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Comparative Study between Direct Anterior Approach and Direct Lateral Approach for Total Hip Arthroplasty in Patients with Hip Osteoarthritis

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ABSTRACT
Background: When an innovative method is used for primary total hip arthroplasty (THA), the patient has the best chance of benefiting from primary surgery, particularly in terms of stability and durability.
Aim: To compare results of THA for patients with hip osteoarthritis via direct anterior approach versus direct lateral approach regarding short term clinical and functional outcomes and evaluation of complications.
Methods: This randomized controlled clinical trial was conducted at Department of Orthopedic Surgery, Zagazig University on 36 patients, 18 in each group as follow: Group A: was treated with THA through direct anterior approach (DAA) and was called (DAA group) and Group B: was treated with THA through direct lateral approach (DLA) and was called (DLA group).
Results: There was significant difference as regard operation time (longer in group A). There was significant difference as regard blood loss and need for blood transfusion postoperatively (increased in group B). There was highly significant difference between groups as regard discontinuation of use of frame and cane/crutches. There was significant difference between groups as regard recorded HHS at one and 3 months postoperatively with no significant difference between both groups as regard recorded HHS at 6 months postoperatively.
Conclusion: While the long-term follow-up results seem to indicate that the expected outcomes are comparable to other traditional approaches, the DAA was demonstrated in this study to offer the potential benefits of reduced muscle injury, a shorter hospital stay, a faster return to work and activities, and a lower dislocation rate.
Keywords: Direct Anterior Approach, Direct Lateral Approach, Total Hip Arthroplasty, Hip Osteoarthritis.

INTRODUCTION

Due to its low complication rates, great satisfaction, functional improvement, and pain reduction, total hip arthroplasty (THA) is one of the most successful orthopedic procedures [1,2]. For THA, a number of approaches can be used, including the direct anterior approach (Smith-Peterson), the lateral approach (Hardinge), the anterolateral approach (Watson Jones), and the posterior approach, with certain modifications [3,4]. Carl Hueter first described the anterior approach to the hip in 1817. However, after describing the method in 1917, Smith-Petersen was the one who popularized it in the United States and the English-speaking world [5].

Hip dysplasia and femoral neck fractures were frequently treated with the anterior approach in the early 20th century [5].

Judet detailed the approach using a fracture table in 1985, while Light and Keggi published their experience with this method for hip replacement in 1980. Concern over the muscle damage from the lateral and posterolateral approaches to the abductors and external rotators began to grow as implants, results, and procedures continued to advance, reigniting interest in the muscle-sparing anterior approach [6]. By utilizing a natural intramuscular and intra-nervous interval, the direct anterior approach (DAA) to the hip for THA has been proposed to offer a number of benefits compared to direct lateral approach (DLA) which utilizes no true internervous plane but intermuscular plane by splitting gluteus medius and minimus distal to innervations (superior gluteal nerve) and vastus lateralis lateral to innervations (femoral nerve) [4].

The DAA's proponents point to faster recovery times, less pain following surgery, happier patients, shorter hospital stays, fewer dislocations, better early rotation range of motion, earlier stoppage of assistive devices, more normal gait characteristics, and easier use of fluoroscopy with better accuracy on leg length restoration and implant alignment [7-9].

The straight anterior approach's potentially limited extensibility and perhaps obscure intraoperative exposure are two of its main criticisms [10,11]. The high rate of complications, particularly in the early stages of the procedure's learning curve, is another significant critique leveled against the anterior approach. Significantly, the inability to expose and manipulate the femur during femoral stem preparation has been linked to intraoperative fractures [12].

Concerns have been raised about challenging exposure and wound problems in patients receiving direct anterior approach, particularly in obese patients [13,14].

So, we aimed to compare results of THA for patients with hip osteoarthritis via direct anterior approach versus direct lateral approach regarding short

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term clinical and functional outcomes and evaluation of complications.

PATIENTS AND METHODS

36 patients, 18 in each of the following groups, participated in this randomized controlled clinical trial study at Zagazig University's Department of Orthopedic Surgery: Group A received THA surgery using a DAA. Group B received THA surgery using a DLA. Every patient in the trial was monitored prospectively for at least a year.

Inclusion criteria:
1. Patients between the ages of 20 and 70.
2. Cases of hip osteoarthritis.
3. No history of total hip replacement surgery.
4. Patients who were surgically fit.

