THE PILANKAR TECHNIQUE: INTRAOPERATIVE DEPTH GAUGE–GUIDED ACETABULAR REAMING TO PREVENT MEDIAL WALL OVER-REAMING IN PRIMARY TOTAL HIP ARTHROPLASTY

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Abstract

Background: Over-reaming of the acetabular medial wall during cementless THA may compromise fixation and risk intrapelvic complications. Methods: We describe the Pilankar Technique using a 3.2-mm central drill and depth gauge measurement applied in 23 consecutive primary THAs. Results: All cups were stable with no medial wall fractures or early loosening. Conclusion: This simple quantitative adjunct helps prevent excessive medialization when fluoroscopy is unavailable

Introduction

Accurate acetabular preparation is essential for achieving stable cementless fixation in total hip arthroplasty. Excessive medial reaming can weaken the acetabular floor, medialize the hip center, and predispose to intrapelvic penetration[1–4]. Conventional reliance on tactile feedback and anatomical landmarks may be unreliable, particularly in dysplasia or protrusio hips[3].

Traditional intraoperative assessment methods depend on visualization of the cotyloid fossa, transverse acetabular ligament, and the surgeon's perception of reamer resistance[5]. However, these cues are inherently subjective and vary with bone quality, patient anatomy, and surgical exposure. In obese patients, dysplastic hips, protrusio acetabuli, or sclerotic acetabular floors, the perceived "end point" of reaming may be misleading[3]. Furthermore, cancellous bone density varies considerably between patients, making tactile resistance an inconsistent indicator of safe depth. As a result, surgeons may either under-ream, compromising press-fit stability[8], or over-ream, risking medial wall violation[9].

Excessive medial reaming has several detrimental consequences. Medialization of the acetabular component alters hip biomechanics by reducing femoral offset and abductor lever arm, potentially leading to instability, limp, and increased joint reaction forces[12]. Loss of subchondral bone decreases implant support and may predispose to early loosening[6, 8]. In severe cases, penetration of the medial wall can cause intrapelvic complications involving neurovascular structures[9]. Preservation of adequate medial bone stock is therefore critical not only for immediate fixation but also for long-term implant survival and the feasibility of future revision surgery[10].

Despite the importance of this step, there is currently no widely accepted quantitative intraoperative method to determine safe acetabular reaming depth. We therefore present a novel intraoperative depth gauge technique — the Pilankar Technique — designed to provide an objective measurement of medial wall thickness and guide safe acetabular preparation.

Materials and Methods

This prospective case series included 23 consecutive primary total uncemented hip arthroplasties performed between 2023 and 2025 using the Pilankar Technique. The indication for using the technique was intraoperative concern regarding safe assessment of acetabular medial wall thickness during preparation for cementless cup fixation.

Inclusion criteria comprised patients undergoing primary THA in whom accurate intraoperative estimation of reaming depth was considered important for preservation of medial bone stock.

Exclusion criteria included active infection, revision hip arthroplasty, and dysplastic hips.

All procedures were performed using standard posterior hip surgical approach with uncemented acetabular components. Patients were evaluated both clinically and radiographically at predefined intervals: immediate postoperative period, 1 month, 6 months, and 1 year after surgery. Clinical assessment included pain, stability, gait, and complications such as dislocation or persistent limp. Radiographic evaluation was done with standard hip radiographs, included assessment of cup position, evidence of medial wall breach, migration, radiolucent lines, and early loosening.

Surgical Technique

After standard acetabular exposure by posterior hip approach, a 3.2-mm drill bit is advanced centrally in the cotyloid fossa until the medial wall is just breached (Fig. 1). A depth gauge is inserted to measure medial wall thickness (Fig. 2). Sequential reaming is then performed with awareness of this measurement, emphasizing peripheral rim preparation[8] (Fig. 3). Care is taken to avoid over-reaming by taking medial wall thickness gauging with depth gauge. Around at least 5 to 6 mm medial wall thickness was targeted at. The drill tract is packed with cancellous bone before final cup implantation.

