



# Functional Outcome of Total Hip Arthroplasty in Patient with Flexion Contracture due to Hip Ankylosis: A Rare Case Report

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## Abstract

**BACKGROUND:** Performing total hip arthroplasty (THA) or total hip replacement (THR) in hip ankylosis is not a simple procedure.

**CASE PRESENTATION:** We presented a complicated case of a patient with flexion contracture and ankylosis of hip joint due to neglected avascular necrosis of femoral head treated with THR on one thigh, and periprosthetic fracture on the other which was also treated with THR later. One year after the surgery, the both hips function was improved and the patient was able to walk without assistive device.

**CONCLUSION:** Total hip replacement is a modality that could be considered for the treatment of advanced AVNFB and ankylosis of hip joint, with femoral periprosthetic fracture as one of its potential complications.

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## Introduction

Avascular necrosis of femoral head (AVNFB) is a condition with loss of integrity of subchondral bone due to microcirculation abnormalities. This destruction is progressive and may result in irreversible bone destruction or end-stage arthritis [1]. Meanwhile, ankylosis of the hip joint is marked by stiffness of the hip joint due to abnormal adhesion and rigidity of the bony component. Spontaneous ankylosis of the hip is uncommon, and is rarely reported in the published articles. Several etiologies of spontaneous ankylosed hips are infection, inflammation, and trauma [2].

Several options of treatment are available for AVNFB and hip joint ankylosis. Total hip replacement is considered as an effective treatment to relieve symptoms as well as to improve patients' function and satisfaction. Performing THR in ankylosed hip is technically challenging, therefore surgeons' experience plays an important role in it [3]. It is also associated with complications that may require revision surgery [4]. In this article, we presented a case report of 1-year outcome of a patient with flexion contracture and ankylosis of hip joint due to neglected AVNFB treated

with total hip replacement (THR). This patient also had contralateral periprosthetic fracture treated with implant revision surgery.

## Case Presentation

A 33-year-old male came to the Orthopaedic Clinic at Sanglah Hospital, complaining pain and stiffness on his left hip joint in the past 14 years (2007). The pain was constant and worsened by activities. The stiffness forced the left thigh fixed in forward flexion and abduction position. He walked in a limping gait and had to be aided by a crutch (Figure 1).

Previously, patient had history of trauma in 2006. He was hit in the back while standing on a moving truck and fell in a sitting position, but could walk and work normally after the accident. A month later, he started to feel pain at both hips and sought a traditional healer. In 2007, both of his hips started to feel stiff and were difficult to be moved. He underwent a THR for his right hip in 2014 in another town. Afterward, he was able

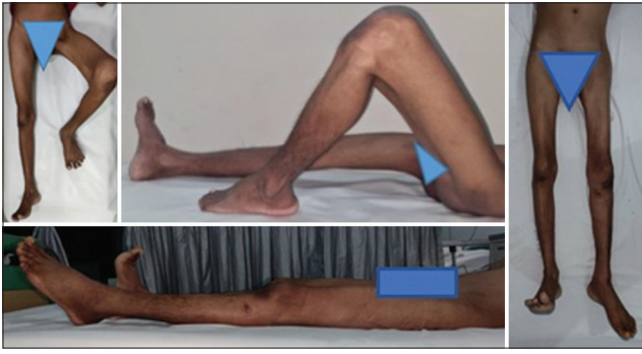


Figure 1: Initial clinical condition

to move his right hip could be moved, but sometimes was accompanied by pain. For that, he consumed dexamethasone and mefenamic acid without any prescription till the day he visited our clinic.

In 2014, his back started to bend forward and could not be straighten normally. He underwent spinal surgery conducted by a neurosurgeon in February 2021. During the preparation, he was detected to have lung tuberculosis and anti-tuberculosis medication was given. In April 2021, sputum examination showed a negative result and he continued the medication until he was declared completely cured in August 2021.

