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Outcome of primary total hip arthroplasty through direct anterior approach

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Abstract
Background and Aim: Total hip arthroplasty is one of the most effective orthopedic procedures, adoption of minimally invasive approaches aims to enhance functional outcome and decrease the burden of patient's recovery.
Aim of the study: Is to explain the surgical approach and to demonstrate the results that were attained and the complications that occurred.
Methods: 30 hips were included in this study; they underwent a n anterior approach for hip replacement. Complications, surgical factors, and patient characteristics were all noted and assessed. Harris hip score was employed to assess the clinical results.
Results: The mean clinical score was 96 points at 1 year follow-up compared to pre-operative score of 54. One patient had a revision while other complications were clinically insignificant. With carefully chosen patients, the direct anterior interval for hip replacement is a viable procedure that produces positive results.

Keywords: Direct anterior approach, hip arthroplasty, minimally invasive surgery

Introduction
One of the most common and effective orthopedic surgical treatments today is total hip arthroplasty (THA). There is a lack of consensus over the hip replacement procedure that will produce the greatest outcomes and cause the fewest drawbacks [1]. Multiple surgical approaches have been used for total hip arthroplasty including direct lateral, posterior, anterior, and anterolateral approach [2].
In minimally invasive surgery (MIS), the length of the skin incision and the dissection of soft tissues are reduced compared to conventional methods. As an alternative, completely new methods have been described, such as the direct anterior approach, which is said to be safe and effective for THA [3]. The direct anterior approach was first utilized by Hueter [4] in 1870 and subsequently by Smith-Petersen [5] and Judet. [6] In order to access the hip, the patient is positioned supine and the space between the sartorius and tensor fascia lata is used. [3] Supporters of the anterior approach claim that it provides an intermuscular plane that protects the glutei, as well as faster healing and shorter hospital stays, less pain, more precise component alignment, a lower chance of dislocation, and more precise leg length restoration [7, 8]. This method is regarded to have a steep learning curve, the necessity for additional tendon and capsule release, the potential for femoral fractures, and difficulties using it on obese patients, among other problems [7, 9]. In order to lower the risk of failure and complications, it is crucial to be aware of any potential problems during primary THA procedures using the DAA, which is becoming a more common technique [2].

Patients and Methods
This study was a prospective and retrospective study that comprised 29 patients (30 hips) who received primary complete hip replacement through direct anterior approach from September 2021 to September 2022. The study was approved by the ethical committee and informed consents were obtained from patients participating in the research. Patients included in the study were cases with moderate to severe arthritis of the hip interfering with daily activity and

not responding to conservative treatment for at least 3 months. Exclusion Criteria were cases of revision THA, acetabular defects requiring augmentation or femoral deformities, congenital or developmental disorders of the hip, previous hip surgeries, history of deep hip infection, morbid obesity (BMI>40), severe flexion deformity of the hip requiring additional soft tissue release.

Pre-operative evaluation comprised: Complete history taking, physical examination, antero-posterior and lateral x-ray views of both hip and routine pre-operative laboratory investigations. All patients were categorized in accordance with the American Society of Anesthesiologists (ASA) Physical Status Classification System as part of the preoperative evaluation [10]. The age of the patients ranged from 19 years to 77 years with a mean age of 54.03±15.32 years. Thirteen patients (43.3%) were 60 years or older. Out of those patients, nine (31%) were males while 20 (69%) were females. Twenty-five patients (83.4%) had primary osteoarthritis of the hip (OA) while 5 (16.6%) had secondary OA of the hip due to avascular necrosis of the femoral head (AVN). As stated by ASA Score, nineteen patients (63.3%) were class I, 9 (30%) were class II and 2 (6.7%) were class III. For this cohort of patients, average weight was 79 kg, average height was 171 cm, and average BMI was 27.1. Eleven patients (36.7%) were of normal weight (BMI less Than 25) while 14 patients (46.6%) were overweight (BMI 25-29.9), and 5 patients (16.6%) were obese (BMI 30 or greater).

Patients and Methods

Surgery was carried out under general anesthesia in all patients to ensure muscle relaxation. A femoral nerve block was also applied to all patients with induction of anesthesia. The patients also received a dose of prophylactic intravenous antibiotics before induction of anesthesia. Special instrument set was required for the procedure including: an offset acetabular reamer, curved cup application handle, an offset femur broach handle and a set of curved retractors. The patient was positioned supine. on a radiolucent table with the possibility to extend the distal half of the table and hip situated above the table break to allow for hyperextension of the hip joint throughout the process. (Fig.1)

Fig 1: Patient positioning

For vertical skin incision, anterior superior iliac spine (ASIS) was palpated, and about 8 to 10 cm of the first incision were removed with its beginning approximately 2 cm lateral and inferior to ASIS and extends toward the fibular head. Skin was opened and subcutaneous fat carefully dissected to avoid injury of lateral cutaneous nerve of the thigh (LCN). The interval between the sartorius and Tensor fascia lata (TFL) should be identified. Fascial incision was performed 1 cm lateral to that interval through the sheath of TFL and the muscle was peeled from its sheath bluntly towards a lateral direction to open the space between it and Sartorius. For bikini skin Incision, A vertical line was drawn down from ASIS and the incision was placed horizontally along the inguinal skin crease with one third of the incision located medial to the vertical line and two third lateral to the vertical line. Dissection of the subcutaneous tissue was performed in the lateral part of the wound up to ASIS and avoided in the medial part to avoid injury to LCN. After That, Fascial incision and the following steps are the same for the two types of skin incision.