Exclusion criteria:
1. A failed hip total arthroplasty procedure in the past.
2. Patients who were surgically unfit.
3. Individuals with active infection.
4. Patients who had a BMI of greater than 35
5. Individuals suffering from osteoporosis

Ethical approval:
Approval was taken from Zagazig university institution review board (IRB), written consent was obtained from subjects who participate in this study after informing them about the study and steps which were done and their capability to withdraw at any time. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Clinical evaluation, radiographic evaluation (including pelvic CT and X-ray), and standard preoperative laboratory tests were all performed on all study participants.

Functional assessment.
The Harris Hip Score (HHS) is based on a total of 100 points. It requires a surgeon to grade patients' pain (44 points), mobility and walking (47 points), joint movement (5 points), and absence of deformity (4 points). The higher the score the better is the outcome.

Surgical Technique:
Direct Anterior Approach:
Patients were positioned in a supine position on a regular operating table that could be reflexed at the hip. We added an extension table to allow dragging the patient down on the radiolucent part of the table and urinary catheter was inserted and fixed at the foot of the table between the patient's legs to allow accessible urinary monitoring during the operation.

Patient was positioned slightly near the edge of the table towards the same operating side and trunk support was positioned on the contra-lateral iliac crest to hold the position.

Contra-lateral arm rest was fixed parallel to the table centered over the level of patient's patella to allow accommodating the flexed adducted limb. Before draping, we checked with C-arm that both hips are in the radiolucent area of the table **(Figure 1).**

Initial Incision Planning:
Three anatomical landmarks were identified and marked with non-erasable marker **(Figure 2)**:
1- The anterior superior iliac spine (ASIS)
2- The tip of the greater trochanter
3- The fibular head.

Fig. (1): Operating room (OR) picture showing positioning and draping of the patient.

We added another anatomical landmark at upper pole of patellae of both sides for easy pre- and postoperative assessment of limb length discrepancy (LLD).

Fig. (2): Intraoperative photo showing positioning and identification of important landmarks.

Initial Skin Incision:

The skin incision started 2 cm distal and 2 cm lateral to the ASIS and extended in distal direction towards the fibular head for 7-12 cm.

The subcutaneous tissue was sharply dissected in line with the incision using knife. Blunt dissection of the subcutaneous tissue from the tensor fascia lata (TFL) muscle fascia was performed to expose its white fascia. Here, going medial in the purple fascia over the sartorius was avoided to avoid injury of lateral cutaneous nerve of the thigh. The whitish fascia over TFL was incised using a scissor in line with the incision.

Blunt dissection of the TFL muscle from its covering fascia on the medial side then developing the intermuscular plane between sartorius medially and TFL using blunt dissection were done making sure to stay within TFL sheath to avoid injury of lateral cutaneous nerve of the thigh. Then the deep internervous plane between rectus femoris and gluteus medius was identified where the ascending branch of lateral circumflex femoral artery can be identified just distal to the intertrochanteric line. These branches were carefully ligated to avoid possible hematoma collection postoperatively**.**

Capsule Exposure:

Once these vessels were ligated, the fat pad under the rectus femoris muscle could be identified. A sharp retractor was placed medial to the TFL muscle and over the lateral border of the femur and a second blunt retractor was placed over the extracapsular inferior aspect of the femoral neck just proximal to lesser trochanter retracting rectus femoris muscle and exposing the anterior capsule

This was followed by removal of the fat pad and iliocapsularis muscle with cobb type curette to identify the anterior capsule. The assistant could hold the hip in slight flexion to relaxes the rectus femoris muscle and femoral vessels while a blunt Hohmann retractor was placed over the anterior aspect of the acetabulum.

Capsulectomy, neck cut and extraction of the head:

A capsulectomy was done in all cases in this series then Hohmanns were repositioned intracapsular over the superior and inferior neck stump.

Neck cut level was done as planned in preoperative templating and was referenced by lesser trochanter or saddle area. Neck cut osteotomy was performed using a long narrow saw blade and completed with osteotome. The femoral neck osteotomy could then be made either with a single cut or a parallel two cuts technique to facilitate removal of the femoral head. Corkscrew was introduced into the cartilage portion of the head and head was twisted several times then extraction of the head was done.

