

STAR: PIRIFORMIS PRESERVING POSTERIOR APPROACH – THE NEW PARADIGM

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SUMMARY

Background / Problem Total hip arthroplasty (THA) approaches seek to balance minimal soft tissue disruption with adequate surgical exposure and component positioning accuracy. While the standard posterior approach offers excellent visualization, it typically involves releasing the piriformis tendon, which can compromise postoperative hip stability.

Objective of the Article This article describes the Superior Transverse Anatomic Reconstruction (STAR) approach, a piriformis-preserving, mini-posterior technique for THA. It outlines the surgical steps, underlying rationale, and summarizes the current clinical evidence supporting its use in modern arthroplasty.

Key Points / Core Message The STAR approach utilizes a short transverse incision and a gluteus maximus split, meticulously preserving the piriformis muscle while releasing and subsequently repairing the other short external rotators. This technique provides unobstructed 360° ("full moon") visualization of the acetabulum and direct access to the proximal femur, facilitating accurate implant placement without specialized instrumentation or a traction table. Its versatility extends from routine primary cases to complex dysplasia and select revisions. Prospective comparative studies demonstrate that, compared to direct superior and standard posterior approaches, the STAR technique is associated with reduced blood loss, shorter hospital stays, and faster early functional recovery. Notably, surgeons transitioning from a standard posterior approach have shown no significant learning curve.

Conclusion / Implications for Practice The STAR approach is a safe, effective, and reproducible muscle-sparing technique for THA. By preserving the piriformis tendon, it enhances hip stability while maintaining the exposure benefits of a posterior-based approach. The growing body of clinical evidence supports its role in promoting rapid recovery and achieving excellent outcomes, making it a valuable technique for hip arthroplasty surgeons.

KEYWORDS

Total Hip Arthroplasty, Piriformis-Preserving, STAR Approach, Minimally Invasive Surgery

INTRODUCTION

The Superior Transverse Anatomic Reconstruction (STAR) is a mini posterior, piriformis-preserving approach for total hip arthroplasty (THA). The main advantages lie in the preservation of the piriformis muscle and minimal soft tissue disruption, which contribute significantly to joint stability and rapid early recovery. Additionally, it is characterized by high versatility that allows STAR to be used in routine primary THA, complex primary cases such as severe osteoarthritis or developmental dysplasia, and selected revision procedures.

By preserving the piriformis and carefully handling the surrounding soft tissue structures, the STAR approach provides clear access and unobstructed view to both the acetabulum and proximal femur, allowing for precise implant placement. The spinopelvic assessment, carefully incorporated into preoperative planning, ensures optimal component orientation and functional alignment tailored to each patient's anatomical characteristics.

Early clinical experience has highlighted several advantages compared with standard posterior and minimally invasive posterior approaches:

- Enhanced stability: Piriformis preservation lowers the risk of posterior dislocation.
- Minimally invasive: Leads to lower blood loss, shorter hospital stays, and faster early mobility.
- Unobstructed view: Offers excellent access to both the acetabulum and proximal femur.
- Reproducibility: Familiar posterior anatomy with standard instrumentation and without the need of traction table.

Introduced by Professor Tsiridis in 2019, the STAR approach has already been evaluated in prospective comparative studies and demonstrated through courses and fellowships. In 2024, the STAR Approach Foundation was launched to support education, research, and international collaboration, promoting broader adoption of the technique.

SURGICAL TECHNIQUE

Patient Positioning & Approach

Standard lateral decubitus positioning is used, familiar to surgeons trained in the posterior approach.

No traction table or intraoperative fluoroscopy is needed

A short transverse incision is made above the greater trochanter (Figure 1).

Incision length is usually 8-10 cm

The incision can be extended for more exposure in complex or revision cases.

