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Original Article

Two-incisions direct anterior approach for THR: Surgical technique and early outcome

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ABSTRACT

Purpose: In recent times the direct anterior approach for total hip replacement has gained considerable interest among orthopaedic surgeons because of the relative muscle-sparing nature than other surgical approaches. However, critics believe that this approach is associated with steep learning curve and high complication rates, mainly attributed to a more limited exposure to the femur. In order to make femoral access easier and implantation of acetabulum in anatomic plane, we designed a "two incisions anterior approach technique" for total hip replacement. The aim of the present study is to determine safety of this technique with respect to perioperative complications as well as early clinical outcome.
Methods: A retrospective review is carried out on a consecutive series of patients who underwent primary total hip replacement by the single surgeon through the two incisions direct anterior approach from 01/2014 to 11/2014. We analysed peri-operative complications and clinical outcome at two years' follow-up.
Results: We observed 01(0.9%) intra-operative complication; calcar fracture and 01(0.9%) anterior dislocation in first post-operative week. All patients reported improvement of their symptoms. The mean modified oxford hip score was significantly better from 25(11–37), preoperatively to 46.97(33–48) at mean latest follow-up. The mean modified Merle d'Aubigné-Postel score improved to 16.84(12–18) from 9.25 (4–14) preoperatively.
Conclusion: The described surgical technique is simple and reproducible technique for easier exposure of femur and insertion of acetabulum in anatomic plane for total hip replacement through direct anterior approach. Easier and better femoral access helps to place implant in anatomical position as well as reduces the risk of femoral fracture associated with inadequate femoral exposure. The added advantage of this technique is, risks of injury to lateral femoral cutaneous nerve can be minimised by careful dissection and isolation of the nerve.

1. Introduction

"Total hip replacement (THR) has proven to be a very effective and reproducible surgical procedure that provides significant improvements in patient mobility, pain relief and quality of life".[1] Continuous research work is being undertaken in various aspects of THR to further improve the long term functional outcome.

In the past, attempts to improve traditional surgical approaches focused on minimizing the length of the surgical incision. A variety of so-called "minimally invasive surgery" techniques were developed.[2–4] As data began to accumulate, it became apparent that length of incision was less important to surgical outcome than disruption of muscles, impairment of soft tissue vascularization and innervations.

Hueter described the anterior approach for hip and has been used by Judets for hip replacement since 1947.[5] The direct anterior approach (DAA) follows a true intermuscular and inter-neural plane to access the hip joint. In recent times the DAA for THR has gained considerable interest among orthopaedic surgeons because of the relative musclesparing nature than other surgical approaches.

Proponents of this technique believe the potential benefits to be a reduction in soft-tissue trauma,[6] less perioperative blood loss, less postoperative pain[7] and earlier hospital discharge. Functional

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recovery is believed to be faster in the early postoperative period with fewer narcotics needed.[8]

However, critics believe that this approach is associated with steep learning curve,[6] and high complication rates,[9] mainly attributed to a more limited exposure to the femur.

In order to make femoral access easier the senior author (AN) has designed a "two incisions anterior approach technique" for THR. With this technique two separate incisions are used to access acetabulum and femur.

In this study, we describe the surgical technique for a two incisions direct anterior approach total hip replacement. We also sought to determine safety of this technique with respect to perioperative complications as well as early clinical outcome.

2. Material and methods

A retrospective review is carried out on a consecutive series of patients who underwent primary THR by the senior surgeon (AN) through the two incisions DAA (AN) from 01/2014 to 11/2014, using an existing patient database. Only elective hip replacements without previous hip surgery were included in the study. Indications for surgery included advanced arthritis recalcitrant to conservative measures in the setting of primary osteoarthritis, posttraumatic arthritis, rheumatoid arthritis and avascular necrosis (AVN). For this study, formal consent as well as approval from ethics committee is not required.

Within this period, 104 primary THR procedures were performed for patients with end-stage hip osteoarthritis using the two incisions DAA. The senior author uses the custom made curved femoral stem for all primary THR (Symbios, Yverdon, Switzerland). A fracture table was used in all cases with no intraoperative fluoroscopy. The case notes of these study subjects were reviewed to identify information including patient demographics and perioperative complications.