After opening the space between Sartorius and TFL, two retractors were inserted in this interval medially and laterally to expose the ascending branch of the lateral femoral circumflex artery over the intertrochanteric line in close relation to the posterior wall of TFL sheath. Ligation or cauterization of this vessel and its concomitant veins is crucial to a void a significant bleeding. Deep Fascia was then incised to expose the pericapsular fat overlying the capsule. Hip may be flexed at this point to decrease the tension of rectus femoris. The fat was excised to expose the capsule. Next, iliocapsularis muscle was identified and bluntly dissected from the capsule. At this point, reflected head of rectus femoris may be released to widen working space. At last, an anterior capsulectomy was done to expose the head starting from inter-trochanteric line leaving a small cuff of capsule at the anterior border of the acetabulum to help prevent friction between the acetabular cup and iliopsoas tendon later.

Following the removal of the capsule, neck osteotomy was performed. It could be done in the form of a single cut or step cut osteotomy in which the definitive cut was followed by another higher cut and the intermediate segment was removed to allow for a wider working space. In order to remove the head without damaging the TFL, a corkscrew is then introduced through the cortical side of the femoral head, or the femoral neck severed. Axial limb traction during this step can help smooth head extraction. After this, the limb was positioned in (Lazy figure of four) position in which the limb was externally rotated, knee flexed and placed Above the contralateral limb, two retractors are placed medial and lateral to the proximal femur and the Inferior capsular release was done at the 6 o'clock which avoids damaging the iliopsoas tendon while loosening the tight pubofemoral ligament down to the lesser trochanter level. A curved hohmann was placed over the anterior wall of the acetabulum and held by the assistant on the other side of the table, another retractor was positioned over the posterior wall retracting the femur and the third curved retractor can be placed at transverse acetabular ligament to facilitate exposure of the acetabulum. Traction and hip flexion can improve visualization at this point. Following the removal of the labrum, an offset reamer was used to ream the acetabulum after evaluating the bone structure of the socket. The acetabular cup is then inserted and hammered gently then fluoroscopy is employed to verify position of the cup before final placement. (Fig.2)

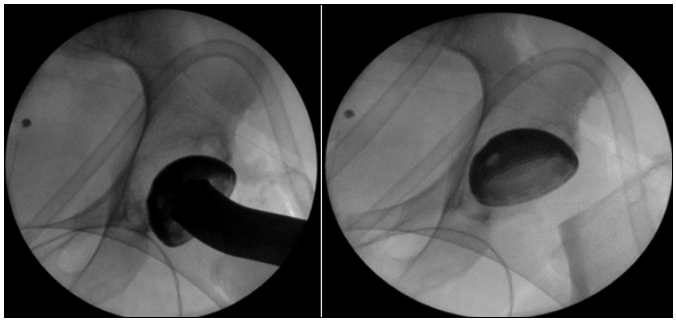

Fig 2: Placement of the cup with fluoroscopic guidance.

The lower part of the table was moved down allowing for hyperextension at the hip. The superior capsular release was started with the surgeon applying a bone hook into the medullary canal lifting the femur upward and stretching the superior capsule. Electrocautery was then used for the release at the site of 12 o'clock and the release was done gradually until the surgeon can lift the femur up denoting that the capsule has lost its tension and the release was complete. After that, the leg was inserted (Figure of four) in which the limb is extended, adducted, externally rotated and leg placed below the contralateral limb. (Fig.3)

Fig 3: Leg position for preparation of femur.

A hohmann retractor was installed over the tip of greater trochanter reflecting gluteus minimis muscle, another one was placed medial to the neck. Femur was broached with care taken to avoid excessive anteversion as it might affect stability of implants later. To maintain a good fit, one should make sure that the right amount of lateralization was used and to avoid varus malposition. A trial implant was placed in accordance with preoperative planning. Reduction was done by the assistant performing extension and internal rotation aided by the surgeon performing manual pressure of the trial head into the cup. Fluoroscopy was used to check position of implant and leg length comparing the level of lesser trochanter on both sides. The leg length and stability testing were performed clinically. (Fig.4,5)

Fig 4: Clinical assessment of Limb length.