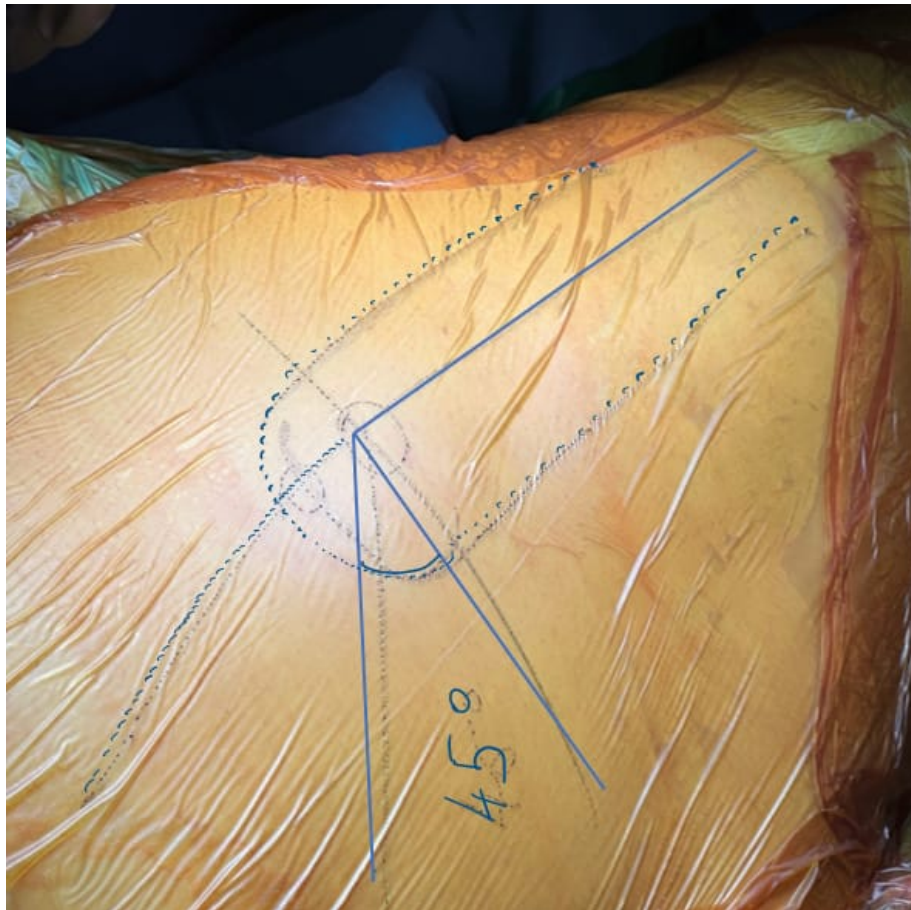


Figure 1: Incision line from starting point, 45° posteriorly and upwards.

Muscle Handling & Piriformis preparation

The gluteus maximus is split along its fibers.

The piriformis tendon is preserved with its tension being monitored throughout the THA (Figure 2).



Figure 2: Piriformis separation from superior posterior capsule.

The rest of short external rotators are released and repaired during closure while quadratus femoris is generally left intact (Figure 3).