Acetabular Preparation:

Exposure of the acetabulum started with Hohmann placement. Acetabular roof Hohmann retractor was positioned over the anterior wall of the acetabulum. Inferior neck Hohmann retractor was positioned below transverse acetabular ligament after release of the inferior capsule. Posterior acetabular double pronged Hohmann retractor was positioned behind the posterior wall and it pushed the femur backwards to expose the acetabulum **(Figure 3).**

Labrum was excised using a fresh “15” blade or just radial incisions all around was enough. Removal of the pulvinar tissues was done to identify the true floor. Sequential reaming of the acetabulum using offset reamer was performed. A straight reamer and straight cup applicator were used.

Fig. (3): Intraoperative picture from outside the field showing 360 acetabular exposure after proper application of Hohmann retractors.

The acetabular component was inserted in the reamed acetabulum. Intraoperative fluoroscopy was used to assess the cup ante-version, inclination angle and center of rotation then the cup was introduced after proper identification of the size and ante-version**.**

Femoral Release:

It began by placing the femur in a position of adduction and external rotation in order to finish releasing the superior and medial joint capsule, while placing a double-pronged retractor under the greater trochanter to protect the gluteus medius fibers. Next step was releasing posterior capsule and piriformis fossa through pulling the femur forward using a bone hook. Obturator externus tendon was the limit of the release and it was left intact to avoid jeopardizing the posterior stability **(Figure 4)**.

Femoral Canal Preparation:

It started with reflexing the table to extend the extremity then the leg was passed beneath the contra-lateral limb and was put on the contra-lateral arm rest with external rotation of the femur at least 90 degrees and adduction of the limb with flexion of the knee to 60 degrees, surgeon avoided excess flexion of the knee as it increases tension of the rectus femoris muscle, which pushes the femur backwards.

Medial femoral Hohmann retractor was positioned on the medial side of the calcar pushing the femur laterally. Box osteotome was used to mark the entry posterolateral and parallel to the posterior neck.

Varus malposition was avoided by entering the femoral canal as lateral as needed. Curved femoral canal finder was used to pave the way for the coming sequential rasping and broaching both in the longitudinal axis of the femur and lateral entry, care was taken to this step as it is a very important instrument for proper femoral component position**.**

Dual offset rasp was used to rasp the femoral canal, beginning with the smallest rasp attached to the rasp handle and increasing the size of raspes one at a time. Stopping the broaching when axial and rotational stability were achieved. The ante-version was automatically set by the anatomy of the femur.

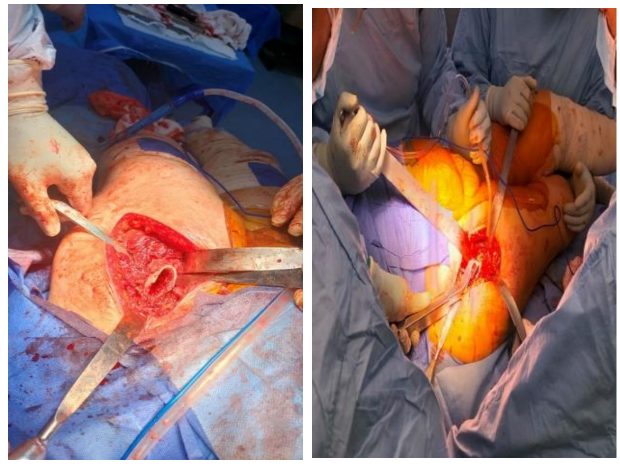

Fig. (4): Picture showing full accessibility for femoral canal after proper release and accurate Hohmann retractor application.

The femoral stem size was that of the last fitting rasp. The neck length was that of the preoperative templating. The head trial was determined by the cup liner size, after applying stem, head and neck trials. We assessed:

(1) Stability of the hip in position of external rotation, abduction and extension.
(2) Assessment of posterior stability in position of (flexion, adduction and internal rotation) to confirm proper femoral release without jeopardizing the posterior stability.
(3) Telescoping both axial traction and lateral traction.
(4) LLD using Galeazzi test and intraoperative fluoroscopy
(5) Impingement in position of flexion then applying external and internal rotation.

Final Closure:

2 grams of vancomycin powder were put in all patients. Closure of the fascia of TFL was done in continuous manner, closure of the subcutaneous layer interrupted manner, and closure of the skin in interrupted sutures. The wound was then covered with occlusive dressing.

Direct Lateral Approach:

All patients were operated upon in lateral decubitus position and the pelvis was secured in neutral position **(Figure 5)**.

Fig. (5): Picture showing patient in standard lateral decubitus position with anterior and posterior trunk support (yellow arrows) and skin marking centered over greater trochanter.

