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Surgical technique

Saddle to Incision Relationship: A Novel Approach to Localizing the Incision for Direct Anterior Hip Arthroplasty

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ABSTRACT

The direct anterior approach for total hip arthroplasty has grown in popularity over the last decade. Incision for this approach is often based on a standardized distance from the anterior superior iliac spine. Despite this method, wound complications remain a known complication during direct anterior approach. We describe a simple and reproducible technique using fluoroscopy to identify the incision during direct anterior total hip arthroplasty. This method allows for accurate placement of incision while adding only a minimal amount of time to the procedure. Using this technique helps minimize proximal skin maceration and lessens the need for extension of incision intraoperatively.

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Introduction

The direct anterior approach (DAA) to the hip was originally described in the 19th century and has grown in popularity in the past decade for use during total hip arthroplasty [1-3]. Despite the increase in its usage, the anterior approach has its own set of complications, including wound dehiscence, fracture of the proximal femur, and damage to the lateral femoral cutaneous nerve [1,4]. Wound complications pose a particular risk in the DAA, especially in obese patients whose pannus may overlie the incision [5,6]. Factors hypothesized to affect wound healing include incision near the inguinal crease and groin, surgeon experience, overlying pannus, and increased tension on the incision site [4,5].

The incision for the DAA varies by surgeon and is often based on a standardized distance in relation to the anterior superior iliac spine (ASIS), as outlined in Table 1. Although this is the current convention, the ASIS may be difficult to palpate in obese patients. In addition, measuring a standard distance from the ASIS does not allow for variations in anatomy such as coxa vara, coxa valga, or acetabular protrusion. This may lead to extension of the incision either proximally or distally intraoperatively or to maceration of the proximal extent of the incision. We have found no sources in the literature that have described a radiographic landmark for the incision in the DAA for total hip arthroplasty.

The purpose of this article is to describe a simple and reproducible method of marking the incision for direct anterior total hip arthroplasty using fluoroscopy. This technique has allowed us to confidently place the incision over the correct interval with minimal need to extend the incision proximally or distally and has provided excellent visualization throughout the procedure.

Technique

The patient is placed in the supine position on the operating table. If using a flat radiolucent table, both legs are prepped up to the ASIS, and the break in the table is positioned so as to allow for hyperextension of the hip joint. In this author's institution, a Hana Table (Mizuho OSI, Union City, CA) is used with both feet placed in traction boots and secured in the leg spars allowing the operative hip to be extended and crossed beneath the opposite limb for femur preparation.

Once positioned, C-arm fluoroscopy is brought in to establish baseline calculations of acetabular version, femoral length, and offset. At this time, a radiopaque marker is placed on the skin overlying the saddle of the femoral neck (Fig. 1). This is marked with a horizontal line on the skin with indelible ink, and the hip is then prepped and draped in the usual sterile fashion (Fig. 2).

A sterile marking pen and ruler is then used to measure approximately 3 cm posterior from the ASIS and is marked. In patients whose ASIS may be difficult to palpate, fluoroscopy can be

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Table 1
Starting point for DAA incision in relation to ASIS.

Author	Posterior/Lateral to ASIS (cm)	Distal to ASIS (cm)
Post et al. [1]	3	3
Matta et al. [2]	2	1
Connolly and Kamath [7]	2-4	2-4
Manrique et al. [8]	2	2

used to identify the ASIS. Using the horizontal line demarcating the femoral saddle as the starting point, a vertical line is then drawn proximally toward this mark for 4 cm and distally toward the lateral patella for 4 cm for a total incision length of 8 cm (Fig. 3).

Routine surgical dissection via the standard anterior internervous plane is then carried out. The use of fluoroscopy to identify the saddle and placing this landmark at the 50-yard-line of the surgical incision will lead to excellent visualization of both the acetabulum and the femur without the need to extend proximally or distally intraoperatively.

Figure 2. Clinical photograph of the femoral saddle as the midpoint of DAA incision.

Discussion

We describe a simple and reliable technique that allows for accurate placement of incision for anterior total hip arthroplasty. To our knowledge, this is the first study to describe an incision for the DAA based on a radiographic landmark.

Fluoroscopy is an essential and straight forward adjunct to the anterior total hip arthroplasty because of the patient being placed supine on the operating table [9]. When compared to the posterior approach, a DAA using fluoroscopy has been shown to more accurately restore femoral offset and leg length, as well as anteversion and abduction of the acetabular cup [10]. Marking the saddle of the femur using fluoroscopy is a simple technique that can be performed while taking the standard preoperative radiographs after the patient has been placed on the operating room table. This technique adds minimal time to the procedure and helps the surgeon to establish a reliable landmark for placing the proximal-distal portion of the incision. While not formally tracked, we estimate that less than 5% of patients needed incision extension when using this technique.

The rate of wound complications during anterior total hip arthroplasty ranges from 1% to 2% [4,6]. While female gender and obesity have been associated with risk of wound complications, authors have commonly attributed wound issues to location of incision and skin quality [4,5]. In an effort to mitigate wound complications, different authors have described a “bikini” incision following Langer’s lines either in or just

