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Removal of Long-Standing Knowles Pins in the Setting of Contralateral Total Hip Arthroplasty: A Case Report

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Abstract

Introduction: *Knowles pins were historically used for femoral neck fractures and slipped upper femoral epiphysis (SUFE). Decades later, complications such as bursitis, implant prominence, migration, or difficult extraction may arise.*

Case Presentation: *AA 52-year-old female (BMI 36), HIV-positive but virally suppressed, presented with severe right hip osteoarthritis (Tönnis grade 3) and chronic left trochanteric bursitis from Knowles pins inserted in 1989. Knowles pin removal was performed first. Each pin demonstrated a completely flattened head with no recess or slot for engagement, making standard extraction techniques impossible. All four pins were removed using a vice grip. A right posterior-approach total hip arthroplasty followed uneventfully. At six weeks, she was pain-free bilaterally and mobilising unaided.*

Conclusion: *Knowles pins retained for more than 30 years may be extremely difficult, or even impossible, to remove using conventional extraction techniques. Chronic in-situ implants often undergo substantial deformation, bony overgrowth, and loss of the original drive interface, making standard removal tools ineffective. When a patient requires a contralateral total hip arthroplasty (THA), removal of the long-standing hardware can significantly enhance post-operative rehabilitation by reducing trochanteric pain, improving mobility, and eliminating mechanical irritation from the retained implants*

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List of Abbreviations

BMI: Body Mass Index
SUFE: Slipped Upper Femoral Epiphysis
THA: Total Hip Arthroplasty
AP: Anteroposterior

Introduction

Knowles pins were historically used for internal fixation of femoral neck fractures and stabilisation of slipped upper femoral epiphysis (SUFE) [1,2]. Many patients treated with these implants decades ago now present with hip pathology while still retaining the original hardware. Although the technique was effective in the short term, several late complications have been reported, including hardware prominence, trochanteric bursitis, pin migration, and peri-implant fractures [3]. Trochanteric bursitis secondary to lateral hardware irritation is particularly well described [4,5].

Removal of these implants many years later can be technically challenging. Over time, cold welding at the bone–metal interface, bony overgrowth, and progressive flattening of the pin head may occur, eliminating the recess required for screwdrivers or extraction tools [6]. Additional technical difficulties with long-standing implant removal have also been documented [7]. Bellemans et al. reported a failure rate of up to 22% when attempting removal of long-standing Knowles pins, underscoring the difficulty associated with these procedures [8].

These considerations are especially important in patients who also require contralateral total hip arthroplasty (THA). Persistent trochanteric pain arising from symptomatic hardware may significantly impair postoperative rehabilitation, particularly gait retraining and early mobilisation [9]. Removing painful or prominent hardware before proceeding with contralateral THA may therefore facilitate a smoother recovery.

Some authors have described innovative extraction approaches during arthroplasty. Karmegam et al. reported a novel intra-articular technique to remove embedded Knowles pins during ipsilateral THA for SCFE [10]. However, this method is not applicable when implants are located on the contralateral hip or when the pin heads are externally accessible but severely deformed, as in this case.

This case highlights the complexity of removing Knowles pins left in situ for more than 30 years and demonstrates the importance of extraction before contralateral THA.

Case Presentation

A 52-year-old female presented with progressively worsening bilateral hip pain. Her medical history included HIV infection (fully virally suppressed), hypertension managed with two agents, and a BMI of 36. She had been fully independent until symptoms worsened over the preceding two years. Her primary complaint was severe right groin pain, accompanied by chronic left lateral hip discomfort.

Her orthopaedic history included a left transcervical femoral neck fracture sustained in 1989 after a fall from height. The fracture had been treated with four Knowles pins, consistent with the standard of care at the time [1]. She reported no complications for nearly three decades.

Clinical Findings

On examination, her right hip exhibited painful, restricted motion. Radiographs demonstrated Tönnis grade 3 osteoarthritis. The left hip revealed focal tenderness over the greater trochanter with palpable hardware prominence. Radiographs showed four intact but laterally protruding Knowles pins. (Figure 1)

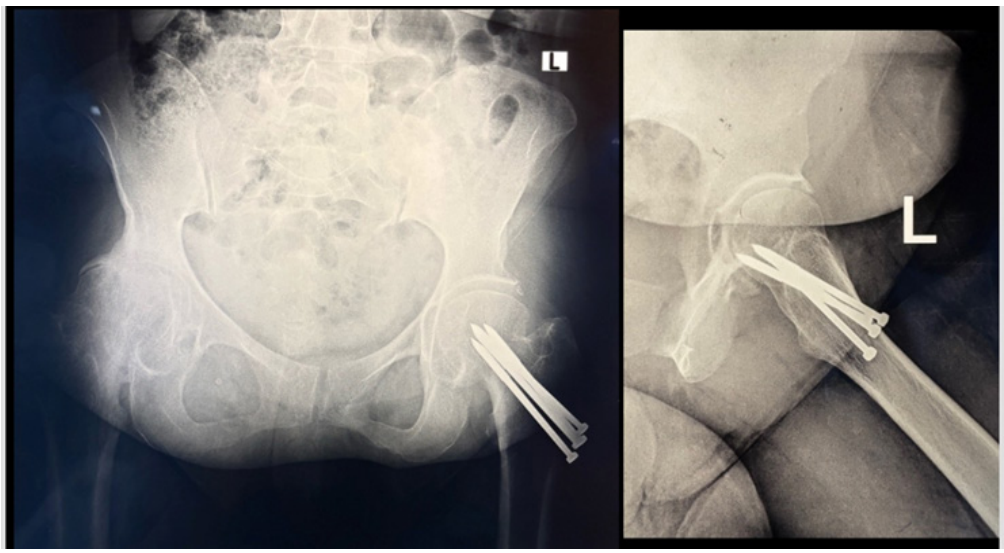

Figure 1: Pre-Operative Pelvis AP and Left Hip Lateral Radiographs: Right Hip with Severe Osteoarthritis and Left Hip with 4 Knowles Pins in-Situ