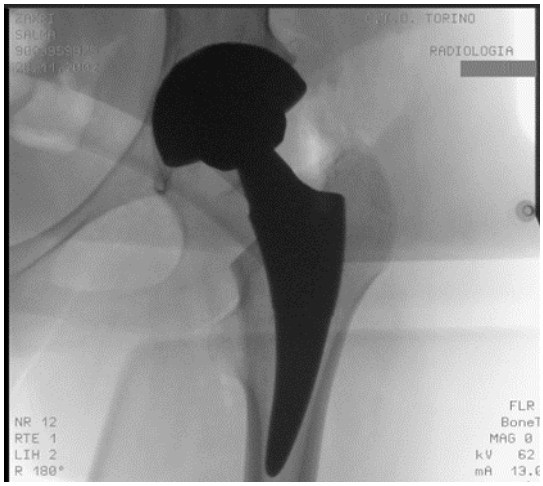

Fig 5: Fluoroscopic assessment of final trial.

Dislocation was done in external rotation and flexion aided by using a bone hook for traction. Then the femur was placed again in figure of four for removal of trial implant and placement of final implant. In this group of patients, all femoral stems and acetabular cups used were cementless. Bearing surfaces included: ceramic on ceramic, ceramic on polyethylene and metal on polyethylene. Sizes of the head included: 28mm, 32mm and 36mm.

Table 1: Bearing surfaces and head size.

Bearing surface	Head size	No. of patients
Ceramic on ceramic	28 mm	5
	32 mm	5
	36 mm	4
Ceramic on polyethylene	32 mm	3
	36 mm	7
Metal on polyethylene	28 mm	4
	32 mm	2

Drain usage was dependent on surgeon preference. In this study, drain was used in ten hips out of 30. TFL sheath was closed using interrupted sutures proceeded by subcutaneous tissue and skin closure. Patients were encouraged to start partial weight bearing in the same day of surgery using walking aids and progress gradually to full weight bearing. No special precautions or restrictions of hip motion were applied. Patients were typically discharged on day two after surgery unless there is an indication to stay in hospital. The routine postoperative protocol included removal of the drain 24 hours after surgery (if inserted in the first place), routine wound care, stitch removal after 2 weeks and chemical thromboembolic prophylaxis for 5 weeks. The follow up period was one year. The patients were subjected to clinical and radiological evaluation.

Harris Hip Score (HHS) [11] was the primary measure of functional outcome. HHS is interpreted as follows: Excellent: HHS 90 – 100, Good: HHS 80 – 89, Fair: HHS 70 – 79 and Poor: HHS less than 70. Plain X-rays were done twice at least for each patient. Post-operative x-rays were used to check position and alignment of acetabular cup and femoral stem. X-rays were done again one year later to evaluate osteo-integration and to detect complications such as loosening and heterotopic ossification which is assessed according to Brooker classification [12].

Statistical analysis

With the aid of the IBM SPSS software package version 20.0, data were fed into the computer and evaluated (IBM Corp., Armonk, New York). Number and percentage were employed to describe qualitative data. To confirm the distribution's normality, Shapiro-Wilk test was utilized. Interquartile range, mean, standard deviation, range (minimum and maximum), and range (minimum and maximum) were employed to describe quantitative data (IQR). The 5% level was employed to determine the results' significance. Spearman coefficient was used to compare two asymmetrically distributed quantitative variables using correlation.

Results

Functional outcome was evaluated using HHS at 12 months post-operative. It ranged from 69 to 100 with a mean HHS of 96.33±6.17, compared to pre-operative HHS ranged from 51 to 65 with a mean of 56.86±3.99. Comparing pre and post operative HHS shows a statistically significant improvement over the study period.

Table 2: Results according to final Harris Hip score.

Final HHS	Number of patients	Percentage
Excellent	27	90
Good	2	6.66
Poor	1	3.33
Total	30	100

Statistical analysis revealed that Harris Hip Score was inversely correlated with the age of the patients, BMI, and ASA score, and this was found to be statistically significant. Better HHSs were found in younger patients with less BMI and lower ASA score. (Fig.6-8)