Regional physical examination showed that the left hip joint was fixed in 60° flexion and 35° abduction position without any passive range of motion (ROM). There was also mild tenderness around the hip joint without swelling or any signs of acute inflammation. The active ROM of all left distal joints was within normal limits. For the right hip joint, the ROM was 0/60° forward flexion and 0/35° adduction, with normal ROM on all distal joints. Muscle atrophy was observed in both lower extremities (Figure 1). Distal neurovascular status of both lower extremities was also normal. The Harris Hip Score (HHS) was 33.

The pelvic X-ray showed bony ankylosis of the left hip joint with an implant protruded through the femoral cortex at the right hip joint (Figure 2). Pre-operative laboratory examination showed mild leukocytosis (WBC  $11.28 \times 10^3/l$ ), prolonged erythrocyte sedimentation rate (49.0 mm/h), and increased C-reactive protein (69.57 mg/dL). Procalcitonin was within normal limit.



Figure 2: Pre-operative X-ray (July 18, 2021). Left: Pelvis (AP view); Right: Left Thigh (AP/lateral view)

We diagnosed the patient with ankylosis and AVNFH of the left hip (Ficat Arlet stage IV) due to suspected corticosteroid abuse and periprosthetic fracture Vancouver B2 of the right femur.

The THR was conducted with posterior approach (Figure 3a). The femoral head was reamed until the acetabulum was exposed (Figure 3b). A cementless acetabular cup (46 mm) was placed along with three screws (Figure 3c). Tissue sample was obtained for culture and histopathologic examination. Intramedullar femur was reamed and a standard cementless femoral stem (size 10) with femoral head (size 28 mm + 1.5) was placed (Figure 3d and e). The stability of the hip joint was evaluated. A tight fascia lata was found and was released with the pie crust technique. Procedural blood loss was 800 mL. A surgical drain was placed (Figure 4a) and post-surgical radiographic assessments were done (Figure 4b-h). For post-operative care, the patient was treated with antibiotics, analgesics, anticoagulant, and regular wound care.

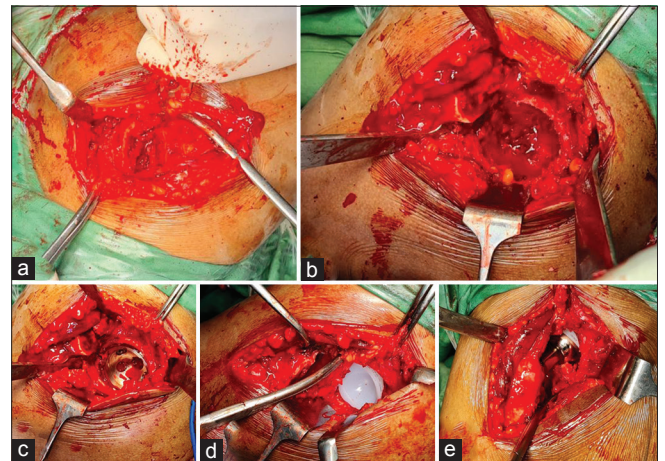


Figure 3: During surgery (July 19, 2021)

During inward care, the left hip joint was positioned in slight forward flexion position. Skeletal traction with a 8-kg load was applied on the left lower extremity with hip joint on extension (Figure 5a and b). The load was added 1 kg daily till 10 kg. Day 3 post-operative, the skeletal traction was removed and the left hip was in a straight extension with passive ROM of 0/60°. The patient was asked to do active ROM and quadriceps and mobilization exercises were prescribed. On day 5, the patient was able to walk slowly using a walker (Figure 5c and d). He was discharged and planned for follow-up visit.

On the first follow-up visit (day 9), he was able to walk slowly with a walker. Wound healing was good without any complication. The active ROM of left hip was 0/60° forward flexion and 0/35° abduction. The culture examination showed normal result while the histopathological examination showed some necrotic area without any malignant cellular component in the marrow tissue. He then moved back to his hometown and did not continue treatment and physiotherapy as instructed due to financial issue. We kept monitoring



Figure 4: Post-operative clinical picture (a) and X-ray (b-h)

his condition remotely. 1-month post-operative, he felt occasional mild pain and weakness on both lower extremities, which made him still depended on a walker for walking (Figure 6).

