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Original Article

Direct Anterior Approach for Total Hip Arthroplasty in the Lateral Decubitus Position: Our Experiences and Early Results

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ABSTRACT

Background: The direct anterior approach (DAA) for total hip arthroplasty (THA) is typically performed in the supine position using a specially designed operating room table, which makes this approach more accessible to orthopedic surgeons. We attempted to perform this procedure in the lateral decubitus position on an ordinary operation table to avoid dependence on a special operating room table. There is an obvious absence of literature regarding this subject.

Methods: A total of 248 patients (295 hips) were recruited for primary THAs from July 1, 2014 to December 31, 2014. In total, 126 hips (42.7%) underwent THAs using the DAA in the lateral decubitus position. The technical feasibility and early results were evaluated.

Results: The orientation of the acetabular component was 16.5° ± 4.9° anteversion and 43.3° ± 3.5° abduction. Intraoperative proximal femoral fracture occurred in one hip. The superficial wound complications occurred in 2 hips and the hematoma in one hip while in hospital. The lateral femoral cutaneous nerve injury was noted in 43 hips. The early dislocation occurred in 2 hips. Heterotopic ossification was Brooker class I in 5 hips and class II in 1 hip. No aseptic loosening, postoperative periprosthetic fracture, and deep infection occurred in our series.

Conclusion: The DAA for THA in the lateral decubitus position may be a valuable alternative if the DAA in the supine position is difficult to implement owing to absence of a special operating room table. This technique also seems to provide satisfactory clinical and radiographic outcomes with an acceptable complication in our early follow-up.

Total hip arthroplasty (THA) has long been considered as one of the most successful procedures for end-stage hip arthritis owing to the definite ability to relieve pain and restore function [1]. The ideal surgical approach for THA should provide adequate exposure to the acetabulum and proximal femur to securely place a well positioned and stable implant without damage to muscles, blood vessels, and nerves. The direct anterior approach (DAA), through a true intermuscular and interneural plane without injury to major muscles around the hip, has recently gained popularity [2-5]. Compared with other surgical approaches for THA, some advocates suggested that this approach has its potential benefit of faster recovery, decreased pain, and increased stability [5-7]. However, there is no consensus about the early complication rates during the learning curve period [8-10].

The DAA typically performed with the patient in the supine position using a special operating room table has been reported in previous studies [2-4,11,12]. Nevertheless, acquired rich experience of a mini-incision anterolateral approach [13] and a mini-posterior approach for THA in the lateral decubitus position, we hypothesized that the DAA-THA could also be carried out in the lateral decubitus position on an ordinary operation table. Only one study [10] reported good outcomes of this procedure using cemented and curved anatomical stems in the literature. Given better survival rate of the cementless stem [14], we performed primary cementless THA using the DAA in the lateral decubitus position at our institution.

Therefore, the purpose of this study was to evaluate the technical feasibility and early results of the DAA-THA in the lateral decubitus position, including the complication rate, functional outcome scores, and radiographic results.

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Fig. 1. Photograph showing an ordinary operation table used for the direct anterior approach for total hip arthroplasty in the lateral decubitus position.

Material and Methods

This study was a prospective, single arm, assessor blinded, observational trial performed at our hospital with 12-month follow-up. We conducted this trial after the approval of the institutional review board. Patients were recruited if they were older than 18 years of age, suffering from end-stage hip disorders, and suitable for primary THAs. The exclusion criteria included severe deformity of proximal femur, posterior acetabular deficiency, stiff hip, Crowe type III/IV developmental dysplasia of the hip, previous hip procedures with retained hardware, and severe osteoporosis. The indications for arthroplasty were severe pain and/or considerable difficulty with walking and performing daily activities. Eligible patients gave written informed consent. All procedures were performed by a senior orthopedic surgeon (X.S.). The operating surgeon never conducted the clinical follow-up. All clinical and radiographic outcomes were assessed by a well-trained physician who was blinded to this study.