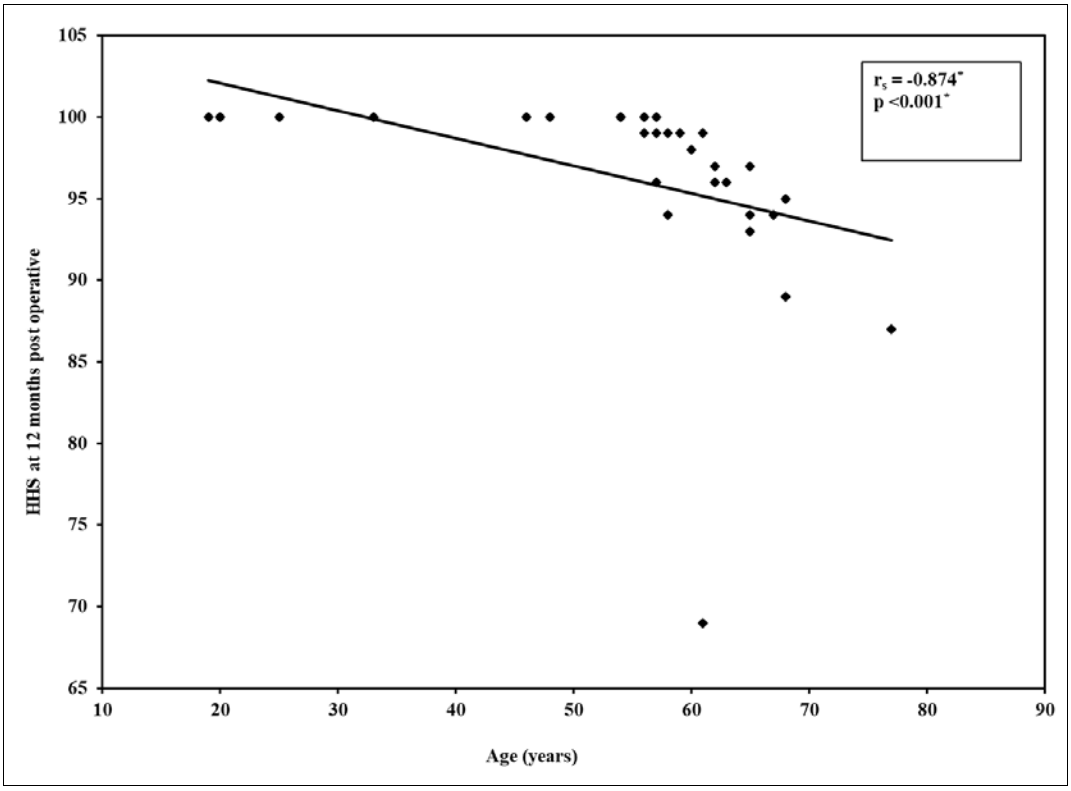

Fig 6: Relation between age and clinical outcome.

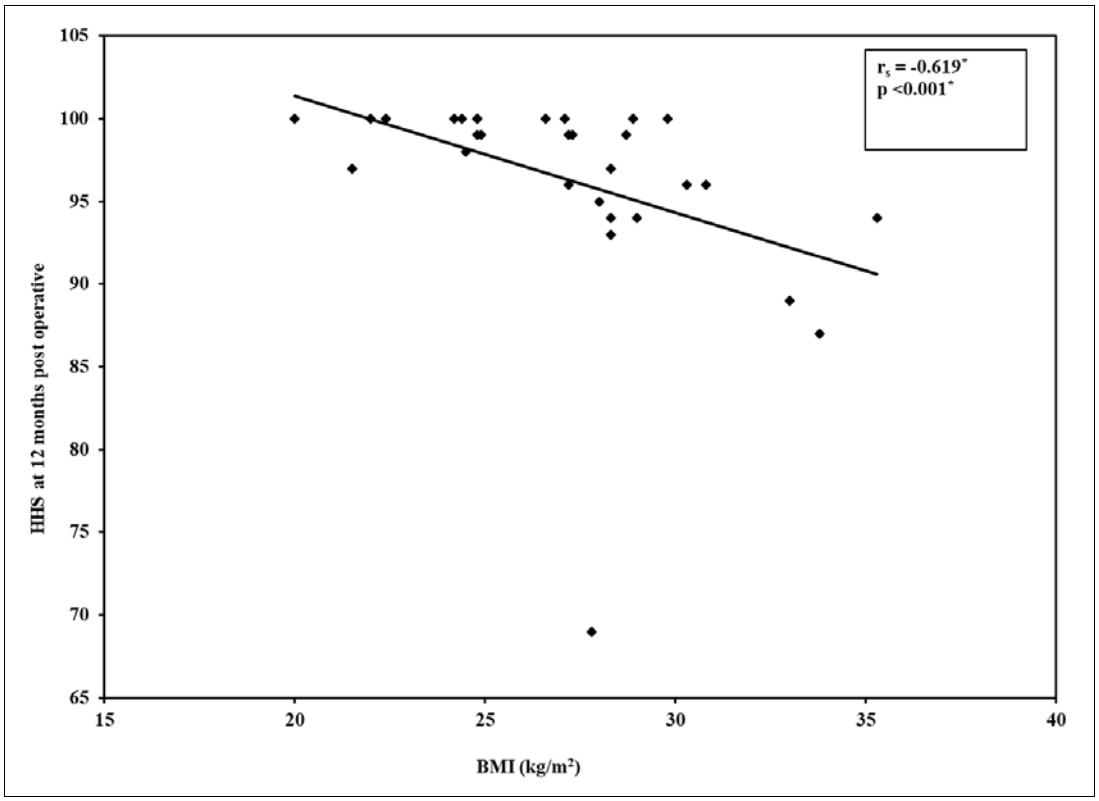

Fig 7: Relation between BMI and clinical outcome.