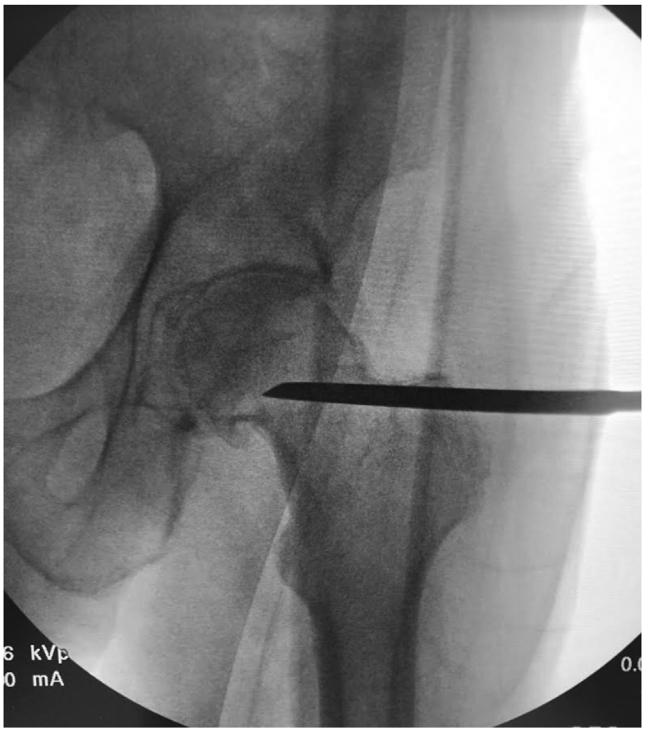

Figure 1. Intra operative fluoroscopy marking of saddle of the femoral neck.

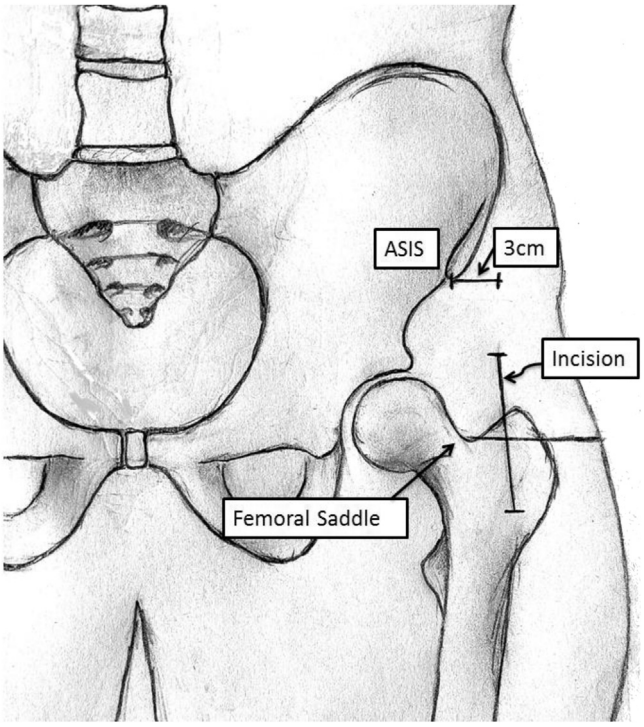

Figure 3. Illustration depicting radiographic and anatomic landmarks needed for correct placement of incision.

distal to the inguinal crease with promising results [3,8,11]. However, a longitudinal incision is currently the convention, likely due to its familiarity and versatility [11]. Misplacement of this incision during DAA can cause decreased access to the proximal femur and acetabulum and may lead to proximal skin damage if too much tension is placed on the wound. For a surgeon learning the DAA, a radiographic landmark to assist in incision placement eliminates a variable that could otherwise cause issues with visualization throughout the case.

This technique does add at least one shot of fluoroscopy, as well as the additional time needed for appropriate marking. However, as fluoroscopy is routinely used during anterior total hip arthroplasty, this technique does not require additional equipment and exposes the patient and surgeon to minimal amounts of additional radiation. Further studies are necessary to determine if this method leads to different outcomes during anterior total hip arthroplasty.

Summary

We have described a simple and reproducible technique using intraoperative fluoroscopy to accurately localize the surgical skin incision during anterior total hip arthroplasty. This technique allows for accurate placement of incision without the need to extend the incision proximally or distally. This technique can be carried out once the patient has been placed on the operating table and adds minimal operative time.

Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

References

[1] Post ZD. Direct anterior approach for total hip arthroplasty: indications, technique, and results. J Am Acad Orthop Surg 2014;22(9):595.
[2] Matta JM, Shahrdar C, Ferguson T. Single-incision anterior approach for total hip arthroplasty on an orthopaedic table. Clin Orthop Relat Res 2005;441:115.
[3] Leunig M. Skin crease 'bikini' incision for the direct anterior approach in total hip arthroplasty: a two- to four-year comparative study in 964 patients. Bone Joint J 2018;100-B(7):853.
[4] Statz JM. Outcome of direct anterior total hip arthroplasty complicated by superficial wound dehiscence requiring irrigation and debridement. J Arthroplasty 2019;34(7):1492.
[5] Watts CD. High risk of wound complications following direct anterior total hip arthroplasty in obese patients. J Arthroplasty 2015;30(12):2296.
[6] Christensen CP, Karthikeyan T, Jacobs CA. Greater prevalence of wound complications requiring reoperation with direct anterior approach total hip arthroplasty. J Arthroplasty 2014;29(9):1839.
[7] Connolly KP, Kamath AF. Direct anterior total hip arthroplasty: literature review of variations in surgical technique. World J Orthop 2016;7(1):38.
[8] Manrique J. Direct anterior approach for revision total hip arthroplasty. Ann Transl Med 2014;2(10):100.
[9] James CR. The use of fluoroscopy during direct anterior hip arthroplasty: powerful or misleading? J Arthroplasty 2018;33(6):1775.
[10] Martin JR, Masonis JL, Mason JB. Anatomic total hip component position is more reproducible with the direct anterior approach using intraoperative fluoroscopy. Arthroplast Today 2020;6(4):777.
[11] Manrique J. Total hip arthroplasty through the direct anterior approach using a bikini incision can Be safely performed in obese patients. J Arthroplasty 2019;34(8):1723.