Initial Skin Incision:

After skin preparation and draping of the ipsilateral side only, a longitudinal 15 cm incision centered over greater trochanter was made through skin and subcutaneous tissue, with its end directed slightly posterior. Sharp dissection was continued down to the fascia lata.

Fascia lata was divided over the center of the greater trochanter, extending it distally to the proximal femoral shaft and proximally splitting the gluteus maximus muscle fibers to reveal the underlying gluteus medius muscle. Bursal tissue was removed over the greater trochanter and gluteus medius muscle as needed**.**

Capsule exposure and capsulotomy:

An incision was outlined to release the anterior third gluteus medius from the greater trochanter. The proximal part of the incision was limited by the superior gluteal nerve and vessels, crossing 3-5 cm proximal to the tip of the greater trochanter. A substantial portion of gluteus medius insertion was preserved posteriorly. Distally, the anterior fibers of vastus lateralis were elevated from the anterior femur. The incision through the gluteus medius and minimus was deepened proximally, retracting the anterior flap to show the hip capsule superiorly and adjacent supra-acetabular ilium. Capsulectomy was done to expose the femoral head and neck and permit free external rotation of the femur.

Extraction of the head and neck cut: It was done as in DAA.

Acetabular Preparation:

Full acetabular exposure **(Figure 6)** was done by: (1) inferior capsulotomy till reaching the transverse acetabular ligament (TAL) (2) A Hohmann was put posterior on wall of acetabulum retracting the femur posteriorly (3) Another Hohmann was put on the anterior wall in the peri-labral sulcus retracting the capsule and the anterior fibers of gluteus medius muscle (4) another Hohmann might be put superior to acetabular roof and was anchored against ilium (5) Removal of the pulvinar tissue was done using cautery to identify true floor (6) Removal of the labrum was done using a fresh blade. Sequential reaming and trial insertion were done.

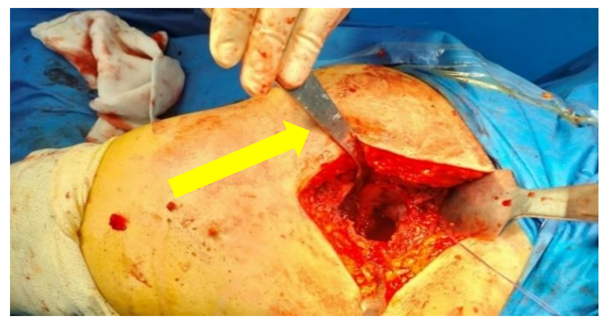

Fig. (6): Intraoperative picture showing full acetabular exposure after proper positioning of Hohmann retractors with femur pushed backwards (yellow arrow).

Femoral Canal Preparation:

Exposure of the proximal femur was gained by careful placement of the involved limb in an externally rotated and flexed position with the lower leg hanging over the edge of the operating table. To maintain sterility, the lower leg was inserted into an envelope or pocket made from a sterile sheet. Retractors were used as necessary to expose femoral head and neck. The assistant held the patient's leg perpendicular to the table surface, which was thus the plane of the knee axis **(Figure 7)**.

Final Closure:

2 grams of vancomycin powder were put in all patients. The gluteus minimus and medius tendons were repaired back to anatomic position and were closed with a running braided, absorbable suture while ensuring not to strangle the muscles. Finally, the iliotibial band, subcutaneous tissue, and skin were closed according to surgeon preference.

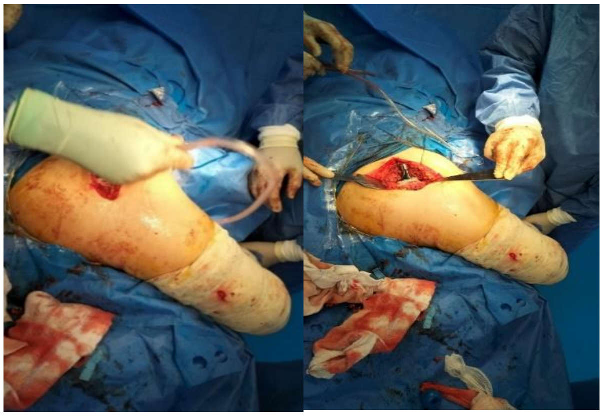

Fig. (7): Picture showing leg position during femoral broaching

Statistical analysis:

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software.

Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) **(Statistical Package for the Social Sciences)** software for analysis. According to the type of data qualitative represent as number and percentage , quantitative continues group represent by mean ± SD , the following tests were used to test differences for significance;. difference and association of qualitative variable by Chi square test (X^2).