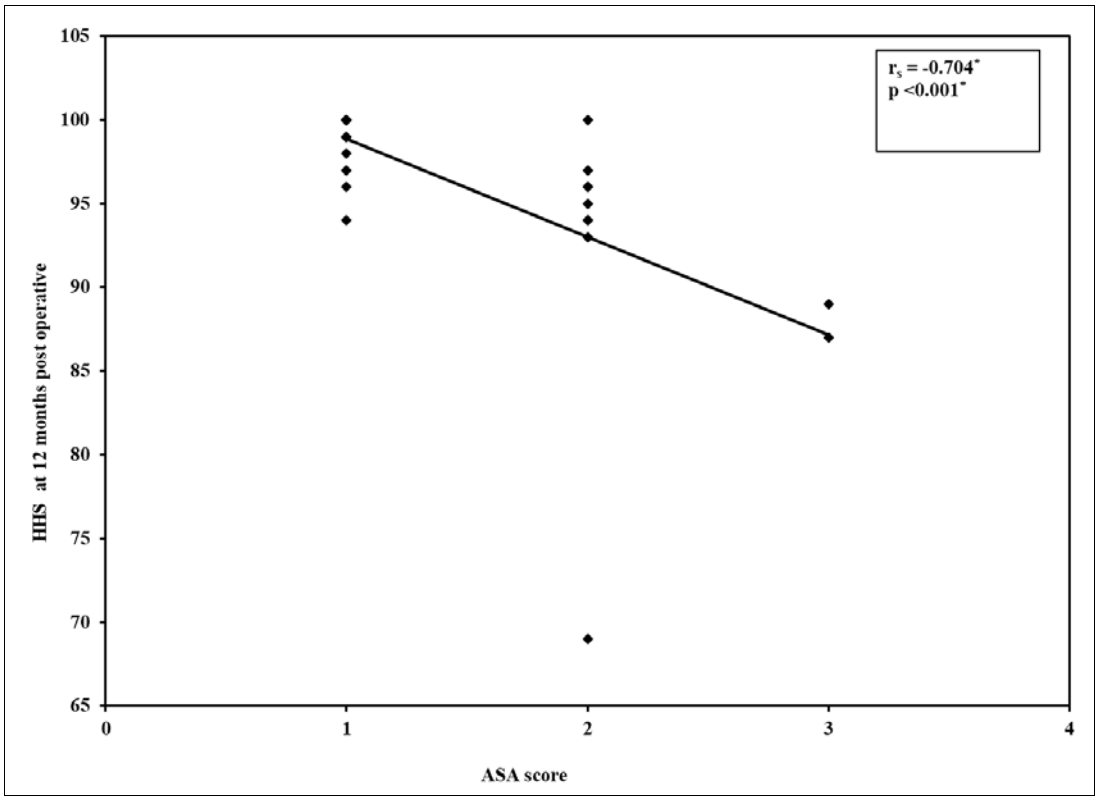

Fig 8: Relation between ASA score and clinical outcome.

On the other hand, Patients' gender, underlying diagnosis, size of prosthetic femoral head and type of skin incision had no statistically significant relationship with functional outcome. At post-operative radiographs, 29 stems were neutral (within 2º of varus or vulgus) while only one stem was in varus. The mean cup abduction angle was 45.3º with all the cups within safe zone (30-50 degrees). X- rays at one year showed good bony osteo-integration of all implants with no signs of loosening. On the other hand, it detected heterotrophic ossification in two cases, one case was grade II and the other case was grade III according to Brooker Classification.

Regarding complications, heterotopic ossification (HO) was the most common complication in this study. Two out of 30 patients (6.66%) developed post-operative heterotopic ossification. (Fig. 9) According to Brooker classification, one patient developed class II HO and one patient developed class III HO. None of the patients had any related signs or symptoms.

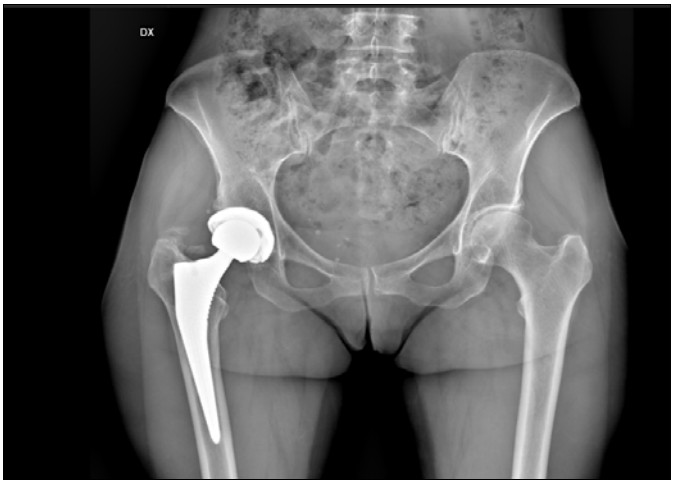

Fig 9: X-ray showing heterotrophic ossification.