Eight months after the surgery, he felt pain on his right thigh that worsened over time. He visited our clinic 11 months post-operative. Shortening of the right thigh (approximately 2 cm leg length discrepancy) (Figure 7a) with tenderness over the middle third part of the right femur was observed. The active ROM of

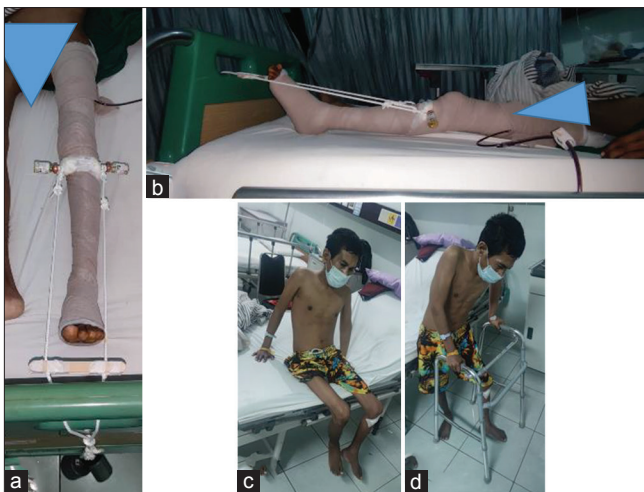


Figure 5: Post-operative care in the ward



Figure 6: Clinical condition at 1-month post-operative

right hip was 0/80° (flexion), 0/10° (abduction), and 0/30° (adduction), whereas the active ROM of left hip was 0/100° (flexion), 0/40° (abduction), and 0/20° (adduction). The HHS was 60. Radiologic examination showed periprosthetic fracture Vancouver type B2 of middle third right femur (Figure 7b and c). We planned to perform a revision surgery by removing the old

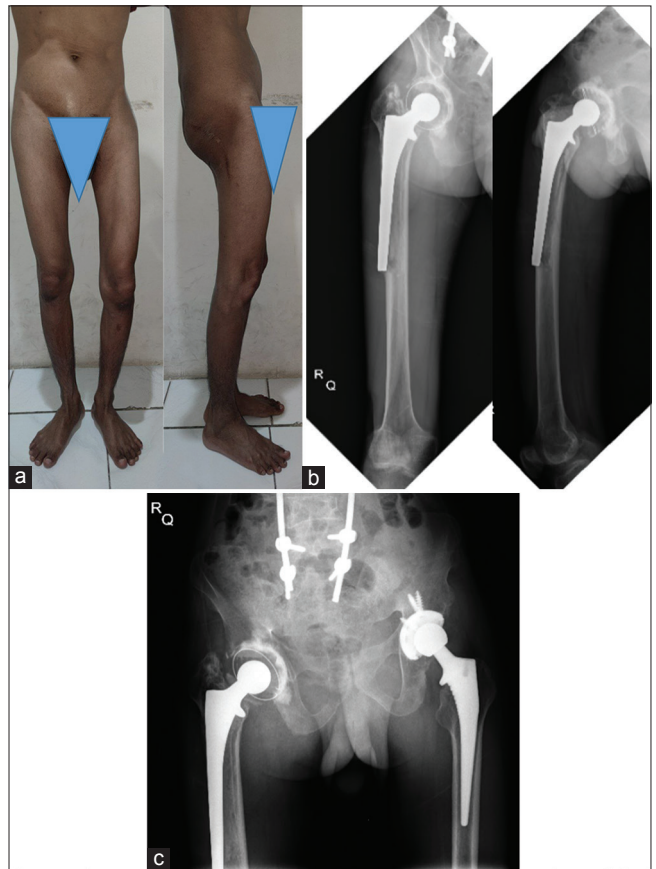


Figure 7: Clinical (a) and radiologic (b-c) examination 11-month post-operative

implant and replace with a diaphyseal engaging implant (long stem).