Differences between quantitative independent groups by t test. P value was set at <0.05 for significant results & <0.001 for high significant result.

RESULTS

❖ ***Preoperative parameters:***

In terms of sex distribution and age, there was no significant difference or correlation between groups A and B. Group A's BMI was substantially lower than Group B's (Table 1).

Table 1: Demographic data distribution between studied groups

			Group A	Group B	t/X^2	P
Age			**43.28±11.56**	**47.56±12.46**	**1.067**	**0.29**
BMI			**30.43±2.4**	**32.4±1.98**	**2.8**	**0.011***
Sex	**Male**	**N**	**10**	**9**	**0.11**	**0.74**
		%	**55.6%**	**50.0%**		
	Female	**N**	**8**	**9**		
		%	**44.4%**	**50.0%**		
Total		**N**	**18**	**18**		
		%	**100.0%**	**100.0%**		

In terms of co-morbidities, there was no discernible difference or correlation, and over one-third of the group under study had either DM, HTN, or BA (Table 2).

Table 2: Co-morbidities data distribution between studied groups

			Group		X^2	P
			Group A	Group B		
DM	**-VE**	**N**	**10**	**10**	**0.0**	**1.0**
		%	**55.6%**	**55.6%**		
	+VE	**N**	**8**	**8**		
		%	**44.4%**	**44.4%**		
HTN	**-VE**	**N**	**13**	**11**	**0.50**	**0.48**
		%	**72.2%**	**61.1%**		
	+VE	**N**	**5**	**7**		
		%	**27.8%**	**38.9%**		
Bronchial asthma	**-VE**	**N**	**12**	**13**	**0.13**	**0.72**
		%	**66.7%**	**72.2%**		
	+VE	**N**	**6**	**5**		
		%	**33.3%**	**27.8%**		
Total		**N**	**18**	**18**		
		%	**100.0%**	**100.0%**		

There was no significant difference or association, and the majority were ASA II (Table 3).

Table 3: Injuries characters distribution between studied groups

			Group		X^2	P
			Group A	Group B		
ASA	I	N	9	5	3.0	0.22
		%	50.0%	27.8%		
	II	N	8	9		
		%	44.4%	50.0%		
	III	N	1	4		
		%	5.6%	22.2%		
SIDE	Left	N	7	8	0.11	0.74
		%	38.9%	44.4%		
	Right	N	11	10		
		%	61.1%	55.6%		
Total		N	18	18		
		%	100.0%	100.0%		

ASA: American Society of Anesthesiology.

There was no significant difference regarding length of hospital stay (Table 4).

Table 4: Length of hospital stay distribution between studied groups

	Group A	Group B	t test	P
Admission to operation	3.33±1.13	3.55±1.24	0.559	0.58

❖ ***Intraoperative parameters***

In terms of operation time, there was a notable difference (it was longer in group A). In terms of blood loss and postoperative blood transfusion, there was a notable difference (raised in group B). In group A, three instances suffered intraoperative fractures, and cerclage was the implant used; in group B, only two cases had intraoperative fracture and the same implant was used (Table 5).

Table 5: Operation characters distribution between studied groups

			Group A	Group B	t/ X^2	P
Operation time (min)			123.33±16.98	91.39±12.34	6.45	0.0001**
Incision length			9.11±1.52	8.94±1.34	0.347	0.731
Blood loss			391.67±100.37	509.44±162.86	2.6	0.013*
Blood transfusion	No	N	18	13	5.8	0.02*
		%	100%	72.2%		
	Yes	N	0	5		
		%	0%	27.8%		
Intraoperative fracture (Implant used)	No	N	15	16	0.23	0.63
		%	83.3%	88.9%		
	Yes	N	3	2		
		%	16.7%	11.1%		
Total		N	18	18		
		%	100.0%	100.0%		

❖ ***Post-operation parameters:***

Cup inclination was higher in group A with no statistically significant difference between both groups (Table 6).

Table 6: Postoperative radiological characters distribution between studied groups

		Group A		Group B		t/ X^2	P
Cup inclination		43.6±2.09		42.3±2.5		1.89	0.11
Cup anteversion		18.16±0.77		18.31±0.99		0.506	0.616
Stem alignment	Neutral	N	16	N	17	0.36	0.55
		%	88.8%	%	94.4%		
	Varus	N	2	N	1		
		%	11.2%	%	5.6%		

There were only three incidences of superficial infection, two in group A and one in group B, which manifested as minor serous discharge. Depending on culture and sensitivity test, all were managed with regular dressing changes and antibiotics. There was no discernible difference between the two groups' approaches to pain management and in terms of LLD.

