Limited Incisions for Total Hip Arthroplasty

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CHAPTER 1

Single-Incision Anterior Approach for Total Hip Arthroplasty: Smith-Petersen Approach

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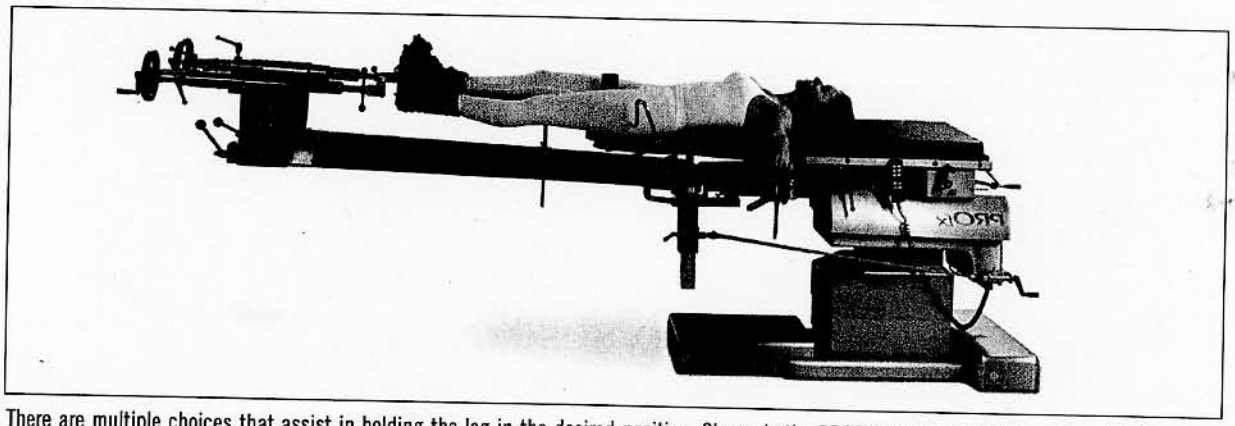
Hip replacement surgery has become one of the most successful interventions in modern medicine. The clinical results frequently show well over 90% good or excellent outcomes.[1,2] Recently, an increased emphasis has been paid to surgical approaches that lessen trauma to soft tissue and bone, potentially allowing a much quicker recovery. This has resulted in several modifications of existing techniques as well as the establishment of new techniques. Modification of the posterior and anterolateral approaches has resulted in decreased incision length and less detachment of the muscles from bone; however, the general principal of these approaches has stayed the same. The main advantages of these techniques are the familiarity to surgeons and the possibility of extensile exposure when needed. Two-incision techniques were developed with the intention of allowing each component to be placed in an optimal position with the least amount of soft-tissue damage. These approaches usually require intraoperative radiography since direct visualization of the femur often is not possible and visualization of the acetabulum may be suboptimal.

Total hip arthroplasty (THA) through a single-incision anterior approach is a less invasive technique because it does not adversely affect any of the major muscle groups around the hip joint, consisting of the hip extensors, abductors, and short external rotators.[3] Hip extensors are vital to activities of daily living such as getting out of a chair, walking upstairs, getting in and out of a car, and rising from the toilet. The abductors are critical for proper gait. The short external rotators are dynamic stabilizers of the hip joint; therefore, they are important to hip stability. Although the hip flexors are also important, they are rarely sufficiently affected during surgery to hinder hip function.

The first hip arthroplasty performed through a single anterior incision was by Robert Judet in 1947 at Hospital Raymond Poincare in Garches outside of Paris, France. The patient was supine on the Judet table that was designed by Judet's father, Henri Judet in 1940.[4,5] Judet referred to the surgical approach as the "Heuter approach." A published reference for this, however, is unknown, and "Heuter" may have been a reference to "Heuter Volkmann," the approach for drainage of a tubercular hip abscess. The approach also can be called the "Short Smith-Pete" because it follows the Smith-Petersen interval distal and lateral to the anterior superior iliac spine. Judet used the anterior approach for several reasons: (1) the hip is an anterior joint, closer to the skin anterior than posterior; (2) the approach follows an internervous plane between the superior and inferior gluteal nerves lateral (tensor fascia lata) and the femoral nerve medial (sartorius); and (3) the approach exposes the hip with minimal detachment of the muscular attachments.

This anterior approach preserves posterior structures that are important for preventing dislocation while preserving abductor muscle attachments to the greater

FIGURE 1



There are multiple choices that assist in holding the leg in the desired position. Shown is the PROfx table by OSI designed by JM Matta, MD, www.osiosi.com.

trochanter.[6,7] The gluteus maximum and tensor fascia lata muscles also remain undisturbed and function as hip abductors and pelvic stabilizers, inserting on the fascia lata/iliotibial band complex to form the "deltoid of the hip." Preservation of this "hip deltoid" and the attachments of the gluteus minimus and medius facilitate earlier functional recovery and avoid postoperative abduction weakness.[8,9]

Acetabular access is easy to appreciate through the anterior approach; however, femoral access is more difficult. This has lead to other techniques that often require a separate incision for implantation of the femoral stem.[10] With the single anterior incision, access to both the acetabulum and femur is facilitated by a special orthopaedic table or table attachment used to control leg positioning during the procedure.[11-14] The original table used in France by Judet was the Judet/Tasserit table. This table is no longer manufactured, which led to the design of the OSI PROfx table (**Figure 1**). We currently use the OSI PROfx and HANA (OSI, Union City, CA) tables, and the tables have the additional feature of the femoral jack and hook device to facilitate femoral exposure. Other devices, such as the arch table extension and the medacta table extension, are available. One of the authors has some experience with the arch table extension; the other devices are only included for the sake of completeness. In this chapter, we will review patient selection criteria, surgical technique, pearls and pitfalls, and early to midterm clinic results of the single-incision anterior approach using a special operating table.

PATIENT SELECTION

Although the single-incision anterior approach with a specialized surgical table for hip replacement can be performed in most patients, certain patients are not considered appropriate candidates for this approach. Patients with severe heterotopic bone, ipsilateral below-knee amputation, an ipsilateral hinged knee prosthesis, or severe dysplasia requiring femoral osteotomy should undergo hip arthroplasty via a different surgical approach. In severe heterotopic bone, femoral exposure and mobilization may be very difficult. In below-knee amputation, a proximal tibial pin may be attached to a Kirschner traction bow that attaches to the table spar, but this adds complexity to the procedure. Although ipsilateral total knee arthroplasty is not an absolute contraindication, a hinged knee may rotate out around the rotating platform. Caution should be used since we do not have any experience with this particular situation. Although acetabular dysplasia in need of bone grafting can be done without difficulty by fixing the graft with either screws or a plate, a femoral shortening osteotomy can be difficult. Acetabular work (ie, bone graft with screw fixation) is relatively easy, but the difficulty with dysplastic hips is on the femoral side. Dyplastic hips that require femoral shortening osteotomy are difficult to correct and require a separate incision. Therefore, we feel that dysplasia with the need for femoral shortening osteotomy is a contraindication. Femoral dysplasia without femoral shortening is acceptable. The advantage of using the anterior approach in dysplasia includes preser-