

CASE REPORT

Femoral Stem Dislocation Caused by Trunnionosis Along with Adverse Local Tissue Reaction: A Case Report and a New Technique of Head to Cone Cementing

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Abstract

In total hip replacement (THR), fretting and corrosion at the modular head-neck junction (trunnionosis) may cause adverse local tissue reaction (ALTR). In this report, we presented a 34 years woman with a history of THR eight years ago, presenting with acute pain and limping. The radiographic assessment revealed stem-head dislocation for which a revision hip surgery was planned. Surprisingly, we observed pseudotumor and tissue necrosis resulting from the body's reaction to cobalt-chromium alloy. The revision surgery entailed pseudotumor debridement and replacing the femoral head with a new metal head (size 36, long). Due to the separation of the femoral head on a stem, we fixed it on a stem using bone cement. The stem (Omnifit®, Stryker®) was well-fixed and retained to avoid fractures and infection risk. This technique revealed an acceptable outcome without recurrence of ALTR after a one-year follow-up. Our findings suggest that stem dislocation secondary to trunnionosis might be a long-term complication after THR with subsequent ALTR.

Level of evidence: V

Keywords: Arthroplasty, Hip dislocation, Hip prosthesis, Long term adverse effects, Postoperative complications

Introduction

In recent years, total hip replacement (THR) has attracted the attention of many researchers and physicians, and the need for this surgery is increasing daily.¹⁻⁵ Regardless of the excellent outcome in most cases, the risk of long-term adverse events such as fretting and corrosion at the trunnion (trunnionosis) is a potential concern.⁶⁻¹¹ Trunnionosis is a situation in which the junction of the femoral head and neck of the prosthesis (trunnion) faces unanticipated wear and erosion, causing failure of THR and accounting for 3 % of all revisions.^{12,13} Trunnionosis results from various mechanisms, including wear at the metal-on-metal modular interface, corrosion and fretting, and release of metal debris and ions (Metallosis) into the surrounding fluid.¹⁴

Adverse local tissue reaction (ALTR) is a consequence

of metal debris and ions released from the cobalt-chromium (CoCr) metal-on-metal (MoM) implants.^{15,16} These nanometer-sized particles are biologically active and lead to an adverse reaction in situ.¹⁷ Trunnionosis in the MoM modular junction of THR also accelerate this process by releasing more metal derivatives.¹⁸ There is little knowledge regarding the etiology and pathophysiology of this adverse event.¹⁶ In this regard, several studies reported that trunnionosis accompanied by metallosis and local tissue reaction in both MoM and MoP THR patients.¹⁸⁻²⁵

To our knowledge, stem dislocation from trunnion secondary to trunnionosis is a rare condition. Therefore, regarding the importance of ALTR in THR outcomes, we decided to describe a case of stem dislocation secondary

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to trunnionosis accompanied By ALTR eight years after unilateral THR. Written consent was received from the patient to permit this report.

Case presentation

A 34 years old woman was referred to our center with acute severe pain in the right hip region and limping after falls on the same level (BMI = 27.2). She suffered mild to moderate pain for about three months before the trauma. She had a surgical history of uneventful THR due to femoral head avascular necrosis and secondary osteoarthritis eight years ago. Our graphic investigations revealed stem dislocation without femoral head displacement [Figure 1]. The physical examination and the laboratory data (CRP and ESR) did not show evidence of infection.

Then, we performed revision hip surgery through a lateral approach. Surprisingly, pseudotumor and tissue



Figure 1. Stem dislocation due to ALTR secondary to corrosion at the trunnionosis in total hip arthroplasty.

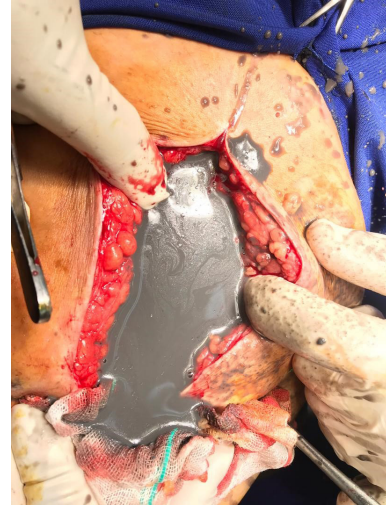


Figure 2. Pseudotumor and tissue necrosis following the reaction of the body to chromium.

necrosis were seen, and a greyish viscous fluid occupied the joint space [Figure 2]. The stem was narrowed due to corrosion and separated from the femoral head. An intraoperative specimen was sent for culture to rule out infection. The results showed no infection or positive microorganisms.

Next, the pseudotumor was evacuated, and necrotic tissues were debrided. The stem (Omnifit®, Stryker®) was preserved because it was well-fixed, and removing it put patients at risk of fractures and infections. The stem has a trunnion size of 12/14mm and a taper angle of 3° biplanar taper, full length. Next, the femoral head was replaced by a metal head (size 36, long) with a collar. Because of femoral head separation and trunnion corrosion, the head was fixed to the stem with cement to fill the gap (the length of the neck was increased by 4 mm) [Figure 3]. We used a long-size head to fix the head

