Abstract: Timothy P. Lovell, MD (Spokane, Washington) presented a review of the literature related to the direct anterior approach at the second annual ICJR Anterior Hip Course hosted by the Methodist Institute for Technology, Innovation, and Education (MITIE) in Houston, Texas. Dr. Lovell began by noting that multiple authors have claimed that the direct anterior approach results in less soft tissue damage, faster recovery, and lower dislocation rates, asking whether the data support these claims. Dr. Lovell then presented multiple publications that corroborate each of these claims, providing the caution that the direct anterior approach involves as substantial learning curve.

Support for the Direct Anterior Approach

Dr. Lovell outlined the published evidence that, when compared to traditional approaches, the direct anterior approach results in:

1. Less soft tissue damage
2. Earlier and easier recovery
3. Lower risk of dislocation

The papers cited by Dr. Lovell to support each of these three claims are listed below, along with the key findings of each publication.

Claim 1: Less Soft Tissue Damage

Meneghini, et al. (2006): This cadaver study found less damage to the gluteus minimus muscles and tendon with direct anterior approach; the posterior approach resulted in damage to the abductor muscles.

Bergin, et al. (2011): This prospective study compared the muscle damage and inflammation in patients treated with MIS anterior and posterior approaches by measuring serum creatine kinase levels, a validated marker for muscle damage. Levels were 5.5 times higher in the posterior-approach group in the post-anesthesia-care unit, and nearly twice as high cumulatively, in relation to the anterior cohort.

Bremer, et al. (2011): This retrospective MRI study compared the direct anterior and anterolateral approaches, concluding abductor damage, partial tears and tendonitis of gluteus medius and minimus, peri-trochanteric bursal fluid, and fatty atrophy of gluteus medius and minimus were significantly less evident and less frequent with the direct anterior approach.

Claim 2: Earlier and Easier Recovery

Bourne, et al. (2010): In this comparison between direct anterior and anterolateral approach outcomes, the direct anterior approach resulted in better function and pain scores at six weeks and six months and superior function at one year post-op.

Alecci, et al. (2011): This retrospective study of 419 consecutive patients comparing the direct anterior and anterolateral approaches found that the direct anterior patients experienced less pain, had a shorter time to discharge, and were more often discharged to home (58.4% for DAA versus 11.6% ALA).

Mayr, et al. (2009): Researchers looking at gait for patients receiving direct anterior and traditional anterolateral hip replacement found that direct anterior patients improved in a greater number of gait parameters and that the majority of the improvements occurred between six and 12-weeks post-op.

Restrepo, et al. (2010): In this prospective, randomized study of supine direct lateral versus single-incision direct anterior approach, the direct-anterior patients had significantly better improvements at six weeks, six months and one year.

Deshmukh, et al. (2013): Found accelerated early post-operative recovery with the direct anterior approach when compared to the conventional posterior approach, although significant differences were not apparent by six weeks post-op.

Orishimo, et al. (2013): This comparison of direct anterior and posterior approaches found higher internal-external ROM with the direct anterior approach; the two groups had similar improvement in gait parameters up to one year follow-up.
Maffiuletti, et al. (2009): At six months, posterior approach patients reported higher stiffness at six months post-op (using WOMAC questionnaire) compared to the direct anterior patients.\textsuperscript{11}

Nakata, et al. (2009): In this comparison of the direct anterior approach and the mini-posterior approach, the researchers found faster patient recover of hip function and gait ability and also better acetabular component alignment in the direct anterior group.\textsuperscript{12}

Bhadra, et al. (2012): In this retrospective review, 90 consecutive patients operated by a single surgeon were divided into mini-posterolateral and direct anterior approach. Direct anterior was found to be more effective for very early functional recovery and pain control but at a higher complication rate.\textsuperscript{13}

Barrett, et al. (2013): This prospective, randomized study compared a group of 43 direct anterior to 45 mini-posterolateral patients. The direct anterior patients required less post-op pain medications, a half-day shorter hospitalization, and had higher functional scores at one and three months; no functional differences were apparent at one year post-op.\textsuperscript{14}

Schweppe, et al. (2013): In this study, researchers compared hospital-related outcomes for the direct anterior and posterior total hip replacement performed by a single surgeon in 100 consecutive patients in each study arm. The direct anterior group experienced less blood loss (p=0.002) and transfusions (p=0.009), less narcotic usage (p=0.010), and quicker discharge (p<0.001).

\textbf{Claim 3: Lower Risk of Dislocation}

Sariali, et al. (2008): In this study, the authors reported the published dislocation rate of different approaches to hip replacement. The posterior approach had a 4% dislocation rate with an N=10,187; the transtrochanteric, 1.5% with N=1,052; and the anterolateral 2% with N=7,473.

Horne, et al. (2011): This paper provides a summary of the published dislocation rates for direct anterior approach using a fracture table; on average the dislocation rate was 1%, ranging from 0.0-1.5%.

\textbf{Caution Regarding the Learning Curve}

To demonstrate the idea that the direct anterior technique involves a learning curve, Dr. Lovell cited the following publications, noting, “I think you will notice improvement after every 10 cases.”

Hungerford, et al. (2009): This study noted an obvious improvement in proficiency over time with a lack of major complications; some improvement noted after 40 cases, with substantial improvement after 60 cases.\textsuperscript{15}

Huddleston, et al. (2009): This study found that community surgeon outcomes were inferior compared to the outcomes of an innovator of the direct anterior technique. The authors concluded that adequate training is critical to reduce the risk of complications during the learning curve and that risk of serious complication was decreased after 30-40 procedures.\textsuperscript{16}

Spaans, et al. (2012): This study concluded that there was a higher early complication rate with the direct anterior approach when compared to a conventional posterolateral approach.\textsuperscript{17}

DeGeest, et al. (2013): The authors caution that there is a higher risk of occult intraoperative fractures when first learning the DA technique.\textsuperscript{18}

Rüdiger, et al. (2013): These authors also address the femoral fracture issue, noting a 2.7% fracture rate in their series and that seven of the eight patients with trochanteric fracture consolidated without reoperation.\textsuperscript{19}

Hallert, et al. (2012): These authors conclude that morbidly obese patients, patients who are very muscular, and patients with a very short femoral neck are particular difficult. Owner [Dr. Lovell advised that these patients not be taken on early in a surgeon’s experience with the direct anterior approach.]

\textbf{Conclusion}

Publications and conference presentations demonstrate that the direct anterior approach for hip surgery results in less soft tissue damage, a faster and easier recovery, and lower rate of dislocation. However, multiple authors have identified a definite learning curve that results in a higher rate of complications in early experience with this technique. For further reading, Dr. Lovell recommended two additional papers that provide an overview of the benefits of the direct anterior approach: Bal, et al. (2008)\textsuperscript{21} and Wegman, et al. (2012)\textsuperscript{22}. 

References


