



# Failure of Cementless Total Hip Arthroplasty in a Patient with Contralateral Hip Arthrodesis: A Case Report

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## Abstract

A procedure once considered standard of care for end-stage degenerative joint disease of the hip, hip arthrodesis, has experienced decreased enthusiasm due to the enormous success of total hip arthroplasty (THA). Patients that have undergone previous hip arthrodesis may present with ipsilateral knee or contralateral hip pain due to altered biomechanics exhibited in the adjacent joints. Patients may be considered candidates for THA of the contralateral hip due to joint deterioration. Orthopaedic Surgeons must be aware of possible complications associated with performing a THA. We present a case of a cementless THA, contralateral to a long-standing hip arthrodesis, that failed within five years due to liner dissociation.

## Introduction

The utilization of hip arthrodesis for the treatment of end-stage hip degenerative joint disease has significantly declined due to the success of total hip arthroplasty. In 2010, the Centers for Disease Control (CDC) reported that over 332,000 THA procedures were performed in the United States alone.<sup>1</sup> Although fewer patients are undergoing primary hip fusion, patients that have previously undergone hip arthrodesis persist, and the risk of development of degenerative changes in ipsilateral and contralateral lower extremity joints increases over time.

A biomechanical study examining body kinematics following hip arthrodesis revealed that loss of motion in one hip resulted in increased rotation of the pelvis and increased flexion of the ipsilateral knee.<sup>2</sup> The altered mechanics of these joints had been shown to lead to accelerated development of degenerative joint disease. Therefore, it is expected that adjacent joint deterioration will follow hip arthrodesis and will occur over varying time periods as a function of the individual.

Salvati and Insall published a case series in 1989 evaluating patients during the time period of 1972 to 1986 that had undergone total joint arthroplasty, contralateral hip or ipsilateral knee, following primary hip arthrodesis.<sup>3</sup> In this study, patients that underwent THA for contralateral hip arthritis were treated with one of several different cemented THA components utilizing first generation cement technique. A total of 14 patients underwent THA and three (21%) patients required revision for mechanical failure of the implant. We report, to our knowledge, the first case of mechanical failure of a cementless

acetabular highly cross-linked polyethylene liner in a patient having undergone total hip arthroplasty following previous contralateral hip arthrodesis.

## Case Presentation

### *Pre-Operative Findings*

The patient is a 64-year-old male who underwent right hip arthrodesis after a traumatic injury in Vietnam in 1976. He presented to the Veterans Affairs Medical Center in 2008, at age 59, with contralateral hip pain. Clinical and radiographic examination confirmed the diagnosis of end-stage degenerative joint disease with an infero-medial arthritic pattern (Figure 1). The patient was considered a candidate for THA following failure of conservative treatment, and underwent an uneventful Left THA, by a previous Orthopaedic team, in December 2008 through a posterior approach (Figure 1).

