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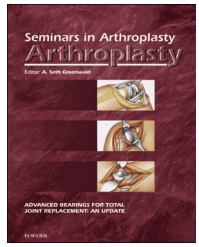

The mini anterior approach: Optimizes total hip arthroplasty outcomes—Opposes

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ABSTRACT

Much has been written and talked about in both the lay press as well as orthopaedic journals regarding the potential for enhanced recovery in anterior total hip arthroplasty. It is our feeling that the evidence regarding this claim is weak at best, and that the approach has a high complication rate in many surgeon's hands. We propose the elements of leading to enhance recovery as it applies to all approaches to total hip arthroplasty and propose alternative means to achieve them.

1. Introduction

Much attention has surrounded the development of the anterior total hip arthroplasty in the last decade. Claims of "no tendons cut" and enhanced recovery utilizing the direct anterior approach (DAA) have been showcased as a dramatic improvement in care in the popular media [1], and captured the attention of both the general public and the orthopaedic community; however, can we accurately state that the DAA does in fact improve early outcomes in total hip arthroplasty? It is our belief that it is not the anterior approach that leads to optimized outcomes, but instead it is (1) avoidance of complication, (2) accuracy of component placement, (3) early mobilization, and (4) respect for key anatomic structures that lead to optimized early recovery in THA. As these are not exclusive to any one approach, the purpose of this article is to describe the elements involved in early recovery following total hip arthroplasty, as they relate to both anterior and non-anterior approaches to hip arthroplasty.

2. Avoidance of early complications

Although this article focuses on the early recovery, both short- and long-term results may be adversely affected by early complications following total hip arthroplasty. The ideal approach for THA should be safe, reproducible, and applicable in all levels of hip disease as well as all patient types.

2.1. *Lower dislocation rate*

Much of the early enthusiasm for non-posterior approaches to total hip arthroplasty was the reduction in dislocation risk and removal of postoperative hip precautions. With rates of dislocations quoted as high as 6.4% with posterior approaches, this would appear to be a significant source of morbidity and complication [2]; however, this rate can be dramatically reduced with posterior capsular repair. Several studies have shown that, if a soft tissue capsular repair is utilized, low dislocation rates can be obtained with or without the use of soft tissue sparing approaches. In a meta-analysis

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performed in 2006, it was found that posterior approaches not involving posterior capsular repairs have up to an 8.1-fold higher rate of dislocation at 4.46%; however, with soft tissue only posterior repair, this drops to a dislocation rate of 0.49% [3]. Similar dislocation rates are reported from surgeons performing anterior THA, 0–1.5% depending on the series [4–6]. Well-established surgeons, far outside of the learning curve in performing the DAA, have reported dislocation rates of around 0.61% [7].

2.2. *High fracture risk*

Multiple studies have shown a substantial risk of femoral fracture with the DAA, that is most pronounced when a surgeon first adopts the approach. This is often thought of as part of the learning curve of the approach. The exact number of patients required to obtain lower complication rates is debated, with reports as low as 20 to as high as 100 [4,8]. During this period of time, complications rates as high as 31% for single surgeons are reported [4]. Other reports of early experience show intraoperative fracture rates between 1.5% and 8%, with dislocation rates reported between 0% and 6% [4,5,8–11]. Reports from high-volume surgeons indicate a decrease in complication rates with experience, with reports of fractures as low as 0.6% in a series of 494 consecutive patients [7]. The technical challenges posed by the DAA calls into question how many patients should be exposed to a surgeons "learning curve" in order to achieve these lower complication rates? Given these challenges, it also begs the question of whether the approach is appropriate for low volume arthroplasty surgeons.

2.3. *Readily extensile*

Several article and textbook sources have reported the safety of distal extension of the approach [12,13]. This is required in the event of intraoperative fractures, which as noted above, can occur with some frequency. Recent anatomical data published in 2015 disputes these claims and shows that the extension of the approach distally risks damaging the proximal supply to the quadriceps muscles [14]. A benefit of a posterior or modified posterior approach is that it is readily extensile without the need for secondary incisions or risk of neurovascular damage when more exposure is necessary.

Other complications inherent to the anterior approach include lateral femoral cutaneous nerve injury and high rates of heterotopic ossification. Rates of lateral cutaneous nerve palsy are quoted between 17% and 65% in the literature [15–20]. Although reports vary as to the clinical significance, it would appear to be an unavoidable complication of the approach. Other authors have admitted rates of heterotopic ossification as high as 15% with the use of the anterior approach [20]. It is theorized that this may be related to the degree of difficulty in femoral exposure.

3. Component placement accuracy

Acetabular reaming and cup placement in the DAA is most often directly guided by intraoperative fluoroscopy. Some authors suggest that this is an advantage of the approach as the supine position allows for use of fluoroscopy, which may allow for more accurate placement of acetabular components [21]. However, the ability to use intraoperative imaging for guidance is not exclusive to the anterior approach. While historically many posterior approach surgeons have not used radiographic guidance, it is becoming clear that adequate intraoperative radiographs can be obtained in a lateral position. With the advent of digital radiography, it is now possible to obtain quality intraoperative imaging in the lateral position without significant wait time (Fig. 1). Preliminary data from over 1000 hip cases performed by the senior author has shown that 98% of cups placed using intraoperative digital radiography were within 5° of their intraoperative images on postoperative follow-up [22] (Fig 1). Other authors have shown that intraoperative radiography changed management in 50% of the cases performed in a posteriolateral approach at one institution in which it was used. Additionally, these authors have found optimal alignment in 96% of the cups with regard to medialization and 87% of cups with respect to abduction [23]. Utilization of this technology is relatively inexpensive at around $65,000 in comparison to the capital expenditures required for specialized fracture tables used by some anterior approach surgeons that may cost as much as $120,000.

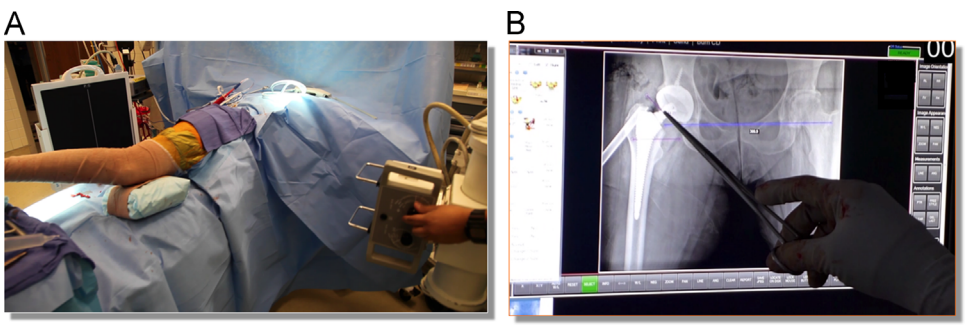

Figure 1 – Intraoperative digital imaging. (A) Picture displaying the set up for intraoperative digital radiography in the lateral position. (B) This allows an accurate assessment of femoral sizing and position, cup abduction, and anteversion and an accurate gauge of limb length in real time with minimal disruption of workflow.