Intra-operatively, we found that the acetabular component was still in good condition, but the femoral component was loose and could be drawn easily. Most of anterolateral cortex was still intact and the distal tip of femoral stem penetrated through the mid- anterolateral part of femur. We decided to preserve the acetabular component and remove the femoral implant. A cemented long stem neutral femoral component (size 4) was placed and it suited the old acetabular component (Figure 8a-c). The femoral component was stable. The joint capsule and soft tissue were repaired and adductor tenotomy was performed. Blood loss was 1000 mL. Placement of the implant was confirmed radiographically (Figure 8d). The patient was treated in the ward for four days and followed by outpatient care.

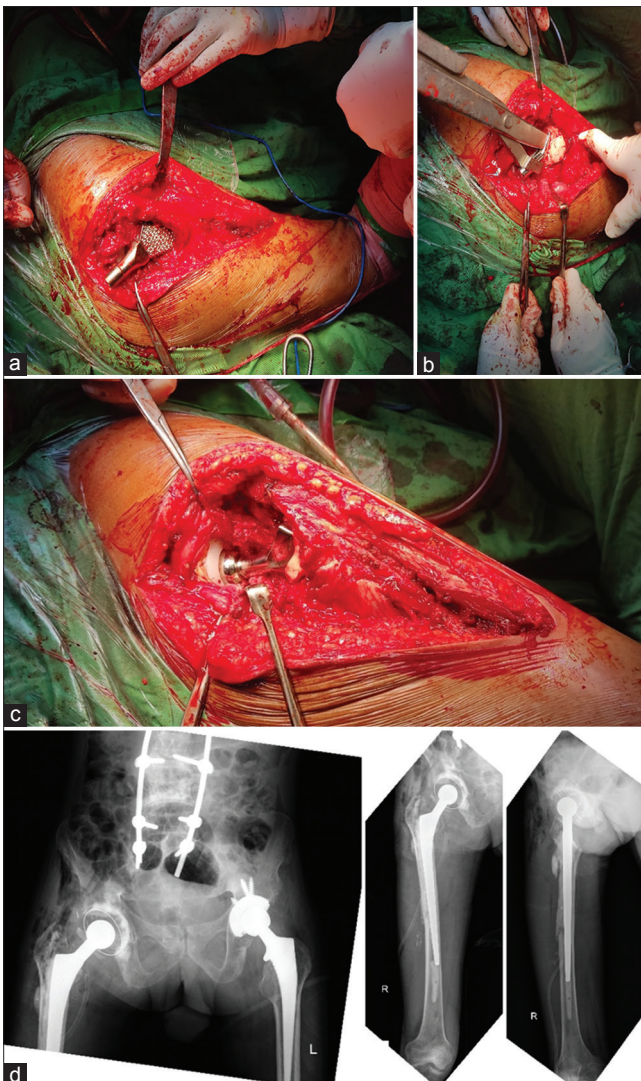


Figure 8: Intraoperative clinical condition (a-c) and post-operative X-ray (d)

One month after the revision surgery, his hip function had improved significantly. The active ROM of the right hip was 0/105° (flexion), 0/25° (abduction), and 0/20° (adduction), with approximately 0.5 cm leg length

discrepancy (Figure 9a and b). The external rotation of the right hip was limited due to pain. The patient could walk without a walker for moderate distance, with the HHS of 70. He complained of low back pain and sacral pain (Figure 9c). Radiographic assessments were done (Figure 9d). Implants were in good position and no complication was observed. Physiotherapy and strengthening exercise were prescribed and the patient was referred to the neurosurgery department for reevaluation of his spine.

## Discussion

The ankylosed left hip joint in this case might be related to neglect AVNFB that progressively lead to hip osteoarthritis. The AVNFB itself might be caused by over the counter consumption of dexamethasone for the past 7 years. Any other causal factors that might contribute to hip ankylosis in this patient were this tuberculosis.

Ankylosing spondylitis is an inflammatory disorder that typically occurs in young adults and mainly involves spine and sacroiliac joints. It can progress to the hip joint and cause stiffness, deformity, and restriction of movements that leads to further restriction in daily living function. The individual may complain of discomfort while sitting and is commonly present with fixed flexion and rotational deformities [5], [6]. The indications of THA in ankylosed hips are pain and significantly restricted mobility or disability. The intention of surgery would rather focus on the latter, as the effect on pain relief may only be partial [6], [7].

