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CASE REPORT - ORTHOPAEDICS

OUTCOME ANALYSIS FOR TOTAL HIP ARTHROPLASTY BY MINI ANTERIOR APPROACH - A CASE SERIES

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Abstract

Introduction : In total hip replacement, the anterior approach is intermuscular and internervous and allows the surgeon to reach the capsule without muscle detachment. Advantages include faster recovery and excellent functional outcome. Aim of our study is to analyse the functional results following THR by anterior approach.

Materials & methods : Patients presenting with indication for total hip replacement were included into the study. Patients with ipsilateral fractures or previous history of surgery were excluded. Total hip replacement was proceeded and followed them for post op rehabilitation and their clinical and radiological parameters were analysed.

Results : Study included a total of 5 cases with M : F 4:1. Average Harris Hip Score was 90 at latest follow up, confirming an excellent clinical outcome. Minimum follow up was 1 year in all the cases.
Patients were into their routine daily activities without any limitations.

Conclusion : Anterior approach provides an excellent functional outcome with a low rate of complications. To overcome the most common difficulties encountered during the anterior approach for THR, reduce complications, and achieve a satisfactory clinical result in a reproducible manner, the steps of the surgical technique must be followed.

Keywords : Total hip arthroplasty, anterior approach.

INTRODUCTION

Over the past decade, minimally invasive surgery has gained popularity as a means of optimizing early postoperative rehabilitation and increasing patient satisfaction and cosmesis following total hip arthroplasty (THA). However, these surgical exposures has also been associated with increased risk of iatrogenic nerve injury and implant mal-positioning due to limited visibility compared to conventionally larger surgical incisions. The search for an ideal minimally invasive approach has always been in the quest of arthroplasty surgeons.

HISTORY OF ANTERIOR APPROACH TO HIP :

Smith-Petersen approach was the first old total hip arthroplasty mini-anterior approach described followed by the Hueter approach which is found 50 years ago .Since 1947,the anterior approach was done by Judet[1].

THE HUETER'S INTERVAL :

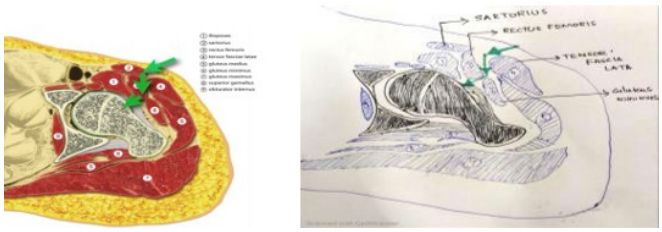

Figure 1: Hueter's Interval

Superficial : Sartorius & Tensor Fascia Lata
Deep : Rectus Femoris & Gluteus medius

The initial technique involved detaching the TFL from the antero-lateral crest, whereas the Hueter approach respected the tensor.

MATERIALS AND METHODS FOR ANTERIOR APPROACH :

Exactly as doing the procedure in the fracture table, this procedure can also be done on a specialized table similar to that or in a conventional radiolucent table. For elevating the femur in preparation and implantation of component, the table has mounted an accessory hook in the side of the table. Preparation and implantation of component for the acetabulum is direct method. Due to difficulty in accessing to the femur many surgeons prefer shorter or curved femur components for making the procedure in a simplified way.

Figure 2: Judet-Type Orthopaedic table

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PATIENT SELECTION :

1) In Thin individuals -Simple Primary THA

2) In Obese individuals -Complex Primary THA

Positioning :

Position – Supine on radiolucent table with operating limb hyperextended with anterior superior iliac spine (ASIS) at table break. For fluoroscopy -Pelvis at level with adequate imaging of both hips.

SURGICAL PROCEDURE :

Figure 3: Interval between TFL and Sartorius

The incision is placed laterally in the interval between tensor fascia lata (TFL) and the sartorius to avoid the injury to the nerve fibers of lateral cutaneous femoral nerve but the course is variable. 3cm distal and 3cm lateral to the ASIS the incision begins and extends distally 8 to 12cm slight laterally. Now bluntly dissect medially in the interval between the TFL and sartorius.

Figure 4: Anterior capsule incised

Figure 5: Femoral neck osteotomy

The femoral neck can be palpated through thin layer of fat overlying the anterior capsule. Place blunt curved retractors superior and inferior to the femoral neck. Release the fibers of the reflected head of the rectus to allow improved medial retraction of the direct head. Divide the anterior capsule. Perform an insitu osteotomy of the femoral neck .Extract the femoral head. Excise the labrum and prepare the acetabulum with reamers.

Figure 6: Femoral canal reaming

Now break the table to position the operated hip in hyperextension for femoral canal preparation. Reaming and implantation, wound closure done in routine.