Lateral cutaneous femoral nerve palsy was reported by one patient (3.3%) out of thirty. At final follow up, he improved partially with little residual paresthesia but with no functional limitation. One patient had an intra-operative incomplete femoral calcar fracture. The patient was managed conservatively with non-weight bearing for six weeks and the fracture healed at the end with no affection on outcome. (Fig.10,11)

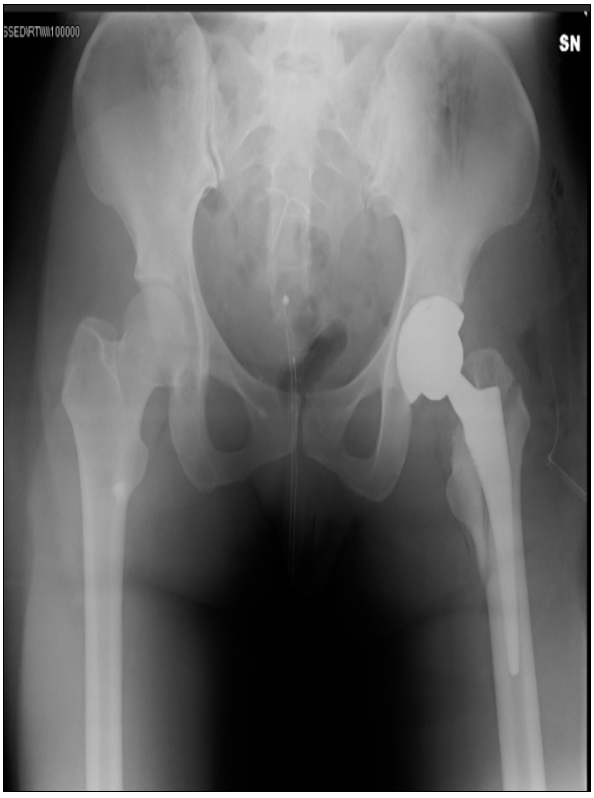

Fig 10: Immediate post-operative x-rays showing intra-operative femur fracture.

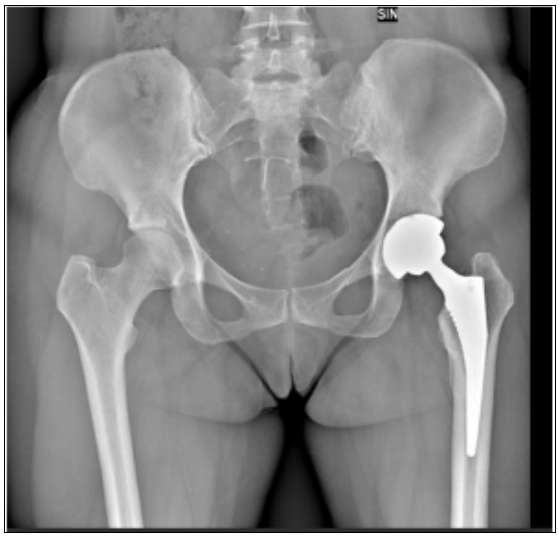

Fig 11: One year post operative follow up with complete healing of the fracture.

One patient had ilio-psoas tendinitis presented with groin pain not responding to any conservative management. Repeated inflammatory markers testing, and a single ultrasound sound guided hip aspiration were done revealing no evidence for peri-prosthetic infection. After exhaustion of conservative measures including corticosteroids injection over one year, the patient had a revision of both cup and stem with debridement of Ilio-psoas sheath through DAA. This is the only case of poor outcome in the study. Overall, we had a total of 5 complications in 4 patients. None of the complications encountered in this study had an impact that is statistically significant on the ultimate functional result.

Discussion

The mean Harris hip score in this study was 96.33±6.17 compared to pre- operative HHS of 54.03±3.99. This is comparable to the outcomes of Bauwens *et al.* [13] who had a pre-operative HHs of 50.1±10.7 and HHS of 92.4±6 at two years and also comparable to the results of Argyrou *et al.* [14] who had a pre-operative modified HHS of (42.5,51.2) and a final modified HHS of (94.7,96.2) at two years of follow up for each of his two study groups respectively, and to Tian *et al.* [15] who had a preoperative HHS of 40.7±5.1 and enhanced to 95.3±4.2 at a minimum 2-year follow-up. These studies had a follow up of two years unlike our series that was followed up for one year. But, in the study of Darwich *et al.* [16], the mean HHS score enhanced from 40.9±18.3 preoperatively to 89.3±10.9 at one year and 89±14 at five years. In that study there was no improvement of HHS after one year which even declined slightly after first year which may be due to aging. So, we believe our final HHS can be compared to studies that had a two-year follow up period. This is further supported by the outcomes of Garavaglia *et al.* [17] who had a HHS of 50.9 preoperatively, 92.2 at 2 years and 90.4 at 5 years. Stratification of final HHS revealed that 90% of cases had outstanding outcomes, 6.66% achieved good outcomes. and 3.33% (one patient) had poor outcomes which was similar to the study of Darwich *et al.*, [16] who had excellent outcomes in 85.3% of cases, good outcomes in 10.3%, fair outcomes in 4.3% and poor outcomes in 0% of cases.