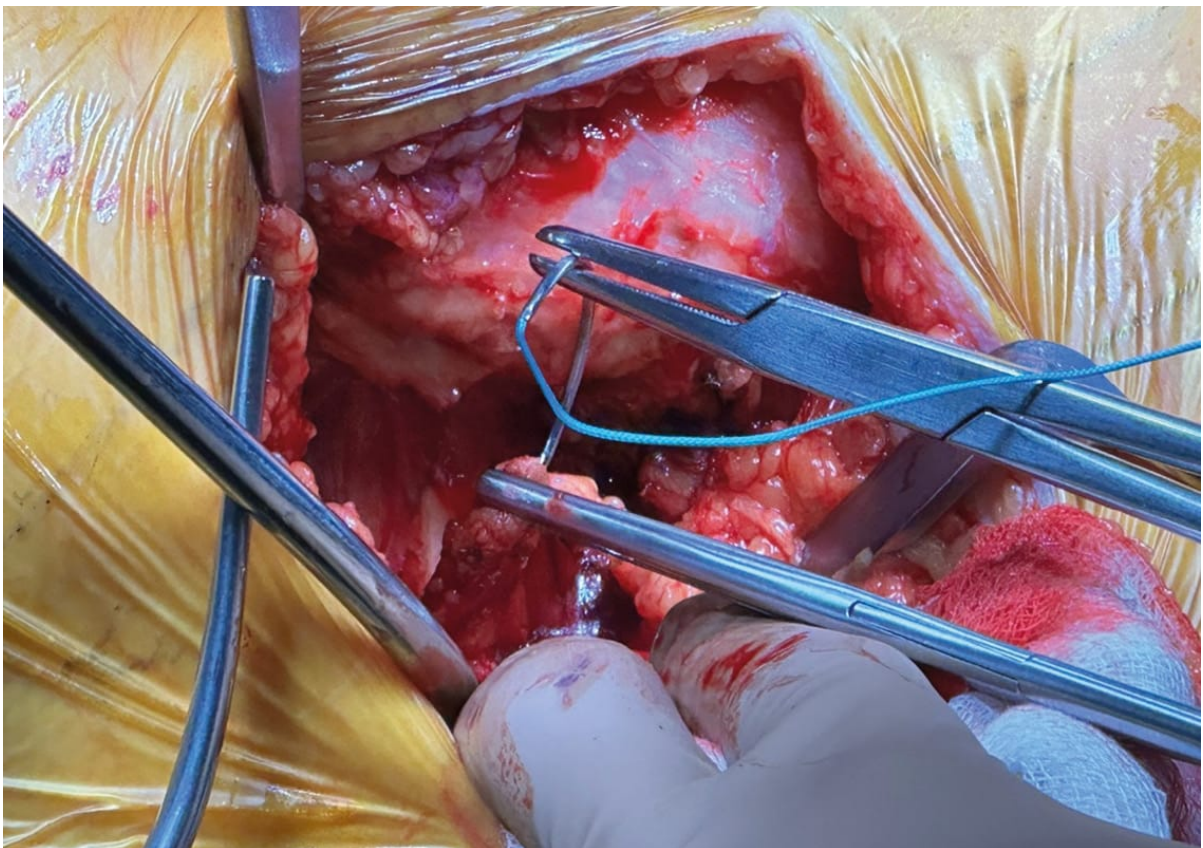


Figure 3: Conjoined tendon release and tagging.

Capsulotomy and Joint Exposure

An inverted-J capsular incision allows joint access and is repaired at the end of the procedure

Reaming and cup placement are performed under direct “full moon” 360° visualization (Figure 4).