CASE ILLUSTRATION :

CASE 1:

Figure 7: 3 months old fracture neck of femur right side

Figure 8: Post OP X-ray

Figure 9: Post OP Range of Movements

CASE 2:

Figure 10: B/L TB Hip Post THR left side

Figure 11: Post OP X-ray

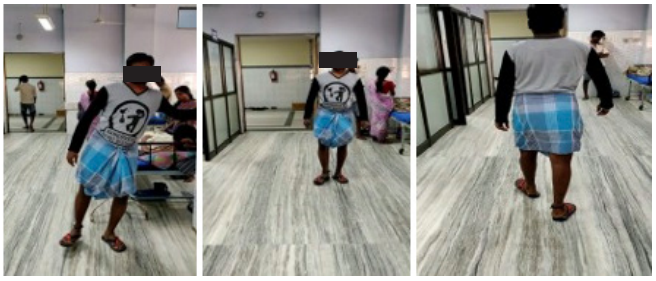

Figure 12: Post OP Range of Movements

CASE 3:

Figure 13: 4 months old Neck of Femur fracture right side

Figure 14: Post OP X-ray

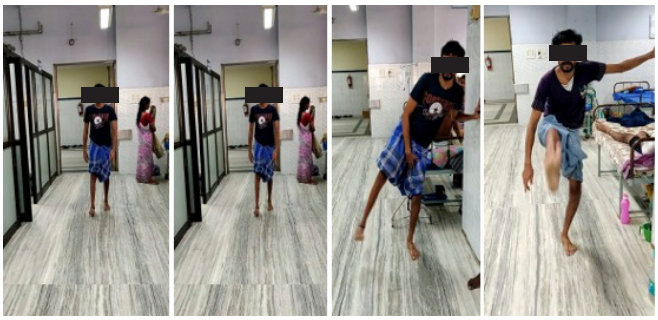

Figure 15: Post OP Range of Movements

DISCUSSION

Study included a total of 5 cases with M: F 4:1. Average Harris Hip Score was 90 at latest follow up, confirming an excellent clinical outcome. Minimum follow up was 1 year in all the cases. Patients were into their routine daily activities without any limitations. Improved Harris Hip Scores (HHS), Western Ontario and McMaster Osteoarthritis Index, and Short Form-36 scores at 6-week, 6-month, and 1-year postoperatively with direct anterior approach over direct lateral approach in a study by Restrepo et al. 2. Barrett et al. reported improved HHS at 6 weeks postoperatively with direct anterior approach.[3]

INFECTION:

Infection is a rare but known complication of total hip arthroplasty with incidence of 0.2%–1.2% after primary total hip arthroplasty.[4] Retrospective studies found no significant difference between the approaches in deep infection rates.

INSTABILITY:

Hip instability is another potential complication after total hip arthroplasty with dislocation rates of 0.6%–1.0% for direct anterior approach and 0.3%–0.6% for direct lateral approach and posterior approach with dislocation rates of 1.7%–5.3%. Sheth et al., in a study on 42,438 primary total hip arthroplasty, also reported significantly lower dislocation rates with both direct anterior approach and anterolateral approach versus posterior approach.[6]

INTRA-OPERATIVE FRACTURES:

Intraoperative fractures, particularly at greater trochanter, can occur during femoral elevation in Total hip arthroplasty. Matta et al.,reported 0.6% complicated with by intraoperative greater trochanter fractures by direct anterior approach total hip replacement done on a specialized traction table. Ankle fractures were reported in 0.6% of cases.[6] 4.0% have Greater Trochanter fractures as demonstrated by Hendel et al with direct lateral approach whereas it is 1.0% with posterior approach as reported by Nakata et al. A meta-analysis showed no difference of fracture risk between the approaches.[7]

SOFT TISSUE DAMAGE:

Muscle damage is a major concern in direct lateral approach and posterior approach. Gluteus maximus and Short external rotators damaged during posterior approach. Gluteus maximus, and medius damaged during direct lateral approach. 4%–20% report with abductor weakness after direct lateral approach total hip arthroplasty. Due to utilization of an intermuscular interval direct anterior approach is "muscle friendly"approach. Higher levels of serum creatine kinase postoperatively in posterior approach patients were observed by Bergin et al.[8] A study by Meneghini et al. on cadaver reflects that direct anterior approach is truly muscle sparing with less damage occurred in gluteus minimus with direct anterior approach (mean 8% of surface area) compared to posterior approach (18%).[9]

NERVE DAMAGE:

Nerve injury is a potentially devastating complication after total hip replacement. The nerves at risk include lateral femoral cutaneous nerve, superior gluteal Nerve, femoral nerve and sciatic nerve. Due to its variable course, Lateral femoral cutaneous nerve is the most commonly injured structure in direct anterior approach. Nearly 3.4%–81.1% of patients will have some symptoms of lateral femoral cutaneous nerve neuropraxia after this surgery and most resolve with time. Superior gluteal nerve injury most commonly occurs in direct lateral approach. 2.2%–42.5% of patients have superior gluteal nerve injury after direct lateral approach total hip arthroplasty.[10] Sciatic nerve injury is significantly higher in posterior approach.

LIMITATIONS

- Lateral femoral cutaneous nerve of thigh at risk.
- Technically demanding.
- Requires extensive knowledge of hip-joint anatomy.
- Previous acetabular fracture.
- Extensive posterior access may be needed for Pelvic deformity/defects in posterior acetabulum.

CONCLUSION

It is a safe and reproducible technique providing low morbidity and fast postoperative recovery for the patient. Early mobilisation and short hospitalisation time have significant social and financial benefits. Training and experience are crucial to successfully performing this minimally invasive surgical technique, so there is a learning curve for the surgeon and the team. Minimal invasiveness is not in size of incision but in the amount of soft tissue injury it incurs during the procedure.

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