It remains controversial whether the THA in an ankylosed hip should be cemented or uncemented. Several authors argue that cemented hip replacement is superior because osteoporosis is often found coexists with ankylosis that may disrupt the osseointegration process. On the other hand, others debated that bone ingrowth in cementless procedure is likely to prolong the durability of the prosthesis. In addition, cementless implant is a more convenient choice in the need of revision surgery in these young populations [6].

The underlying cause of AVNFB can be categorized into two groups: traumatic and non-traumatic. Numerous studies reported the association of prolonged use of corticosteroid and the development of osteonecrosis, especially in high dose [8]. Corticosteroid-induced AVNFB also had a higher incidence of advanced-to-late stage lesion compared to non-corticosteroid group. Infection, autoimmune, and inflammatory diseases had also been shown to increase the risk of AVNFB, which also related to corticosteroid treatment [9].

Avascular necrosis is generally diagnosed by clinical manifestations and imaging findings. The

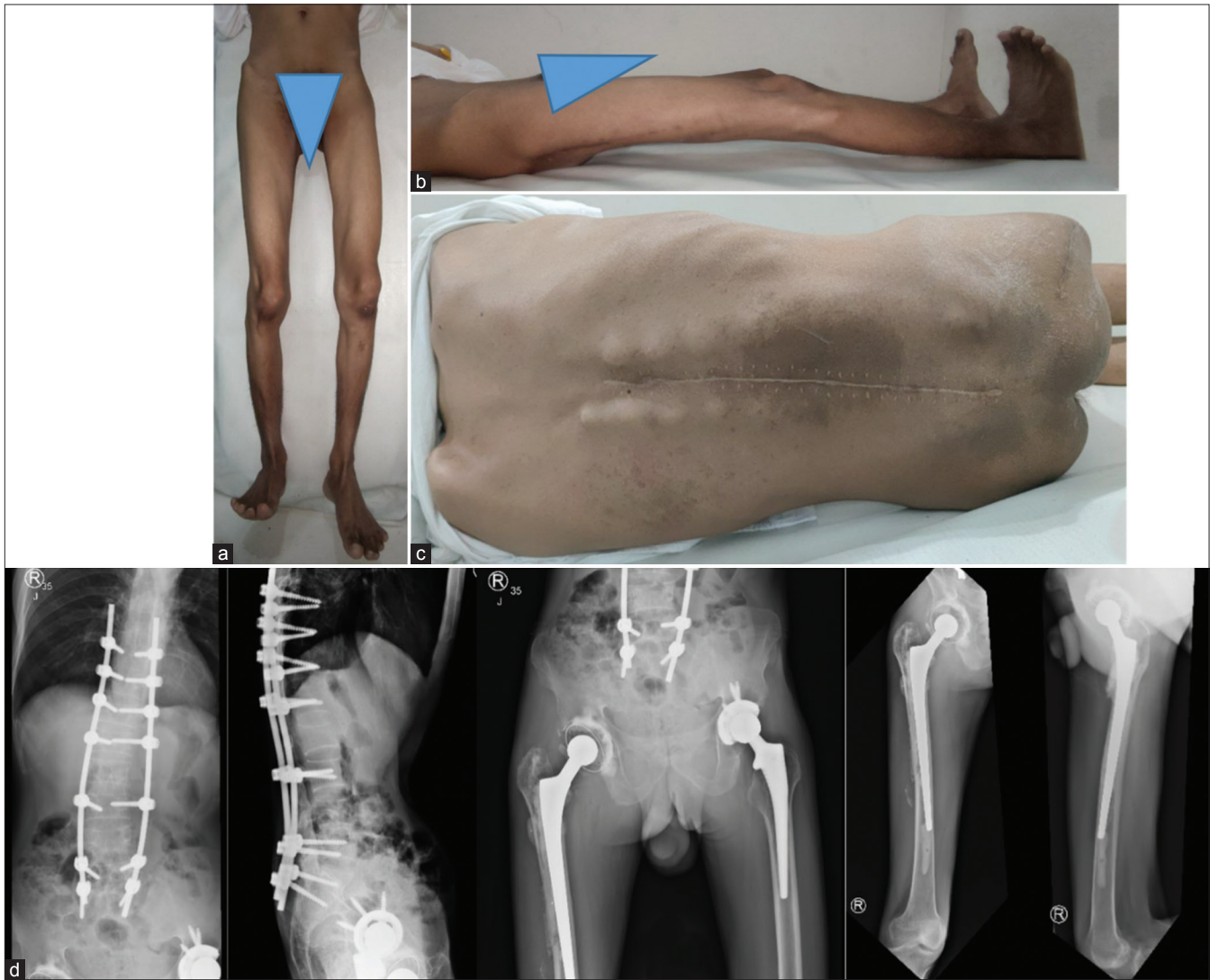


Figure 9: Clinical condition (a-c) and radiologic examination (d) 1-month after revision surgery of the right hip

patients may be asymptomatic or having gradual increase of pain and stiffness, and crepitus at the hips. Limited hip ROM and pain especially in forced internal rotation are often observed in AVNFH. The classic X-ray examination may show a “crescent sign” as an evidence of subchondral collapse while MRI stands as the gold standard for diagnosis. Pre-collapse cases can be treated non-surgically or surgically based on the area of necrosis while collapsed AVNFH should be treated surgically with THR as an excellent option [10], [11].

First, we treated this patient with THR procedure followed by a short period of skeletal traction. As mentioned in previous literature, the treatment of choice for advanced AVNFH is THR. This procedure is mainly performed in patients with compromised articulation due to collapse of the femoral head [12]. However, THR can also be performed in patients who have large lesions with or without collapse or those with cartilage delamination without apparent collapse [4]. THR has been reported to successfully relieve pain and restore function in majority of patients [8]. Outcomes

of THR in AVNFH are comparable to those with osteoarthritis, even long-term clinical outcomes in younger patients [4].

