access the results after primary THA, such as VAS and HHS, that are reliable scales and have good and reliable results (26). We used VAS and HHS to access the functional status of the patients in the *follow up* period and neither the HHS or the VAS showed significant differences in both groups, showing improvement in both groups from baseline.

Regarding the duration of physiotherapy, it was significantly shorter in the DAA group compared to the MDLA group, accordingly with several studies that state the immediate and short-term recovery post-surgery seem to be slightly better with DAA, (2), what could be related with the lower muscular lesion during the procedure (27) (28). This difference between approaches disappears with time, after the second and fourth months, with no difference at 2 years follow up. (2) (6) (8) (18) (22) .

Our study had some limitations that need to be addressed. The limited number of patients may fail to unveil less frequent complications such as infection and prosthetic failure. The selection criteria and the fact that only one surgeon performed the surgeries may also bias the results. The selection criteria were the ones we felt that would led to a more uniform and homogeneous sample. This is a retrospective study, so it has the inherent limitations in data collection. Some functional scales (VAS and HHS) were applied retrospectively and are then subjected to recall bias. We assessed the acetabular anteversion using a

mathematical method that, although shown to be accurate, is an indirect measure. A direct measurement from a cross-table radiography could be more reliable.

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DISCLOSURES

No conflict of interest, financial or others, are declared by the authors.

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ANNEXES

(1) Portuguese Modified Harris Hip Score

HARRIS HIP SCORE (Modificado)

NOME: **HARRIS TOTAL**

PROCESSO: HOSPITAL: DATA __/__/____

MÉDICO: Rúbrica

DOR

Não tem, ou é ignorada	44
Discreta, ocasional (sem comprometer a actividade física)	40
Ligeira (não compromete actividade física normal, só a mais intensa)	30
Moderada, tolerável (mas com limitação clara da actividade)	20
Marcada (limitação séria da actividade física)	10
Incapacitante (dor em repouso, imobilizado na cama)	0
TOTAL DOR	

FUNÇÃ0

Marcha	**Claudicação**	Não tem	11
		Ligeira	8
		Moderada	5
		Severa ou com Incapacidade de marcha	0
	Auxiliares de marcha	Nenhum	11
		1 Bengala em caminhadas longas	7
		1 Bengala a maior parte do tempo	5
		1 Canadiana	3
		2 Bengalas	2
		2 Canadianas ou Incapacidade de marcha	0
	Perímetro de marcha	Ilimitado	11
		1000 metros	8
		250-500 metros	5
		Deambula só em casa	2
		Só Cama e Cadeira	0
Actividade Funcional	**Escadas**	Normalmente, sem corrimão	4
		Normalmente, mas apoiado no corrimão	2
		Com grande dificuldade	1
		Incapaz de usar escadas	0
	Atar os sapatos / Calçar Meias	Facilmente	4
		Com dificuldade	2
		Incapaz	0
	Sentar-se	Em cadeira normal (1 hora ou mais)	5
		Cadeira alta (até 1/2 hora)	3
		Incapaz de sentar-se em cadeira (1/2 hora)	0
	Transportes públicos (autocarro)	Pode utilizador	1
		Não Consegue utilizar	0
		TOTAL FUNÇÃO	