Regarding nerve damage in group A, three patients had meralgia paresthetica as a result of injury to LCN of thigh. Group B did not experience any incidences of nerve damage (SGN), and there was no discernible difference between the two groups. No other issues such as dislocation, deep infection, or DVT were present (Table 7).

Table 7: Post-op. complication distribution between studied groups

			Group		X^2	P
			Group A	Group B		
Superficial Infection	No	N	16	17	0.36	0.55
		%	88.9%	94.4%		
	Yes	N	2	1		
		%	11.1%	5.6%		
Post-op. pain	Mild	N	17	15	1.12	0.29
		%	94.4%	83.3%		
	Moderate	N	1	3		
			5.6%	16.7%		
LLD	Yes	N	0	2	2.11	0.15
		%	0%	11.1%		
	No	N	18	16		
		%	100%	88.9%		
Nerve injury	Yes	N	3	0	3.27	0.07
		%	16.6%	0%		
	No	N	15	18		
		%	83.4%	100%		
Total		N	18	18		
		%	100.0%	100.0%		

There was highly significant difference between groups as regard discontinuation of use of frame and cane/crutches (Table 8).

Table 8: Use of assistive devices (in weeks):

	Group A	Group B	T test	P
Frame discontinue (Days)	10.56±2.36	19.33±3.43	8.94	0.0001*
Cane/ Crutches discontinue (weeks)	3.72±0.67	6.56±1.04	9.7	0.0001*

There was significant difference between groups as regard recorded HHS one month postoperatively and 3 months postoperatively. With no significant difference between groups as regard recorded HHS at 6 months postoperatively (Table 9).

Table 9: HHS distribution between studied groups in different time of follow-up

	Group A	Group B	T test	P
HHS_1M	75.82±1.74	73.0±3.11	2.71	0.002*
HHS_3M	82.06±2.21	80.00±3.51	2.1	0.046*
HHS_6M	87.67±2.87	86.33±2.83	1.403	0.169

DISCUSSION

As regard demographic data, the age distributions for groups A and B were 43.28±11.56 and 47.56±12.46, respectively, with a p-value of 0.29 indicating no statistically significant difference between the two groups and a p-value of 0.73 indicating no statistically significant difference in the sex distribution. Group A's BMI was substantially lower than Group B's (P-value = 0.008).

As regard co-morbidities distribution between the studied groups

Co-morbidities did not differ significantly, and over one-third of the patients under study had either DM, HTN, or BA.

In the current study, **injuries characters distribution between both groups** revealed that the majority of cases were right-sided hip OA and ASA II, with no statistically significant difference between the affected side and ASA score.

As regard **length of hospital stay distribution between the studied groups,** there was no significant difference with P-value 0.58.

According to **Yue *et al.*** [(15)]'s meta-analysis, hospitalization duration using DAA was, on average, 1.19 days shorter than that following the lateral approach.

As regard **operation characters distribution between studied groups:** Group A had a considerably longer operation time (p-value 0.0001). With a p-value of 0.013, group B experienced a statistically greater intraoperative blood loss (509.44±162.86) than group A (391.67±100.37). With a p-value of 0.01, group B had a substantially greater blood transfusion rate than group A among the groups under study. With a p-value of 0.01, three instances in group A had intraoperative fractures, and the implant used was cerclage; only two cases in the second group had the same implant.

Although they were not statistically significant, **Ben Elyahu *et al.*** [(16)] demonstrated that the DAA required less time to operate than the DLA.

Ben Elyahu *et al.* [(16)] assumed that the displaced femoral neck fracture, not the surgical technique, was the primary cause of the blood loss in both groups, and discovered equal rates of blood loss in both surgeries. As a result, the two groups' rates of blood loss did not differ significantly.

The meta-analysis by **Ang *et al.*** [(17)] revealed a longer operating time for DAA than DLA, which was assumed to be caused by the experience of the surgeon. It has also been shown that the usage of a fracture table and/or intraoperative fluoroscopy during DAA THA with blood loss increases with the length of the procedure for DAA as opposed to DLA.

Jin *et al.* [(18)] demonstrated that patients who received the DAA had scars that were noticeably shorter, had lower scar scores, and were more satisfied with their scars. Compared to the PLA group, the DAA group's mean procedure time was lengthier. Additionally, the transfusion rate and mean HGB decline in the DAA group were substantially lower than those in the PLA group.