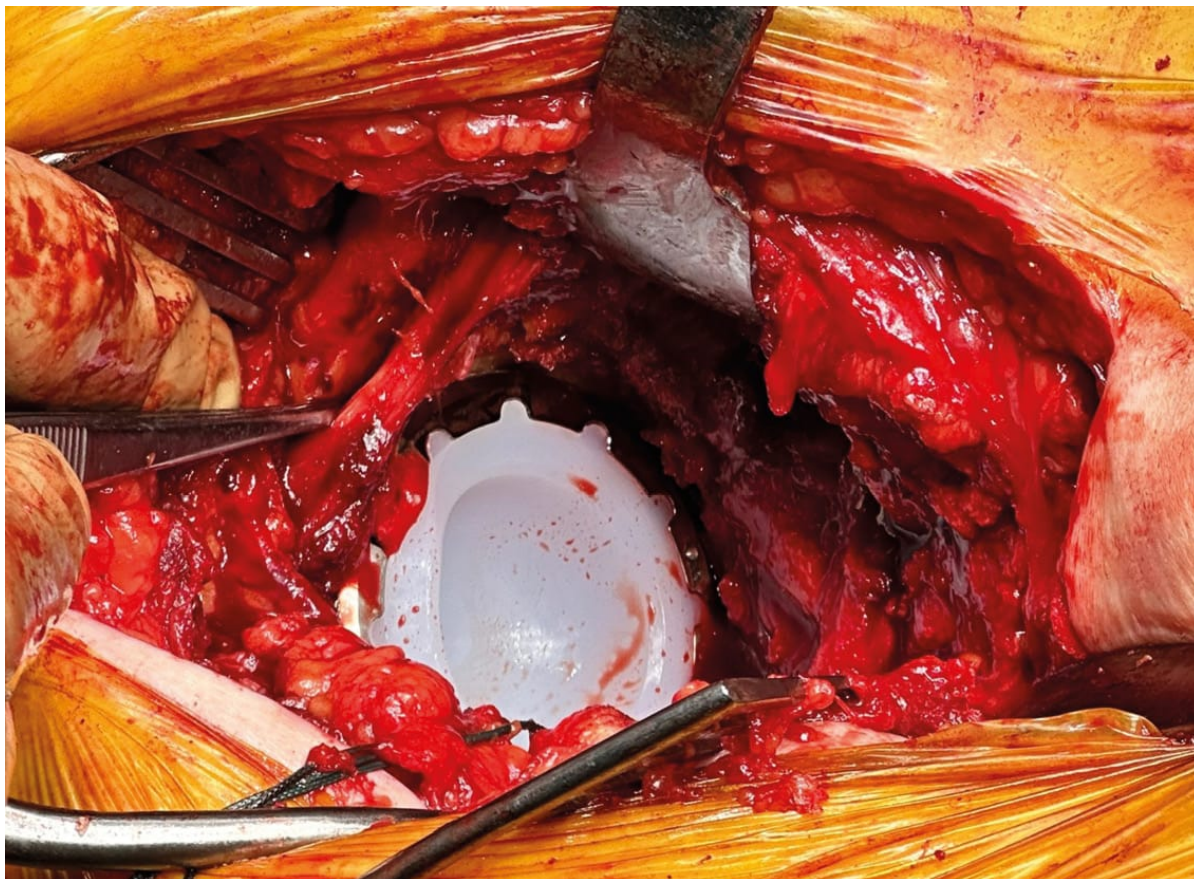


Figure 4: Acetabulum "Full Moon" with intact Piriformis.

Preoperative spinopelvic assessment is routinely performed and incorporated into cup orientation.

Femur preparation

The proximal femur is fully exposed, allowing stem version to be directly assessed using the distal femoral intercondylar axis (Figure 5).



Figure 5: Hip position and stem version assessment during femoral preparation.

Closure

Capsule and short external rotators are repaired with transosseous sutures anchored in the greater trochanter and lower gluteus medius.

Skin is closed in layers to enhance cosmetic outcomes.

For a complete step-by-step guide, including intraoperative pearls and soft tissue repair strategies, refer to the original publication [\[1\]](#).

RATIONALE AND ADVANTAGES

STAR combines the reproducibility of the posterior approach while leaving the piriformis intact (Figure 6). Key benefits include:

- Universal approach: Suitable for primary THA, complex hip dysplasia, and selected revision cases, without specialized instruments.
- Improved stability: Preservation of the piriformis and careful handling of surrounding soft tissues diminish the risk of dislocation.
- Faster recovery: Less tissue trauma leads to lower blood loss and shorter length of stay.
- Spinopelvic-based planning: Preoperative assessment guides to the optimum personalized implant positioning.