Operative Technique

All procedures were performed under general anesthesia with patients placed in the lateral decubitus position on an ordinary operation table (Fig. 1). Four anatomic landmarks are used to position the incision: the anterior superior iliac spine (ASIS), the groin crease, the tuberculum innominatum, and the capitula fibula. The straight incision is a portion of the line segment between the ASIS and the capitula fibula (Fig. 2). After palpation of the ASIS and identification of the location of the tensor fascia latae (TFL) muscle, the fascia of the TFL muscle is dissected approximately 10-mm lateral to the muscular interval (Fig. 3), and the medial edge of the fascia is then split from the muscle. A fat strip, namely the Hueter interval between the TFL muscle and sartorius muscle, is seen.

A blunt retractor is positioned over the extracapsular superior femoral neck to protect the abductors, and another sharp retractor is placed over the lateral femoral greater trochanter to mobilize the TFL muscle laterally. The ascending branches of the lateral femoral circumflex artery must be carefully ligated or coagulated. An additional blunt retractor is placed over the extracapsular inferior femoral neck to mobilize the rectus femoris muscle medially. Once fat over the capsule is removed, the anterior hip capsule is then exposed clearly.

A capsulotomy is performed to provide an excellent view of the femur and acetabulum. The femoral neck is cut in situ using 2 cuts technique with an oscillating saw (Fig. 4A). To make the removal of the neck and femoral head easier, the anterior width of the fragment is greater than the posterior width (Fig. 4B). Once the labrum and cotyloid fat are resected, the acetabulum is reamed with offset acetabular reamers. A cementless acetabular component that is oversized by 2 mm than the last reamer is press-fit into the socket to provide initial stability. We use screw fixation to provide added stability when the initial stability of the cup is suspected. Following acetabular implantation, the surgeon distracts the proximal femur toward a position of the anterior aspect of the acetabulum using a bone hook placed in the femoral canal. The surgical leg is carefully moved to a position of adduction, hyperextension and external rotation by a surgical assistant. The capsule is the first structure to be released. The thorough and sequential release of capsule is helpful to obtain the enough exposure of the proximal femur. During the capsular release, the release of the posterolateral hip capsule is the most important. The release of the posterolateral capsule is performed with a retractor positioned at the femoral calcar to retract the medial tissues and another retractor inserted over the superior portion of the greater trochanter to retract the abductor muscles (Fig. 5).

Once the capsular release is completed, a blunt retractor is placed at the femoral calcar to elevate the proximal femur for broaching. Rotate the broach to control the anteversion and begin with a broach at least two sizes smaller than the anticipated stem. The final broach is retained within the canal, and then the trial neck component is installed. According to the contralateral lower limb length from the ASIS to the tip of the malleolus medialis, the length of the surgical leg is measured intraoperatively with a tapeline after the reduction of the hip. The appropriate neck length of the femoral prosthesis is selected to achieve the limb-length equality or to minimize the limb-length discrepancy. After the reconstruction is completed, it is necessary to assess the stability of the hip.

For closure, we use running sutures for the TFL fascia, interrupted sutures for the subcutaneous tissue, and Allgower-Donati suture for the skin.

Perioperative Management

Intravenous prophylactic antibiotic therapy with cefuroxime or cefamandole was begun half an hour before the operation and was continued for 48 hours afterward. An intravenous dose of tranexamic acid of 10 mg/kg was used 20 minutes before the operation if patients had no history of arterial or venous thromboembolic disease. Thromboembolic prophylaxis with oral rivaroxaban was administered 6 hours after surgery and was continued daily for 5 weeks postoperatively. The drainage was removed 48 hours after the surgery. Under the guide of rehabilitation therapists, patients were required to have a short mobilization on operating day and full weight bearing with walking aids from the second day postoperatively.

Clinical and Radiographic Assessment

A detailed follow-up was carried out preoperatively, at 1 month, 3 months, 6 months, and 1 year after surgery. Hip function was assessed by the Harris hip score [15]. Symptoms of lateral femoral cutaneous nerve (LFCN) injury were defined as numbness and/or burning sensation on the anterolateral thigh [16]. In addition, operating time (skin to skin) and intraoperative blood loss were recorded.

The preoperative, immediate postoperative, and 1-year postoperative standard anteroposterior radiographs of the pelvis and lateral radiographs of the femur were obtained for all patients. Radiographic measurements were carried out using a picture archiving and communication system. The anteversion angle of the acetabular component was measured utilizing the Lewinnek