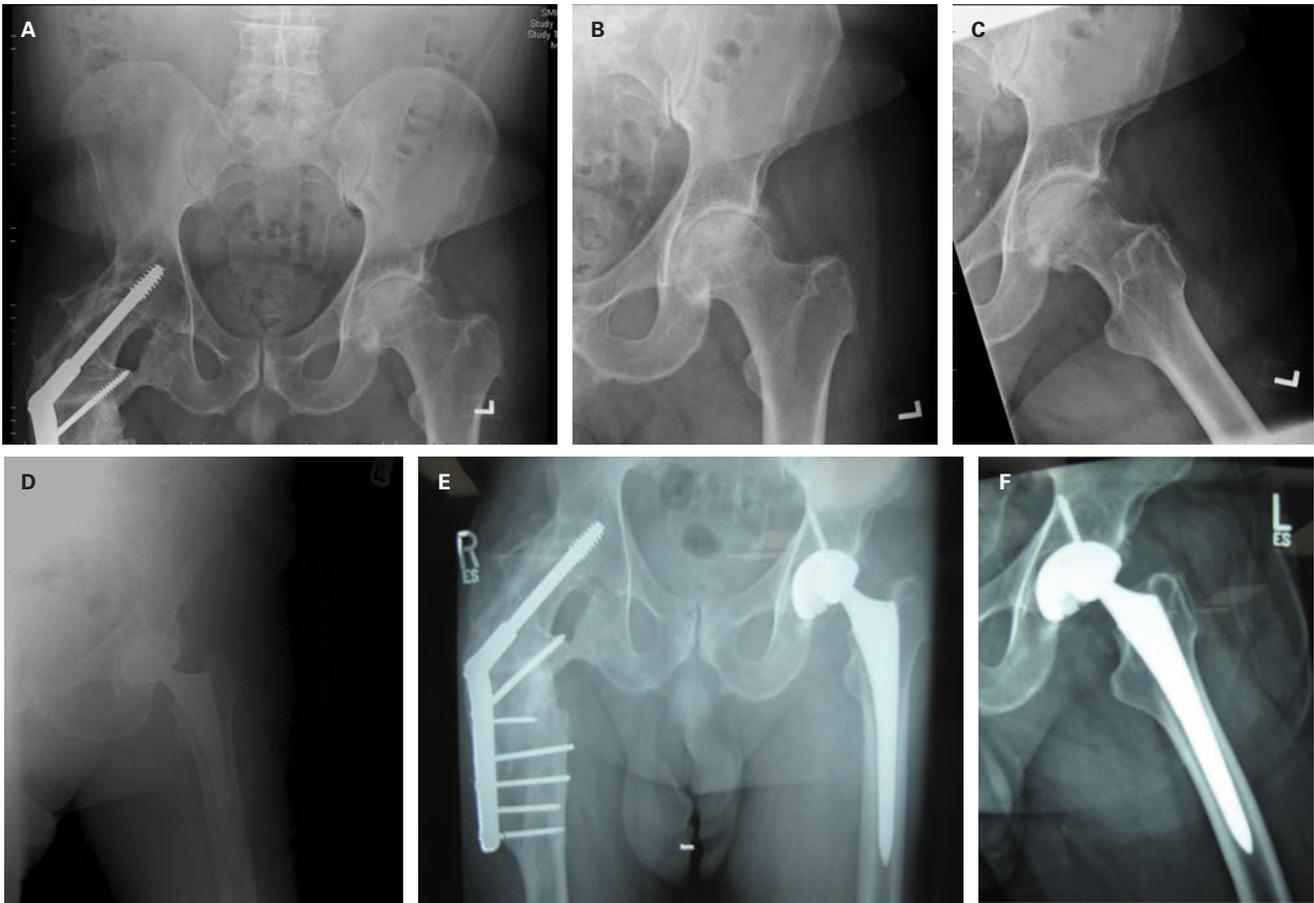
Five years following the index procedure, the patient presented to an outside hospital emergency department with complaints of left hip squeaking during ambulation and painful weight bearing. XR were obtained demonstrating an eccentrically positioned femoral head within the acetabular shell, suggestive of possible liner dissociation (Figure 1). The radiographs otherwise depicted well-fixed acetabular and femoral components, with no evidence of component migration, subsidence or loosening.

The patient was considered a candidate for revision left THA with the plan for isolated head and liner exchange versus possible acetabular component revision if it were determined

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Investigation performed at the Veterans Affairs Medical Center



**Figure 1.** (A) Antero-Posterior (AP) pelvis radiograph demonstrating infero-medial arthritis of the left hip. The right hip depicts a successful hip arthrodesis with a screw and side plate construct; (B) AP left hip radiograph demonstrating infero-medial arthritis; (C) Lateral left hip radiograph demonstrating infero-medial arthritis with evidence of a small femoral head osteophyte; (D) 6 week post-operative AP left hip radiograph following cementless THA; (E) AP pelvis radiograph demonstrating an eccentrically positioned femoral head within the acetabular shell; (f) Lateral left hip radiograph demonstrating an eccentrically positioned femoral head with the acetabular shell.

intra-operatively to be malpositioned. The patient had an erythrocyte sedimentation rate and a C-reactive protein obtained pre-operatively, which were normal at 13 (0–20) and 0.320 (0–0.747), respectively.

#### ***Intra-operative Findings***

The previous incision was utilized for surgical exposure of the left hip. The femoral head demonstrated a large stripe from where it was directly articulating with the acetabular shell, and eccentric wear was evident at the superior margin of the polyethylene (Figure 2). Evaluation of the polyethylene liner demonstrated complete dissociation from the acetabular shell and was locked in an inferior position to the femoral head and neck (Figure 2).

