

The Rise of Minimally Invasive “DAA” Hip Replacements: Hype, Hope, and Reality

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Learning Point of the Article:

The Direct Anterior Approach (DAA) in total hip arthroplasty (THA) offers clinically meaningful advantages in early functional recovery, reduced soft-tissue trauma, and lower dislocation rates; however, its adoption requires a comprehensive understanding of its technical demands, patient selection criteria, and associated complication profile. Optimal outcomes are achieved when the surgical approach is individualized based on patient anatomy and surgeon experience

Introduction: Evolution in Surgical Access for Total Hip Arthroplasty (THA)

THA is widely regarded as one of the most successful orthopedic interventions, providing significant pain relief and functional improvement for patients with end-stage hip pathology. Conventionally, surgical access to the hip joint has been achieved through posterior and lateral approaches, both of which involve varying degrees of soft tissue disruption. Recently, the direct anterior approach (DAA) has emerged as a prominent minimally invasive technique, characterized by intermuscular and internervous dissection, thereby minimizing damage to periarticular musculature [1]. Advocates of the DAA cite reduced post-operative pain, expedited rehabilitation, and shorter hospital stays as key benefits [2]. This editorial critically examines the rationale behind the widespread adoption of the DAA, compares it with other established approaches, and reviews current evidence regarding perioperative outcomes, complications, and long-term implant survivorship.

Clinical Rationale for the DAA

The increasing preference for the DAA can be attributed to its

muscle-sparing nature. This approach utilizes the Smith-Petersen interval between the sartorius and tensor fasciae latae muscles, avoiding detachment of major hip stabilizers [3]. This preservation of soft tissue integrity is theorized to facilitate:

Accelerated early functional recovery

Patients undergoing DAA often mobilize on the day of surgery, with earlier achievement of milestones such as stair climbing and unaided ambulation. Comparative data suggest superior short-term functional scores within the first 6–12 weeks postoperatively, which is clinically meaningful in the context of early rehabilitation protocols, especially in elderly or comorbid populations where early ambulation mitigates thromboembolic risks [4].

Reduced post-operative pain and intraoperative blood loss

Several studies have demonstrated significantly lower post-operative pain scores and decreased opioid consumption among DAA patients compared to posterior or lateral approaches [5]. Furthermore, reduced intraoperative blood loss has been

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consistently observed, likely owing to limited muscle dissection and preserved vascular supply.

Shortened hospitalization duration

The DAA is highly compatible with contemporary enhanced recovery after surgery (ERAS) pathways. Studies indicate that DAA facilitates same-day or next-day discharge, particularly when combined with multimodal analgesia, perioperative rehabilitation protocols, and patient education [6]. This can contribute to improved patient satisfaction and reduced healthcare costs.

Decreased dislocation risk

By preserving the posterior capsule and short external rotators, DAA potentially mitigates posterior instability. Numerous comparative and registry-based studies have reported a statistically significant reduction in post-operative dislocations among patients undergoing DAA, as compared to those treated with the posterior approach (PA) [7]. This anatomical preservation also allows earlier mobilization without the need for restrictive movement precautions.

Given these attributes, patient interest in DAA has surged. Marketing of the technique as a cutting-edge, minimally invasive solution has further influenced patient preference. Surgeons, in turn, have responded to demand; in a 2019 survey, 76% of surgeons performing DAA reported increased patient volume, while those adhering to traditional methods perceived a competitive disadvantage [8].

Comparative Overview of Surgical Approaches

To contextualize the emergence of DAA, it is essential to contrast it with other commonly employed techniques:

PA

Characterized by a posterolateral incision and detachment of the short external rotators, the PA provides excellent visualization and versatility [9]. Its popularity stems from reproducibility and favorable long-term outcomes. However, the higher incidence of dislocations and reliance on soft tissue repair have been noted as limitations.

Lateral and anterolateral approaches

These involve detachment or splitting of abductor muscles, which may compromise post-operative abductor function, resulting in Trendelenburg gait or persistent limp [9]. While these approaches are inherently stable due to intact posterior

structures, the risk of abductor insufficiency has limited their adoption.

DAA

The DAA, performed through an incision along the anterior thigh, enables true muscle-sparing access through an internervous plane [9,10,11]. Despite its advantages, the approach is technically demanding. This approach necessitates specialized equipment such as traction tables and fluoroscopy. Bajwa detailed a leg-positioning traction system that can facilitate femoral exposure while preserving tissue integrity but noted a steep learning curve and the potential for intraoperative complications such as femoral fractures, anterior cortical perforation, and injury to the lateral femoral cutaneous nerve during the initial adoption phase [12].

Although the term “minimally invasive” has been applied to various approaches—including modified posterior and lateral techniques with reduced incision lengths—the DAA is now recognized as the most widely adopted approach fulfilling both soft-tissue preservation and minimally invasive criteria. Earlier techniques, such as the two-incision method, have largely been abandoned due to technical complexity and poor reproducibility [13].