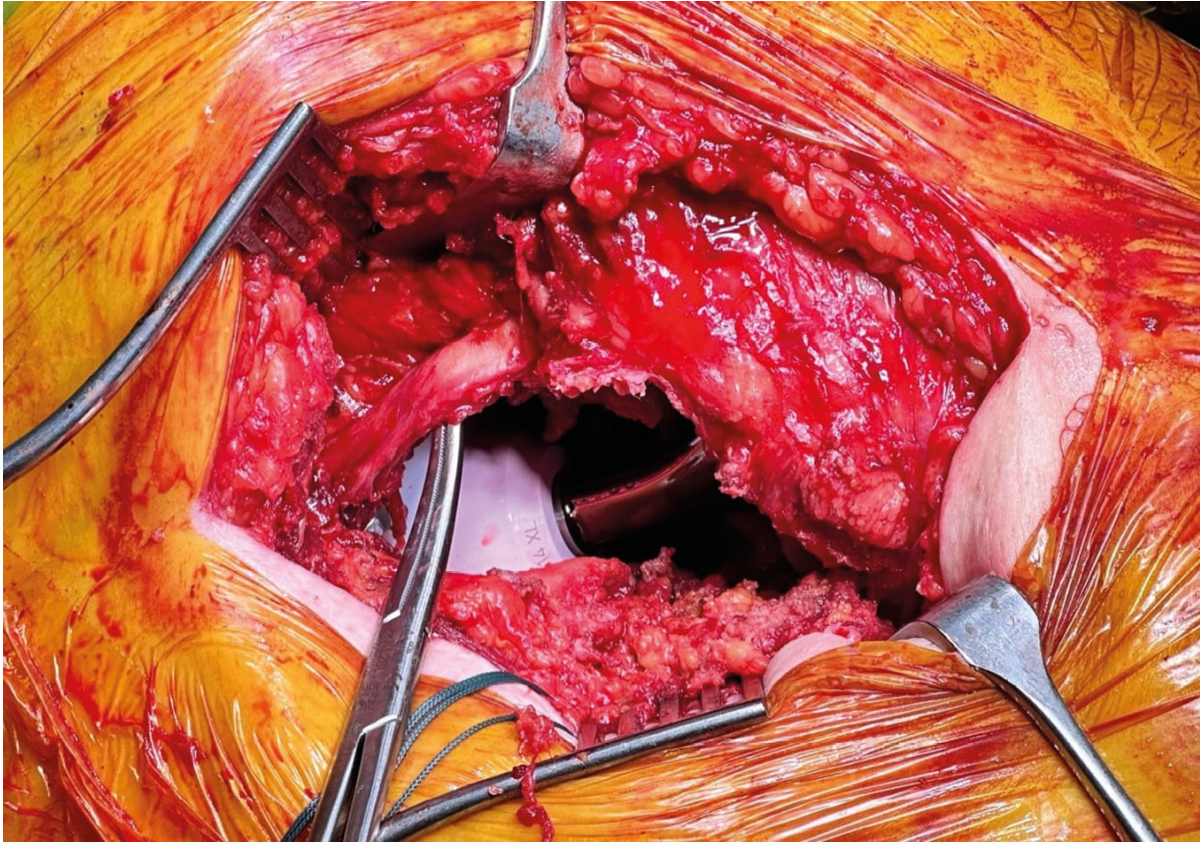


Figure 6: Piriformis final assessment

CLINICAL EVIDENCE

1. Preliminary Report of the New MIS STAR Approach

Tsiridis and Kenanidis (2022) described the piriformis-preserving minimally invasive STAR approach [1], highlighting:

- Preservation of piriformis, quadratus femoris and tensor fascia lata.
- “Full moon” exposure of the acetabulum for accurate component placement.
- Direct visualization of the distal femoral intercondylar axis for precise femoral and combined anteversion assessment.
- Feasibility in primary, dysplastic, and obese patients using standard instruments, without offset reamers, special tables or fluoroscopy.
- Low complication rates.

2. Matched, Prospective Comparative Study

Kenanidis et al. (2023) [2] compared 200 STAR THAs with 200 Direct Superior Approach (DSA) THAs. The STAR group demonstrated:

- Shorter hospital stays.
- Smaller incision lengths.
- Less intraoperative blood loss.