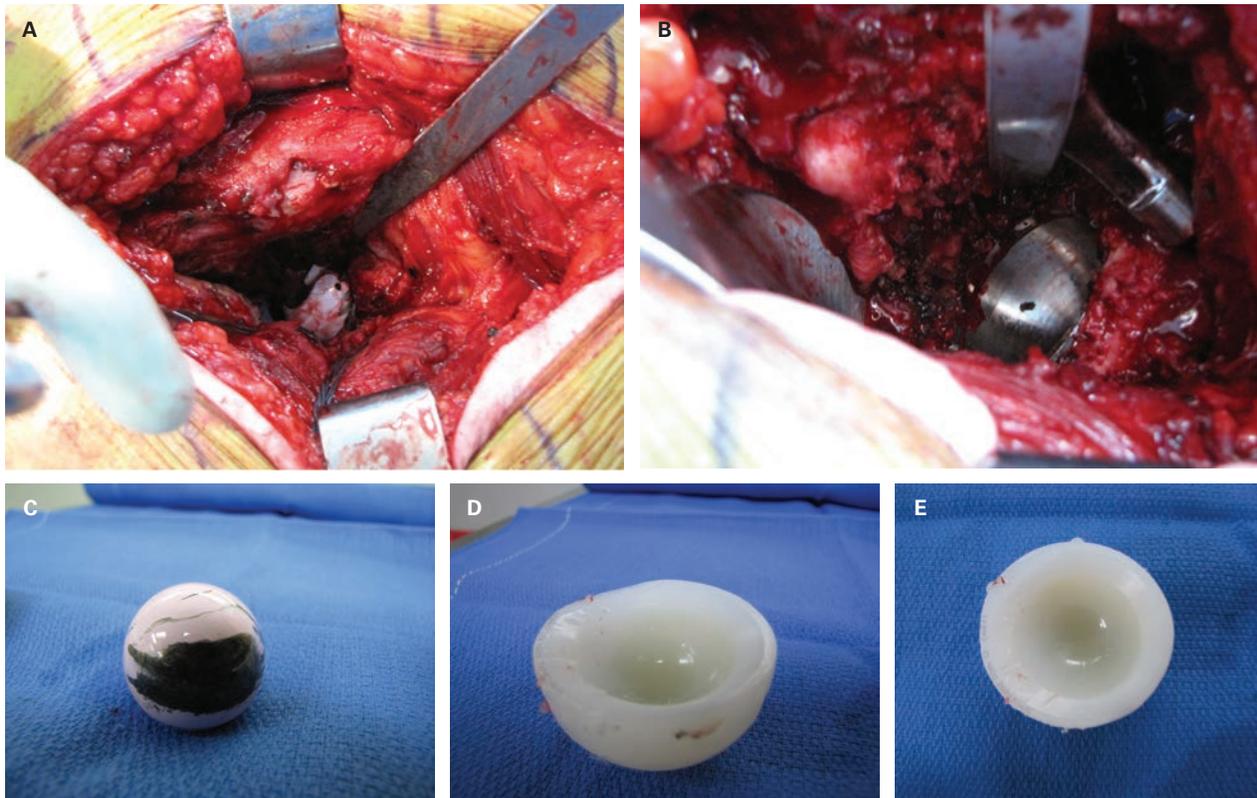
The acetabular component appeared to be well-fixed and in the appropriate anteversion and abduction (Figure 2). The femoral component was also well-fixed and adequately anteverted. The decision was made to implant a new highly cross-linked polyethylene liner and a cobalt-chrome femoral head. The hip was reduced using a plastic “shoe-horn” device to minimize metal transfer from the acetabular shell onto the femoral head (Figure 3). Post-operative radiographs of the left hip demonstrated a concentrically reduced femoral head

within the acetabular shell (Figure 3). Clinically at the 3 month follow-up appointment, the patient is without complaints and has returned to performing his activities of daily living without difficulties. New radiographs obtained at this time demonstrated a concentrically reduced total hip arthroplasty (Figure 3).