Widespread Adoption of the DAA

From a marginal technique two decades ago, the DAA has progressed to mainstream acceptance. By 2019, over 50% of arthroplasty surgeons in the United States regularly performed DAA [8]. Adoption has been even more pronounced in certain countries; for example, in the Netherlands, the prevalence of DAA increased from under 1% to over 40% within 13 years [14]. This growth is attributable to early adopters such as Dr. Joel Matta and the incorporation of the approach into residency curricula [5,15].

Patient-driven demand, bolstered by accessible online information and institutional marketing, has played a critical role in this trend. Nonetheless, a subset of experienced surgeons remains circumspect, citing the steep learning curve and lack of definitive long-term superiority. A majority of non-adopters cite insufficient evidence of clinical benefit as the primary deterrent [8]. This underscores the necessity of surgeon proficiency and appropriate patient selection.

Evaluating the Evidence: Clinical Outcomes of DAA

Numerous randomized controlled trials (RCT) and meta-analyses have examined the comparative effectiveness of DAA

in relation to other approaches.

Early functional recovery

Meta-analyses consistently demonstrate that DAA is associated with modestly improved early functional outcomes, including better Harris Hip scores and reduced time to ambulation, within the first 8–12 weeks postoperatively [16]. These improvements, although modest in magnitude, may be of significant value in frail elderly patients or those undergoing outpatient arthroplasty.

Hospital stay and rehabilitation

DAA facilitates a reduced length of stay by 0.5–1.5 days on average, depending on institution and perioperative pathway. When integrated with ERAS protocols, DAA has enabled outpatient THA in appropriately selected patients [17].

Dislocation rates

The DAA has demonstrated superior results with respect to joint stability, with dislocation rates as low as 0.2–0.5% in some series, compared to 1–2% with the PA [18]. A systematic review of 38 studies concluded that the PA had higher or equal dislocation rates; none reported superiority of posterior over anterior [17].

Surgical complications

While the DAA offers several perioperative benefits, certain complications are more prevalent with this approach. Specifically, the incidence of lateral femoral cutaneous nerve injury is higher, presenting as numbness or dysesthesia in the anterolateral thigh [11]. In addition, intraoperative femoral fractures, particularly anterior cortical perforations, have been reported with greater frequency during the learning curve [14]. National joint registry data from the United Kingdom suggest that non-PAs, including DAA and lateral techniques, are associated with a slightly elevated risk of intraoperative fractures, possibly due to limited femoral exposure [19]. Wound complications, particularly in obese patients, may be more common in DAA due to the groin location of the incision. Nonetheless, posterior and lateral approaches present their own unique risk profiles—ranging from persistent limp due to abductor damage to dislocation due to inadequate posterior soft-tissue repair. Overall, the best available evidence indicates that complication rates are comparable across techniques when performed by experienced surgeons [6,17]. Each approach possesses a distinct set of trade-offs, and no single technique has been universally proven superior in all clinical contexts.

Patient-reported outcomes and satisfaction

Beyond 3–6 months, patient-reported outcomes such as the Western Ontario and McMaster Universities Osteoarthritis index, hip disability and osteoarthritis outcome score, and short form-36 scores converge across surgical approaches. A multicenter RCT with 7-year follow-up found no statistically significant differences in functional outcomes or revision rates between DAA and mini-posterior techniques [16]. Patient satisfaction is marginally higher in DAA recipients in select studies, though this may reflect pre-operative expectations [17]. In another retrospective study of younger male patients undergoing DAA reported not only excellent functional scores (mean hyperosmolar hyperglycemic state ~99 at 1 year) but also a rapid return to sexual activity—with over 70% resuming the activity within 2 weeks postoperatively. This highlights an often-underreported domain of post-operative quality of life, further supporting the DAA's role in enhancing early patient recovery and satisfaction [20]. A recent retrospective study from India evaluating bilateral single-stage DAA in avascular necrosis patients demonstrated not only favorable functional outcomes but also a low complication rate and minimal perioperative morbidity [21]. These findings support the feasibility of DAA in complex, high-demand clinical scenarios such as bilateral simultaneous THA, further establishing its safety and efficacy in an Indian population.

Implant survivorship

Long-term registry and institutional data do not suggest any clinically relevant differences in implant longevity attributable to surgical approach. Concerns about increased early revision risk with DAA have largely been linked to inexperience and are not evident in high-volume centers [22,23].

Selecting the Optimal Approach: A Contextual Decision

Determining the most appropriate surgical approach involves a multifactorial assessment. DAA may align well with contemporary trends favoring outpatient arthroplasty and rapid recovery pathways. However, it requires institutional investment in specialized equipment and training. Certain patient populations—such as those with high body mass index, prior surgeries, or complex anatomy—may be less suitable for DAA. Conversely, well-selected patients managed by high-volume DAA surgeons may benefit from its muscle-sparing attributes [24,25].

Orthopedic consensus is shifting toward a patient-centric model where the surgical approach is tailored to individual anatomy, comorbidities, and surgeon expertise, rather than a universal preference. Surgeons proficient in multiple

techniques are better positioned to adapt intraoperatively and optimize outcomes.

Conclusion

The adoption of DAA in THA reflects a broader movement toward minimally invasive, patient-centered care. The technique provides tangible benefits in early recovery, reduced post-operative discomfort, and potentially improved hip stability. However, these advantages must be balanced against technical challenges and patient-specific risk factors.

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