Clinical outcomes were evaluated using the modified Oxford Hip Score (OHS)[10] and the modified Merle d'Aubigné-Postel score (MAP).[11] OHS and MAP scores were collected preoperatively, 6 weeks postoperatively and at two years' follow-up. Standard radiographs of the involved hip were taken at initial consultation and 6 weeks postoperatively All the patients had pre-op CT scan.

3. Surgical technique

3.1. Pre-operative planning

A preoperative CT scan is being carried out using a specific protocol.[12] CT scan data are analysed with the HIP-PLAN® 3D hip planning software (Symbios, Yverdon, Switzerland). The surgical approach as well as both femoral and acetabular components is planned on the bases of available information from CT-scan.

The proximal vertical incision is planned over anterior aspect of the proximal thigh along the lateral margin of the rectus femoris muscle extending from superior part of the femoral neck to the distal base of the neck. The exact location and size of the incision is measured with reference to Anterior Superior Iliac Spine (ASIS) on the pre-operative CT scan.

The second distal incision is placed once the cup position and orientation has been finalized, as the intersection of the cup axis in both AP and Lateral planes.

3.2. Operative technique

The patient is placed in the supine position on a traction table. Bony landmarks are marked.

The leg is prepared from umbilicus to the knee on the operative side and draped.

3.3. The proximal vertical incision

A vertical incision (Fig. 1) of 5–7 cm in length is made over the anterior aspect of the proximal thigh as per plan. Depending of particular bony and muscular anatomy of the patient, this incision may be medial or lateral to ASIS.

Careful dissection is carried out in the superficial plane to isolate and protect the Lateral Femoral Cutaneous Nerve (LCFN). After isolation of the LCFN, superficial plane is developed between the sartorius and the tensor fascia lata (TFL). The sartorius is retracted medially and the tensor fascia lata is retracted laterally. This exposes the lateral border of the rectus femoris.

The rectus muscle is retracted medially to expose the fascia overlying the lateral circumflex vessels and the femoral capsule. The lateral circumflex vessels are carefully isolated and ligated. The fat pad then is removed off the capsule over the femoral neck. The iliocapsularis muscle is retracted medially to get better exposure of the anterior part of the capsule of the hip joint.

Anterior portion of the capsule is excised from the edge of the acetabulum to the intertrochanteric line. The femoral neck then is observed from the acetabulum to the intertrochanteric line.

Femoral Neck osteotomy is done at desired level. For easier removal of femoral head, a second neck osteotomy is done 1 cm proximal to the first osteotomy.

The small wafer of bone is removed first and then with help of a corkscrew femoral head is removed. Gentle traction is applied on the leg to facilitate the removal of femoral head. Alternatively, a high-speed drill and the destruction-suction of femoral head can be carried out in patients with high muscle mass.

At this stage Charnley's self-retaining retractor is placed to expose acetabulum. The labrum is excised, exposing the entire peripheral bony rim of the acetabulum.

3.4. Distal transverse incision

The proximal vertical incision is placed more anterior and medial to facilitate easier exposure of femur. In order to achieve anatomic acetabular alignment, second incision is placed over anterolateral aspect of proximal thigh.

Second transverse skin incision (Fig. 2) of 1 cm is made about 7–10 cm distal to the distal end of first incision, depending of the orientation of the acetabulum and volume of the thigh. Blunt dissection is carried out and superficial fascia is divided to explore interval between TFL and rectus femoris.

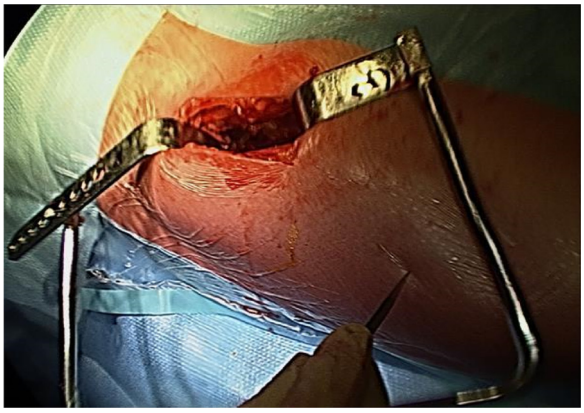

Fig. 1. Proximal vertical incision.