After THR procedure, the biomechanics of the hip is improved causing the alleviation of symptoms. However, prior study reported that improvement in walking ability and gait is unpredictable [13]. After the left THR procedure, the functional status of the left hip was slightly increased, reflected by the increase of HHS from 33 to 60, although the hip function was still poor. The HHS consists of four subscales that consist of pain severity, function, deformity, and ROM [14]. The inferior result of the HHS in this patient might be due to pain caused by the periprosthetic fracture on the right hip.

Periprosthetic fracture is one of many possible complications of THR. This fracture could happen both during prosthesis implantation and post-operative period (such as this case). The risk factors associated with periprosthetic fracture after THR procedure include mechanical factors that disrupt prosthesis stability (causing loosening) and other factors that intrinsically weaken the bone. Prosthesis loosening

allows motion along the bone-prosthesis interface as a result of traumatic or non-traumatic causes (infection, osteoporosis, or aseptic osteolysis) [13]. In this patient, the periprosthetic fracture might be preceded by implant loosening due to aseptic osteolysis.

The optimal strategy of periprosthetic fracture management depends on a variety of factors, including type of prosthesis, mechanism and integrity of prosthesis fixation, fracture pattern and location, available structurally sound bone, and clinical considerations (e.g., age and comorbidities) [13], [15]. For periprosthetic femoral fracture in femoral stem area with associated loosening of femoral stem (Vancouver B2 or B3), the previous literature stated that the treatment of choice is revision with diaphyseal engaging implant (long stem femoral component). Bone graft (allograft) can be considered in Vancouver B3 [15]. In this case, the new cemented long-stem femoral component inserted was stable so neither additional fixation nor bone graft was needed. One month after the revision surgery, the function of both hips improved and the patient could walk without any assistive device, despite only in short distance.

## Conclusion

Total hip replacement is a modality that could be considered for the treatment of advanced AVNFB and ankylosis of hip joint, with femoral periprosthetic fracture as one of its potential complications.

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