- Reduced need for transfusions.
- Greater functional improvements at 3 months postoperatively.

3. Single-Surgeon Cohort Study

Kenanidis et al. (2024) [3] evaluated 522 STAR THAs over a mean follow-up of 2.13 years. Key findings:

- High accuracy in implant positioning (cup inclination/anteversion, stem alignment, leg length).
- Low complication rates (1 early dislocation, 1 deep infection, 3 superficial infections).
- Average hospital stay of 1.5 days.
- Minimal need for blood transfusions.

4. Piriformis Preservation Review

Kenanidis et al. (2025) [4] reviewed the functional role of the piriformis in THA, emphasizing that preserving this muscle—as done in STAR—supports hip stability, reduces dislocation risk, and enhances functional recovery.

5. STAR Transition Study (in press)

Anatone et al. (2025) [5] compared 561 STAR THAs with 561 posterolateral (PA) THAs, findings:

- Shorter operative time.
- Reduced blood loss.
- Shorter hospital stay.
- Lower opioid use during hospitalization and at 6 weeks.
- No learning curve—posterior surgeons adopted STAR safely without additional complications.
- Similar improvements in HOOS Jr scores, transfusion rates, and readmissions.

THE STAR APPROACH FOUNDATION

Established in 2024 by Eleftherios Tsiridis (PGH, Thessaloniki, Greece) and Peter K. Sculco (HSS, New York, USA), the STAR Approach Foundation is a non-profit focused on education, collaboration, and research in STAR THA [6]. Its core objectives are:

- Provide education for trainees and surgeons through courses, workshops, and online resources.
- Encourage multicenter collaboration and innovation.
- Maintain an international registry to track outcomes globally.
- Publish high-quality clinical and translational research.

GLOBAL SUPPORT AND RECOGNITION

The Foundation has attracted support from well-recognized surgeons across North America, Europe, Asia, and the Middle East. These internationally respected arthroplasty surgeons are affiliated with leading institutions such as Hospital for Special Surgery (New York), NYU Langone Health (New York), UCSF (San Francisco), Stanford University (California), Duke University (North Carolina), Mayo Clinic (Rochester and Jacksonville),

Cleveland Clinic (Ohio), Rush University Medical Center (Chicago), University of Wisconsin–Madison, Atrium Health Wake Forest Baptist (North Carolina), University College London Hospitals, Charité University Hospital (Berlin), CHU Montpellier (France), Hôpital Pierre Paul Riquet Toulouse (France), Hospital Universitario La Paz (Madrid), University Hospital Infanta Leonor (Madrid), Clinique de Genolier (Switzerland), Città di Roma Hospital (Rome), Policlinico Tor Vergata (Rome), and Hospital Italiano de Buenos Aires (Argentina).

Their involvement:

- Validates the technique's credibility by demonstrating endorsement beyond its origin center.
- Expands dissemination via teaching courses, live surgical demonstrations, academic collaboration, and educational videos and industry-supported content that allow surgeons worldwide to observe and learn the STAR technique in detail.
- Accelerates evidence generation by enabling multicenter trials and registry participation.

CONCLUSION

The STAR approach is a muscle-sparing, minimally invasive posterior approach that provides excellent exposure of the acetabulum and proximal femur while preserving the piriformis muscle. Its versatility enables use in primary, complex primary, and selected revision cases without special instruments. Research studies prove STAR's high implant accuracy, low complication rates, minimal blood loss, short hospital stays and fast rehabilitation. Supported by the STAR Approach Foundation and a global network of surgeons, STAR ensures reproducibility through structured education, live demonstrations, and multimedia resources. Overall, STAR represents a safe, effective, and reliable technique for modern THA, combining minimally invasive principles with preservation of key stabilizing muscles and promoting early recovery.

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