Meta-analysis of **Yue *et al.*** [(15)] revealed that while the transfusion rates for the DAA and lateral approach groups were comparable, the DAA group required more time for surgery.

As regard **post-operation radiological characters distribution between the studied groups:** All of the cups were in the safe zone, and there was no statistically significant difference between the two groups in terms of cup inclination, with group A having a higher inclination (43.6±2.09) than group B (42.3±2.5) with a P-value of 0.066. Additionally, there was no statistically significant difference between the two groups in terms of stem alignment and cup anteversion (p-values of 0.45 and 0.0616, respectively)

A 2021 meta-analysis by Huang *et al.* [(19)] showed that the DAA group's postoperative dislocation rate was noticeably greater than the LA group's. They assessed prosthesis malposition by comparing the DAA and LA groups in terms of improper cup anteversion, abduction, and stem alignment. They discovered that the DAA group's prosthesis malposition rate was substantially lower than the LA group's, demonstrating DAA's superiority in terms of proper prosthesis placement. They therefore hypothesized that the loosening of the tendon and capsule around the hip, rather than the prosthesis malposition, may be the cause of the increased incidence of postoperative dislocation in DAA as opposed to LA.

Jin *et al.* [(18)] demonstrated that there was no discernible difference in the two groups' acetabular inclination angles. Compared to the PLA group, the DAA group's average acetabular anteversion angle was noticeably lower. Stem anteversion and the femoral stem's varus/valgus angle did not significantly differ between the DAA and PLA groups in terms of stem positioning.

In the meta-analysis of **Yue *et al.*** [(15)], according to radiographic assessments, the two methods were linked to comparable rates of varus or valgus stem placement, as well as comparable degrees of inclination and anteversion.

In terms of **postoperative complications** in the current investigation, only three cases—two in group A and one in group B—presented with superficial infection in the form of mild serous discharge, and there were no statistically significant differences in this regard. Depending on sensitivity and culture, all were managed with regular dressing changes and antibiotics. In terms of pain management, there were no instances of severe (disabling) pain and no significant difference between the two groups (p-value 0.28). Regarding LLD, all cases were evaluated clinically and radiologically after surgery, and LLD greater than 5 mm was regarded as an anomaly. With a p-value of 0.14, there was no significant difference between the two groups, and only two individuals in group B suffered LLD as a result of a high implanted femoral stem, measuring roughly 1 cm. Regarding nerve injury, group A experienced three cases of meralgia parathetica as a result of injury to LCN of the thigh, but group B did not experience any cases of nerve injury (SGN), and there was no discernible difference between the two groups. No other issues such as dislocation, deep infection, or DVT were present.

Ben Elyahu *et al.* [16] discovered that after the 6-week follow-up and following hospital discharge, individuals in both groups (DAA and DLA) had comparable pain levels, which could be explained by the femoral neck fracture-related acute pain they experienced. Therefore, it was challenging to identify a meaningful distinction between the two strategies.

Ang *et al.* [17] revealed that the mean length of stay for DAA was somewhat lower than that of DLA. The risks of dislocations, periprosthetic fractures, and VTE were the same for DAA and DLA, and there was no difference in the risk of neurapraxia.

In a meta-analysis by **Huang *et al.*** [19]**,** the BMI of less than 35 kg/m^2 in the enrolled patients may have contributed to the lack of a significant difference in the rate of surgical site infection between the DAA and LA groups.

Jin *et al.* [18] demonstrated that the DAA group's mean LLD was substantially lower than the PLA group's. Within seven days following the procedure, the DAA group's VAS scores were higher than the PLA group's. After a while, though, the disparity lessened. LFCN dysesthesia tended to be more common in patients in the DAA group. Other postoperative problems, such as wound complications, dislocation, intraoperative fracture, venous thromboembolism, or postoperative infection, did not vary. During the follow-up period, no patients had revision surgery or were readmitted to the hospital.

Meta-analysis of **Yue *et al.*** [15] demonstrated that the risk of dislocation, intraoperative fracture, nerve palsy, superficial infection, deep infection, and postoperative hematoma was comparable for both DAA and the lateral route. On the other hand, DAA was linked to an increased risk of cutaneous nerve palsy. Much improved pain scores were reported following DAA.