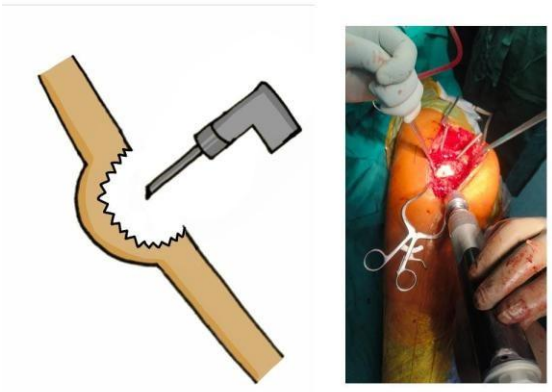

Fig1. Central drilling of acetabulum

Fig 2. Depth gauge for assessing acetabular medial wall.

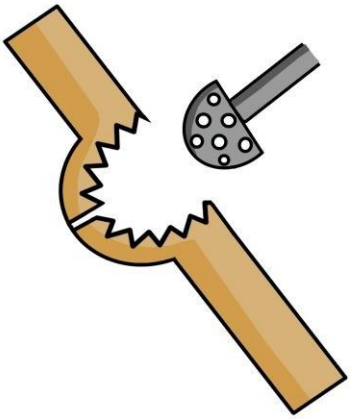

Fig 3. Sequential reaming of acetabulum

Results

All 23 cases achieved stable press-fit fixation of the acetabular component. The measured medial wall thickness in the series ranged from a minimum of 4 mm to an average of 6.4 mm using the Pilankar Technique. No medial wall fractures, intrapelvic breaches, dislocations, or early revisions were observed.

Postoperative radiographs confirmed appropriate cup seating with restoration of the hip center in all patients[2]. The mean acetabular cup inclination was 48°. During follow-up, there were no cases of cup loosening, migration, or radiographic failure, and all implants remained stable throughout the study period.

Discussion

Current literature on acetabular preparation in total hip arthroplasty primarily focuses on radiographic assessment of cup position, biomechanical consequences of medialization, and complications following medial wall breach[4]. Existing techniques rely on anatomical landmarks, tactile feedback, or postoperative imaging to judge adequacy of reaming depth[5]. To the best of our knowledge, no prior MEDLINE-indexed publication has described an intraoperative method that quantitatively measures medial wall thickness using controlled central drilling followed by depth-gauge assessment to determine a safe reaming endpoint. The Pilankar Technique therefore introduces a novel, reproducible, and low-cost intraoperative measurement method aimed at preventing medial wall over-reaming before it occurs, rather than identifying it retrospectively.

Multiple studies have evaluated acetabular reaming depth and its influence on hip center restoration, cup positioning, and hip biomechanics, including the work of Shao et al[2], Kim and Kim[6], Sugano et al[5], Callanan et al[7], Dorr et al[8], and Huo et al[9].

The literature also documents the risks and complications associated with medial wall breach during acetabular preparation, as described by Mandelli et al[4]. Comparative work exists on anatomical versus conventional reaming strategies emphasizing avoidance of excessive medialization[6, 7]. However, these studies are largely radiological, biomechanical, or retrospective analyses rather than validation of a specific intraoperative measurement technique. No prior publication describes intraoperative drilling of the acetabular floor followed by depth gauge measurement to determine a safe reaming limit. Therefore, the Pilankar Technique represents the first described quantitative intraoperative method designed specifically to guide acetabular reaming depth and prevent medial wall over-reaming in total hip arthroplasty.

Conclusion

The Pilankar Technique is a safe and reproducible method for guiding acetabular reaming depth in primary total hip arthroplasty. By providing a simple quantitative intraoperative assessment of medial wall thickness, it reduces reliance on subjective tactile feedback and minimizes the risk of excessive medialization, loss of bone stock, and intrapelvic complications [4, 9]. The technique is inexpensive, requires no additional equipment beyond standard instruments, and can be easily incorporated into routine surgical workflow, particularly in anatomically distorted hips where conventional landmarks are unreliable. Early results in 23 cases demonstrate stable fixation, appropriate cup positioning, and absence of medial wall–related complications.

Given its practicality and potential to improve intraoperative safety, we recommend consideration of the Pilankar Technique as a routine adjunctive step during acetabular preparation in cementless total hip arthroplasty.

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