In this study, final HHS was inversely proportional to patients' age and American society of anesthesiologists (ASA) score. There is no study in the literature that investigated such relationship, and it could be a topic for further research. The mean BMI in this study was 27.13±3.56 which was comparable to other studies (Tian *et al.* 27.7±4.5, [15] Bauwens *et al.* [13] 25.8±4.4, Darwich *et al.* [16] 27.4±4.4, Alexandrov *et al.* [18] and Dall'Oca *et al.* [19] 27,79±4,3) and final HHS score in this study was inversely correlated to BMI. Argyrou *et al.* [14] investigated the impact of BMI on outcome in anterior approach for THA comparing between an obese group of patients (BMI more than 40) to a non-obese group (BMI less than 30), the final modified HHS at two years follow up was 94.71±3.21 for the obese group versus 96.29±1.95 for the non-obese group. However, this difference in final modified HHS was not statistically analyzed. On the other hand, that study illustrated the relative higher risk of complication in obese patients in contrast to non-obese ones although the approach was generally safe for them. Another interesting point in that study was noted while comparing demographic data of both groups that show that obese group had relatively higher ASA scores compared to the other group which raise the question whether the differences between two groups are caused only by obesity or a combination of (BMI-ASA score). An adjusted statistical analysis for each risk factor could be of benefit in such situation.

At post-operative radiographs, 29 stems (96.6%) were neutral (within 2º of varus or vulgus) while only one stem was in varus (3º). The mean cup abduction angle was 45.3º±4 with all the cups within safe zone (30-50 degrees). This is comparable to the results of Bauwens *et al.* [13] with mean cup abduction angle of 44.9±5º and 9.5% of cups outside safe zone and results of Argyrou *et al.* [14] who had a mean cup abduction angel of (42.31º to 42.61º). Both studies used fluoroscopy as done in this study and support the value of fluoroscopy in achieving cup placement within safe zone which is facilitated by the supine position of the patient. In the study of Alexandrov *et al.*, [18] The average acetabular cup abduction was discovered to be 48.4˚±7˚ (range,34˚ to 70˚). A total of 15 hips (34.8%) had abduction of more than 50 degrees. The mean stem varus was discovered to be 0.9˚±2˚ (range, −4˚ to 6˚). The higher tendency to have a vertical cup can be referred to the developing learning experience despite the use of fluoroscopy in that series.

Four patients had (five) complications in this study making the rate of complications (16.66%), only one of them (3.33%) required revision for persistent ilio-psoas tendinitis. Another one had a calcar fracture that did not require surgery and only required alteration of post-operative protocol. The rest of patients with complications (10%) had minor incidents that not have an impact on the post-operative protocol. None of the complications in our study was significantly correlated to the functional outcome. The rate of revision surgery at two years interval was 1.5% in the study of Tian *et al.* [15] study, 1.2% in Darwich *et al.* [16] study at five years follow up, 1,09% in Dall'Oca *et al.* [19] study and ranged between 2.3% and 5.8% in Argyrou *et al.* [14] study at two years follow up which was found comparable to this study. The adjusted risk of revision in anterior approach was found comparable to anterolateral approach and less than posterior approach. (20) On the other hand, rate of complications in this study is comparable to those mentioned in the study of Argyrou *et al* (14) (9.3%-16.3%) and Bauwens *et al.* [13] 15.5% and Dall'Oca *et al.* [19] 15.4% and less than complication rate in Alexandrov *et al.* [18] study (30%) which represents their learning experience.

The incidence of postoperative periprosthetic femoral fracture for primary cementless THA varies from 0,47 to 7,1%. [21] BMI, female sex, and advanced age have all been listed as risk factors; no correlating relationships between the various

surgical techniques were discovered [22, 23]. This study had one case of intra-operative periprosthetic fracture; a 48-year-old female with BMI of 28.9, she had smooth surgical steps until final implant insertion and fracture occurred when some maneuvers were exerted to extract the implant and place another one which might indicate that such a fracture was related to bone quality more than the surgical approach itself. The patient was managed conservatively with prohibition of weight bearing for 6 weeks. The patient had an excellent functional outcome despite the fracture. The frequency of periprosthetic fractures in similar studies ranges between 1.09% and 4.6% [18, 19]. On the other hand, this study did not have any greater trochanter avulsion fracture while the rate is ranged between 2.3% to 3.5% in similar studies [13, 14, 19]. These are usually minor incidents managed conservatively with no major drawbacks. In most cases, they occur due to inadequate capsular release that leads to increased tension forces at greater trochanter. This fact may explain their higher incidence during the learning curve as in Alexandrov *et al.* [18] study (11.6%). Authors believe that incidence this type of fractures markedly decrease with surgeon experience.