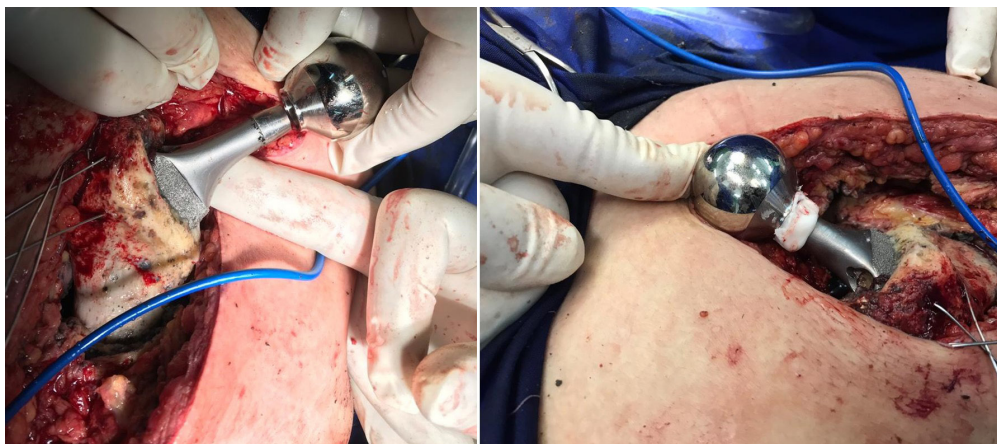


Figure 3. The femoral head was replaced by a metal head (size 36, long) with a collar attached to the stem using bone cement.

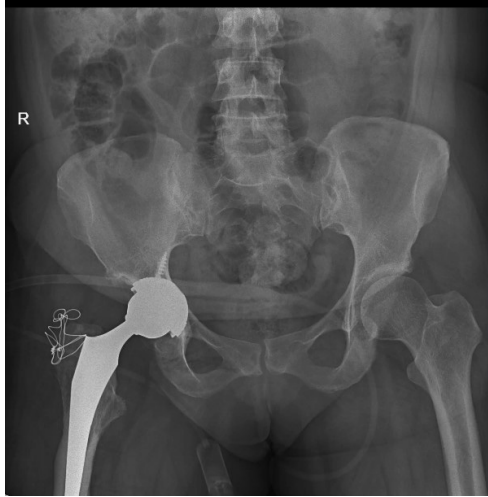


Figure 4. Radiograph after revision hip surgery.

well. The previous femoral head had no collar. Finally, the hip abductors were tenodesed to the greater trochanter with wire [Figure 4]. Within 4 to 6 weeks after surgery, patients were allowed to bear weight with a walker partially and were required to use an abduction pillow for 3 to 4 days after surgery.

At the 1-year follow-up, the patient had minimal pain, and the range of motion was appropriate without limping. The Harris Hip Score was calculated for her and resulted in 82 (good outcome), and the Forgotten Joint Score (Persian version) was 70.²⁶ The patient had not any complaints about participating in daily activities.

Discussion

In this case, we observed a stem dislocation, which resulted from trunnionosis and ALTR to modular prosthesis observed during the revision surgery. The patient developed Pseudotumor-like tissue reactions. The present report shows that trunnionosis might lead to ALTR and stem dislocation after years past THR. Surgeons should be aware of this problem to make a timely diagnosis and the best clinical decision. In our study, we introduced a new technique of head-to-stem (cone) cementing to fix the head when there was corrosion at the trunnion and the head did not fit properly.

The ALTR occurs due to corrosion debris released from the prosthesis.²⁷ This phenomenon leads to tissue necrosis, exudate excretion, pseudotumor formation, lymphocytosis, and tissue.²⁸ Cobalt is the most accused metal forming the hip prosthesis, causing ALTR development and imposing toxicity on macrophages.^{18,29} Therefore, increasing serum cobalt concentrations—more than increasing chromium ions—could be beneficial for early diagnosis and screening.¹⁸ The serum cobalt concentration of >1 ppb directly diagnoses an adverse reaction to CoCr alloy.²³ However, the corrosion and related ALTR diagnosis is still a challenge. Cross-sectional imaging (MRI or CT-Scan) displays more clues

for a definite diagnosis.

Contrary to previous reports, our report presented a patient with stem dislocation after THR. Stem dislocation seems to be a long-term complication, unlike hip dislocation, which usually occurs a few months after THR.^{30,31} It is logical to expect when observing stem dislocation in radiography to be a long-term complication since fretting and corrosion at the trunnion and subsequently ALTR processes occur slowly (the meantime is about four years after the index surgery).²³ This fact suggests long-term follow-up of the patients undergoing THR with metal stems.

Regarding other studies, Cooper et al. represented ten patients with metal-on-polyethylene THR with corrosion and fretting at the trunnion.¹⁸ In their series, two patients suffer from recurrent dislocation that may stem from great necrosis with deficiency of the abductors. The dislocation, unlike in our study, was from the femoral head. They suggested receiving constrained liner in the revision surgery based on abductor deficiencies.¹⁸ Plummer et al. also report 27 patients diagnosed with ALTR Secondary to trunnionosis in the metal-on-polyethylene THR.²³ As mentioned, they represented two patients with recurrent instability due to abductors' insufficiency resolved by revision surgery with constrained liner.²³

The appropriate treatment for ALTR is the removal of the metal ion source. In most cases, it includes only femoral head removal and introduces a ceramic head sleeved with titanium.^{18,22,23,32} This technique has acceptable outcomes with a minimum recurrence rate.^{18,22,23,32} In the condition that the stem or cup is loose, the revision of loosed component is indicated. In severe corrosion with extensive trunnion loss, femoral stem change will be the treatment option.³² In our case, we preserved the femoral stem once it was well-fixed. Because the stem was well-fixed, only the femoral head had to be replaced. As a result of the corrosion of the trunnion, the head could not fit properly; therefore, we used cement to fix the head to the cone appropriately and fill the gap.

In sum, this study provides not commonly discussed complications of THR: stem dislocation secondary to trunnionosis in THR and ALTR. In this regard, arthroplasty surgeons should consider this event for patients' new-onset pain and instability after THR. Early revision surgery is expected due to the demolition nature of this event. Changing the femoral head and cementing it to the stem to fix it well have promising results that should be studied further in the future. More aspects of this complication should investigate in longitudinal studies with a great population.

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