

# Isolated Septic Arthritis of the Hip Due to *Fusobacterium Nucleatum* in An Immunocompetent Adult: A Case Report and Review of the Literature

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## Learning Point of the Article:

*Fusobacterium nucleatum* can be the cause of septic arthritis, even in an immunocompetent patient, requiring surgical debridement and appropriate antibiotic therapy.

## Abstract

**Introduction:** Hip septic arthritis is more common in children than in adults. *Staphylococcus aureus* and *Streptococcus* spp. are commonly found in association with septic joints. In contrast, *Fusobacterium nucleatum* septic arthritis in adults is extremely rare. To the best of our knowledge, only five cases have been reported in the literature in English, and three of them were cases of periprosthetic joint infection. We report a rare case of hip septic arthritis due to *F. nucleatum* in an immunocompetent adult.

**Case Presentation:** A 56-year-old Asian man with a history of bilateral Perthes' disease and mild alcoholic liver disease presented to our hospital complaining of worsening right hip pain and difficulty in walking for the previous 3 weeks. On presentation, his temperature was 38.7°C, and laboratory results showed a white blood cell count of 19 200 cells/μL and a C-reactive protein level of 43.56 mg/dL. Hip movements were limited due to pain. Contrast-enhanced computed tomography and magnetic resonance imaging showed fluid retention, suggesting infection. *F. nucleatum* was detected in the culture test from joint aspirate. Surgical drainage was performed 3 times in combination with antibiotherapy. Finally, we performed two-stage total hip arthroplasty, and the post-operative course was uneventful without implant loosening or infection relapse.

**Conclusion:** The patient had a history of Perthes' disease and had hip osteoarthritis, which may have contributed to the development of hip septic arthritis. We treated this rare case of hip septic arthritis due to *F. nucleatum* with two-stage revision surgery and antibiotherapy. Clinicians should be aware that *F. nucleatum* could be the etiologic agent of hip septic arthritis in an immunocompetent patient.

**Keywords:** Septic Arthritis, Hip joint, *Fusobacterium nucleatum*, Adult

## Introduction

*Fusobacterium* species are Gram-negative anaerobic bacillus. They have been isolated from mainly oral and dental infectious diseases, brain abscesses, bacteremia, and soft-tissue infections [1, 2]. To date, a few authors have reported the isolation of *Fusobacterium* species from bone and joint infections [3]. Septic arthritis is an infection of a synovial joint due to the pathogenic inoculation of the joint (which may occur either directly or through the hematogenous route) and involves a potential risk of high morbidity and mortality [4]. Hip septic arthritis is more common in children than in adults, and

*Staphylococcus aureus* and *Streptococcus* spp. are often found in association with septic joints [5]. There have been very few reports on septic arthritis caused by *Fusobacterium nucleatum* in adults [2, 6, 7, 8, 9]. Here, we report a very rare case of hip septic arthritis due to *F. nucleatum* in a male adult.

## Case Presentation

A 56-year-old man with a history of bilateral hip osteoarthritis due to Perthes' disease and mild alcoholic liver disease presented to our hospital complaining of worsening right hip

Access this article online

Website:  
www.jocr.co.in

DOI:  
10.13107/jocr.2021.v11.i04.2142

## Author's Photo Gallery



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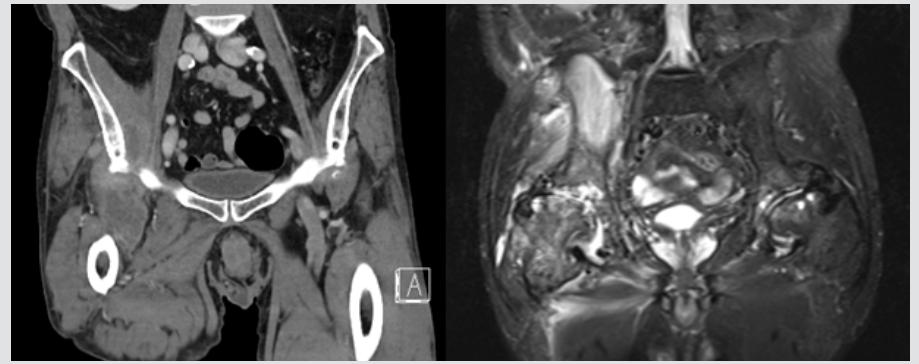
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**Figure 1:** Radiograph of the anteroposterior pelvis showing a narrow joint space at the bilateral hip joint.