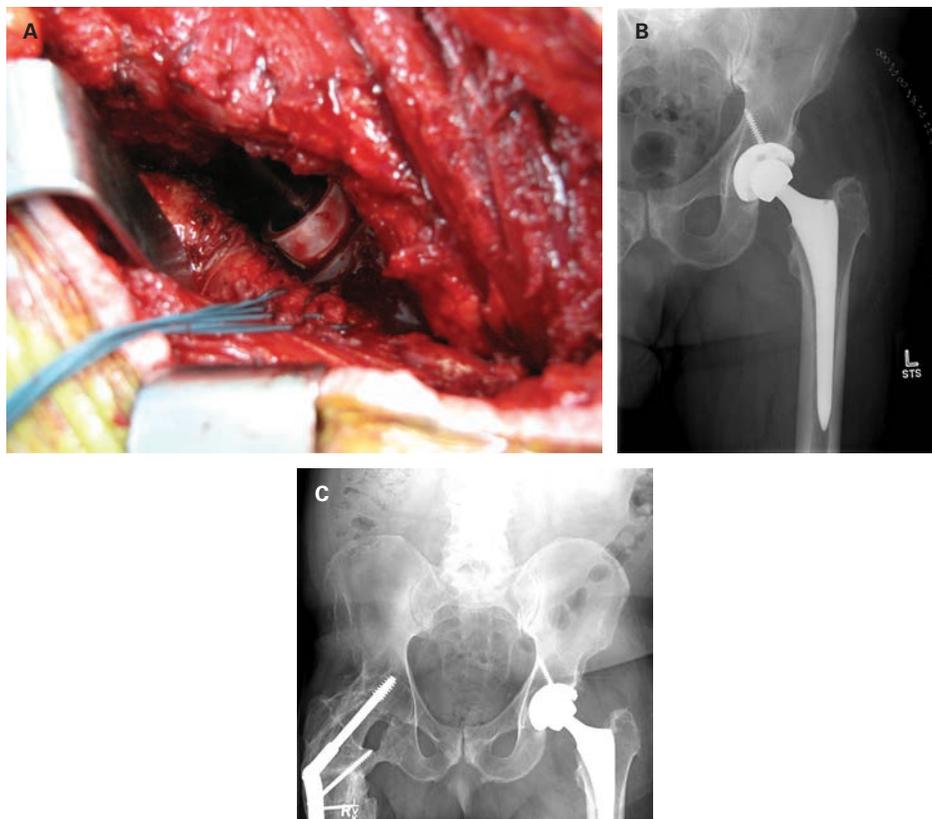
#### **Discussion**

Hip arthrodesis is an effective method to treat hip pain secondary to end-stage degenerative joint disease. However, arthrodesis may result in debilitating low back pain, ipsilateral knee and contralateral hip arthritis. Most commonly, hip arthrodesis take-down (conversion to THA) is indicated for end-stage lumbosacral degenerative disk disease.

Current literature supports favorable clinical outcomes following conversion of a previous hip arthrodesis to THA. However, in October 2013, Giannoudis et al. published a systematic review evaluating conversion of hip arthrodesis to THA. In this review, 11 studies were included accounting for 579 patients that underwent THA conversion. The authors concluded that the clinical results of hip arthrodesis take-down were mixed regarding reproducible pain relief and were associated with an overall complication rate as high as 54%.<sup>3</sup>



**Figure 2.** (A) Intra-operative images of original prosthesis reduced with a disengaged liner from the acetabular shell; (B) Intra-operative images of the acetabular component demonstrating adequate positioning; (C) Ceramic femoral head following explantation with evidence of a large metal stripe on the bearing surface; (D) Arrow indicates superior wear pattern within the polyethylene liner; (E) Arrow indicates superior wear pattern within the polyethylene liner.



**Figure 3.** (A) Intra-operative image with new liner engaged within the retained acetabular shell; (B) Post-operative left hip AP radiograph showing concentric reduction; (C) AP Pelvis radiograph at 3 months post-op showing concentric reduction.

Salvati et al. reported on a series of 14 patients following cemented Charnley or modified Charnley THA for hip arthritis in patients with contralateral hip arthrodesis.<sup>4</sup> In this series, three (21%) patients required revision for mechanical failure while an additional three (21%) patients developed radiolucencies and component migration. Only two (14%) patients at final follow-up of eight years had excellent results without any complications. Clinical follow-up after cementless THA and contralateral hip arthrodesis using modern day THA technology has not been reported.

Our case demonstrates early failure (within five years) of cementless THA in a patient with contralateral hip arthrodesis. It is speculated that the excessive forces generated across the THA bearing articulation due to contralateral hip arthrodesis was responsible for the encountered liner dissociation. It is unclear whether this will recur after a short time interval due to continued increased loads; however, it is expected that this may occur again. Once THA has been performed, another solution is not available for treatment of polyethylene liner failure.

It is imperative that arthroplasty surgeons counsel patients regarding the risk of early failure of cementless THA planned for an arthritic hip contralateral to a previous hip arthrodesis.

Patient expectations may also factor into longevity of the prosthesis, as this patient has been extremely active with his left THA following the index procedure.

Patients may also require counseling regarding hip arthrodesis take-down, as this is the only method by which to normalize the loading conditions across the contralateral THA bearing surface. However, take-down should still only be considered for the proper indications, end-stage lumbosacral degenerative disk disease. This is a complicated patient scenario without a long-term solution, and patients need to be aware prior to undergoing treatment for the contralateral arthritic hip.

## Literature Cited

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