Huang *et al.* [19] discovered that, in comparison to the LA group, the DAA group had a comparatively low rate of leg length disparity. Although they hypothesized that the supine position employed in DAA was better for precise prosthetic installation and limb length management, this meta-analysis included the DLA in the lateral decubitus position, which resulted in a comparatively high rate of leg length discrepancy in the DLA group. In **Huang *et al.*** [19] meta-analysis, they discovered that the DAA group had a greater overall rate of nerve damage than the DLA group. In the terms of using assistive devices, with a p-value of 0.0001, the two groups' withdrawal of utilizing frames, crutches, and canes revealed a highly significant difference.

Ben Elyahu *et al.* [16] showed improved functional outcomes during the 6-week follow-up in the DAA group. Even though the DAA cohort's patients were already walking more easily when they were discharged, the two groups' overall HHS scores were comparable at that early point and had considerably improved by the 6-week follow-up.

Ang *et al.* [17] claimed that DAA demonstrated an earlier recovery of function in the early post-operative period. This faster recovery has been ascribed to DAA's ability to spare muscles by using an inter-nervous plane between the gluteus medius and rectus femoris deeper and between the tensor fasciae latae and sartorius muscle superficially. As a result, soft tissue injury is reduced and muscle splitting is prevented.

In the current study, **the postoperative functional scoring system** carried out at various intervals Following up revealed that the two groups differed statistically significantly in terms of HHS-1M and HHS-3M, with p-values of 0.01 and 0.04, respectively. With a p-value of 0.169, no statistically significant difference between the two groups was shown in terms of HHS-6M.

Ben Elyahu *et al.* [16] claimed that upon discharge, the total Harris Hip Scores of the DLA and DAA groups were comparable. However, the DAA arm patients had certain benefits that became apparent in the initial days following surgery.

The results **Ang *et al.*** [17] HHS claims that there is no clinically meaningful difference between DAA and LA in HHS at 12 weeks.

Functional results, perioperative parameters, and complications of THA done via DAA versus PA or LA were compared in an updated comprehensive level-1 meta-analysis. Early postoperative functional outcomes in terms of HHS were better for DAA than for LA, according to **Ang *et al.*** [17], with a statistically significant difference at 12 weeks.

Over all **Ben Elyahu *et al.*** [16] demonstrated that the direct anterior approach to complete hip arthroplasty for a displaced femoral neck fracture in an active older patient yields improved early functional outcomes. Patients who underwent surgery using the direct anterior method also had the opportunity to return home sooner than those who underwent surgery using the direct lateral approach.

Collectively, based on the results of **Huang *et al.*** [19] according to the meta-analysis, the DAA group had a lower rate of prosthesis malposition, leg length discrepancy, and Trendelenburg gait than the DLA group, despite the fact that there was no difference in the rates of surgical site infection, heterotopic ossification, and reoperation. This suggests that DAA has advantages in terms of precise prosthesis placement and less damage to the surrounding hip musculature. However, the DAA group also experienced a greater rate of dislocation, periprosthetic fracture, prosthesis loosening, and nerve injury, indicating that the exposure offered by DAA was somewhat limited and that there was a longer learning curve for DAA that needed to be surmounted. In light of this, mastery of the surgical technique is essential to lowering the risks associated with THA.

Huang *et al.* [19], according to a meta-analysis, found that the longest learning curve was frequently cited as DAA's worst drawback for THA. Because of the exposure required to prepare the femur and implant the prosthesis, prior studies in the DAA have documented a greater rate of femoral failure throughout the learning curve, including periprosthetic femoral fracture and aseptic loosening. LA, on the other hand, might offer superior femoral and acetabular exposure. As previously stated, their meta-analysis revealed that the DAA group had a considerably higher rate of prosthesis loosening and periprosthetic fractures than the LA group.

Jin *et al.* [18] revealed that at seven days, four weeks, and three months after surgery, the DAA group tended to have a higher HHS than the PLA group. At the 6-month follow-up, however, the differences (in the HHS) between the DAA group were no longer noticeable.

Meta-analysis of **Yue *et al.*** [15] demonstrated that while DAA and the lateral method produced comparable results on these measures at two years, DAA produced better functional outcomes and considerably higher Harris Hip Score (HHS) scores at six weeks, six months, and one year.

CONCLUSION

While the long-term follow-up results seem to indicate that the expected outcomes are comparable to other traditional approaches, the direct anterior approach was demonstrated in this study to offer the potential benefits of reduced muscle injury, a shorter hospital stay, a quicker return to work and activities, and a lower dislocation rate.

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