Because the left-sided trochanteric pain was expected to impede mobilisation following THA, the surgical team elected to perform:

1. Removal of the left Knowles pins, followed by
2. Right posterior-approach THA in the same sitting.

Operative Findings – Knowles Pin Removal

A lateral approach exposed chronic bursitic tissue. Notably, each Knowles pin demonstrated a completely flattened head with no recess or slot for any screwdriver or extraction device to engage. This pattern of deformation and cold welding is consistent with published descriptions of long-standing implants [6-8].

Standard extraction devices failed due to the total loss of a purchase point. A high-strength vice grip was used to clamp onto the exposed portion of each pin. (Figure 2) By applying controlled oscillating rotational force, all four pins were removed without cortical compromise. (Figure 3) Overlying bursitic tissue was excised.

Figure 2: Image Showing Vice Grip Tool Used to Clamp and Remove Knowles Pins

Figure 3: Knowles Pins Post Removal: Flattened Head with no Recess for Screwdriver Engagement

Contralateral Total Hip Arthroplasty

The patient was repositioned, and a right posterior-approach THA was performed without complication following established surgical technique [10]. Implant stability and component positioning were satisfactory. (Figure 4)

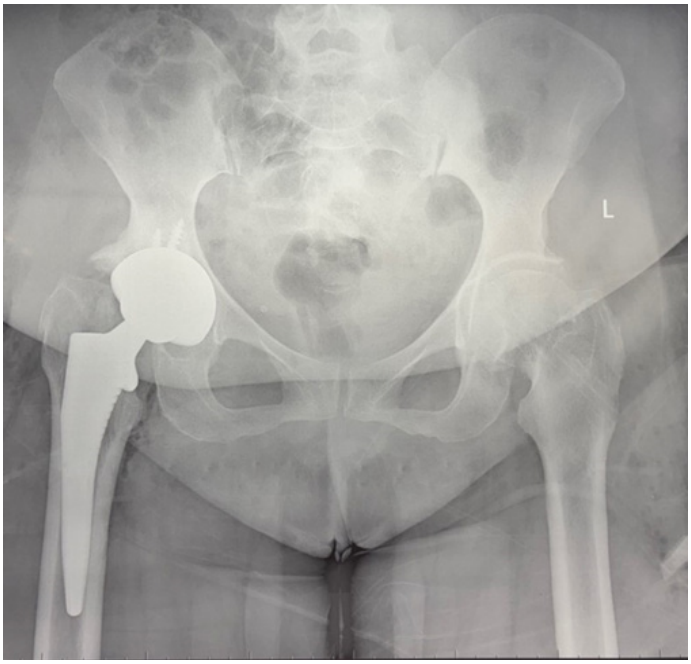

Figure 4: Post op AP Pelvis Radiograph: Right Total Hip Arthroplasty and Left Hip Post Removal of Knowles Pin

Postoperative Outcome

The patient mobilised on postoperative day one. At two weeks, all wounds were healed and left trochanteric pain had resolved completely. At six weeks, she was walking independently, pain-free in both hips, and expressed excellent satisfaction with her recovery.

Discussion

This case demonstrates the substantial challenges encountered when removing Knowles pins that have been retained for over 30 years. Long-standing implants frequently develop bony overgrowth, fibrosis, cold welding, and head deformation, all of which complicate extraction [6]. Trochanteric pain due to lateral prominence is well recognised in such cases [4,5]. In this patient, the complete flattening of the implant heads eliminated any recess for conventional extraction tools, consistent with mechanisms described for difficult implant removals [7].

Bellemans et al. reported a 22% failure rate when attempting removal of Knowles pins, largely due to head deformation and inability to achieve implant purchase [8]. This aligns with the challenges faced in our case. The use of a vice grip, although unconventional, is effective in situations where all standard methods fail.

Novel extraction methods have been described during ipsilateral THA for SCFE, where the femoral head is resected, allowing intra-articular access to embedded Knowles pins [9]. These techniques, however, were not applicable to our case because the symptomatic implants were on the contralateral side, the femoral head was not being resected, and the heads were externally accessible but fully deformed.

Addressing symptomatic hardware before contralateral THA was critical for optimising postoperative rehabilitation. Persistent trochanteric pain would likely have hindered gait recovery, particularly given the patient's elevated BMI. The combined single-sitting approach allowed the patient to mobilise comfortably and recover rapidly.

Conclusion

Long-standing Knowles pins may become extremely difficult to remove due to head deformation, cold welding, and bony ingrowth. Removal should be prioritised before contralateral total hip arthroplasty to ensure optimal rehabilitation. Non-conventional extraction methods such as vice grip application may be required when standard tools fail.

Clinical Message

When symptomatic, long-standing Knowles pins should be removed prior to contralateral THA. Surgeons must anticipate that standard extraction may be impossible and prepare alternative techniques.

Learning Point of the Article

Long-standing Knowles pins can be extremely difficult to extract, requiring preoperative planning and non-conventional techniques when standard screwdrivers cannot engage the flattened pin heads.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Competing Interests

The authors declare no competing interests.

Authors' Contributions

RR and TA both collected the case data and performed the surgery. RR and TA both drafted, revised, and finalized the manuscript. Both authors reviewed and approved the final version.

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