This study had no case of dislocation which is consistent the low dislocation rate in DAA reported in the literature. Bauwens *et al.* [13] did not have any dislocation in his series of 116 hips within 2 years of follow up, other studies reported dislocation rate of 0.96% to 1.5% [24, 25]. Tamaki *et al.* [26] analyzed the possibility of dislocation Following DAA in 871 hips and found that the rate of dislocation was 0.92% in after a mean follow up of 7.8 years and suggested that maintaining muscle structures may aid in maintaining the hip's dynamic stability. Sheth *et al.* [20] found that direct anterior approach and anterolateral approach possessed a decreased adjusted risk of dislocation compared to the posterior approach. Zhou *et al.* [27] on the other hand found no difference between DAA and posterior approach regarding dislocation risk. Overall, these findings illustrate the fact that THA after DAA is generally stable with very low risk of dislocation and this stability is maintained even in patients with higher risk for dislocation such as patients with spinal fusion [28].

Authors believe that obesity increase the risk of infection and wound complication with any approach generally and with DAA [29]. Obese people's increased rates of reoperation for wound complications may be explained by the anterior skin incision's proximity to the inguinal skin crease and the presence of abdominal pannus overlaying it [30]. This study didn't encounter any case of infection or wound complications. But it is to be mentioned that cases with BMI of 40 or more were excluded from this series.

Interpreting the literature on rates of lateral femoral cutaneous nerve injury is challenging due to the ongoing evolution of the DAA method because there are significant variations reported ranging from 0.1% to 81% [31-33]. This is probably connected to the irregularities in the deep dissection and skin incision reported for the anterior route [34]. This study had one case of nerve palsy that improved partially at final follow up with some residual paresthesia with no functional limitation. This rate of nerve palsy (3.3%) is less than the rate reported in the studies of Zhang *et al.* [35] (10.64% to 31.91%) and Leunig *et al.* [36] (7.5%-14.5%). Better results in this study may be since other studies used blunt dissection to open the plane between Sartorius and Tensor fascia lata while in our technique, we made an incision in the fascia 1 cm lateral to this interval and started peeling tensor fascia lata from its sheath to reach deep structures without violation of the interval itself.

In this study, two patients (6.6%) developed post-operative heterotopic ossification. Considering the category of Brooker *et al.*, [12] one patient developed class II and one patient developed class III. They didn't have any related clinical symptoms. This was similar to the study of Tian *et al.* [15] who had a series of 1017 cases with a minimum of 2 years follow. Seventy-eight cases (7.6%) had evidence of heterotopic ossification. The heterotopic ossification was Brooker grade I in 44 hips, grade II in 26 hips and grade III in 8 hips. No patient had Grade IV. None of the patients had a revision out of HO. In the study of Dall'Oca *et al.* [19] they had one patient showing HO, but it was grade IV and needed surgical excision because of a restricted range of motion. Another retrospective radiographic study investigated the incidence of HO after DAA and was found to be 41.5% which is parallel to incidence reported in traditional approaches [37]. The actual prevalence of such condition is not fully evaluated as studies provide mixed reports; some report the cases based on radiological findings while others report cases with clinical manifestations.

This study had one case of revision which was due to resistant Ilio-psoas impingement. Conservative treatment was tried over one year and during that time, results of investigations for periprosthetic infection was equivocal and a final diagnosis wasn't obtained. The decision was to do a full revision in which all components were removed; joint washed and ilio-psoas tendon was released from adhesions found anterior to the hip and new components inserted. The patient's pain improved within days and intra-operative specimens didn't show any bacterial growth which favored the diagnosis of ilio-psoas tendinitis.

Burell *et al.* [38] investigated the incidence of ilio-psoas tendinitis after DAA in 559 hips and found it be 5.7%, conservative treatment was successful in 69% of patients while six patients needed arthroscopic release and two patients needed socket revision. The study suggested that risk factors for such complication include female sex, acetabular component overhang or large acetabular component in relation to native femoral head diameter. violation of anterior capsule and tendency to place the cup in a less anteverted position to enhance stability in comparison to posterior approach are two anatomical factors that makes patients with DAA more susceptible to ilio-psoas impingement than posterior approach. However, the incidence of this condition in posterior approach was found to be 4.4% which is less than the incidence in Burell *et al.* [38] study but is higher than the incidence this study (3.33%) [39, 40]. This may be explained by surgical technique in this study in which ilio-capsularis muscle was preserved and the most medial part of the capsule was kept attached to the acetabulum so they could work as a protective layer between acetabular component and ilio-psoas tendon.

This study had some limitations; different implants were used and the follow up period was relatively short with inability to comment on implant survival. On the other hand, the advantages of this research include the fact that all the cases were done using the same detailed surgical technique with reproducible steps.

Conclusions

Direct anterior approach for total hip arthroplasty is a safe surgical approach that could improve the final functional outcome of the patients. Future studies would be helpful in comparing this approach to other approaches.

Conflict of Interest
Not available

Financial Support
Not available

Reference

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