**Figure 2:** Contrast-enhanced coronal computed tomography showing fluid retention from the iliac muscle to the region around the right hip. Magnetic resonance imaging showing A T2 high-intensity lesion around the right hip and iliac muscle.

pain and difficulty in walking for the 3 previous weeks. On presentation, his temperature was 38.7°C, and laboratory results revealed a white blood cell count of  $19.2 \times 10^3$  cells/L and C-reactive protein level of 43.56 mg/dL. The right hip experienced extreme pain on mobilization. Radiographs showed bilateral hip osteoarthritis due to Perthes' disease (Fig. 1). Contrast-enhanced computed tomography showed fluid retention from the iliac muscle to around the right hip, and magnetic resonance imaging of the right hip was suggestive of septic arthritis (Fig. 2). Three-phase bone scintigraphy showed increased activity in all phases (Fig. 3).

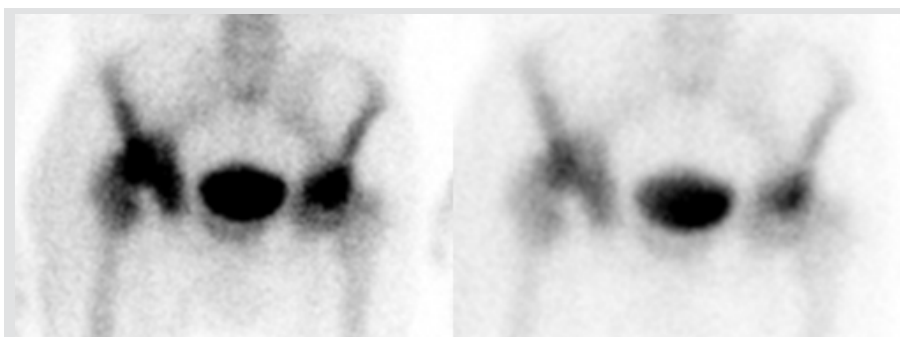
The right hip was aspirated and specimens were sent for pathological and microbiological examination. We performed surgical drainage (on day 1). During the first phase of the procedure, we took three samples for analysis and all intraoperative biopsy samples were positive for *F. nucleatum*. One week after the first surgery (on day 8), we performed femoral head resection and added antibiotics to the cement spacer. In total, arthrotomy with debridement was performed 3 times (on days 1, 8, and 35). On admission, parenteral antibiotic treatment was started with meropenem. After confirming that the culture was positive for *F. nucleatum*, we started treatment with intravenous cefmetazole for 21 days. After the third procedure, we changed antibiotics to intravenous cefazolin and clindamycin due to a poor inflammatory response. Finally, we successfully performed two stage total hip arthroplasty (THA) on day 75 (Fig. 4). The post-operative course was uneventful

with the oral administration of minocycline. The patient showed no evidence of implant loosening or infection relapse during the 3 years of follow-up.

### Discussion

*F. nucleatum* is a normal inhabitant of the oral cavity, female genitals, and gastrointestinal tract. It is often identified as the cause of oral infections, skin and soft tissue infections, and intraabdominal abscesses [6]. However, *F. nucleatum* septic arthritis in adults is extremely rare. To the best of our knowledge, only five cases of *F. nucleatum* septic arthritis in adults have been reported in the literature in English, and three of them were cases of periprosthetic joint infection (Table 1) [2, 6, 7, 8, 9]. While there are two reports of knee septic arthritis, this is the first case report of hip septic arthritis caused by *F. nucleatum* in adults.

Lemierre disease is an oropharyngeal infection caused by *F. necrophorum*, which is complicated by sepsis, thrombosis of the internal jugular vein, and multiple metastatic infections, including septic arthritis [10]. Williams et al. [11] reported a case of Lemierre disease caused by *F. nucleatum*. In our case, no history of recent oropharyngeal infection or dental portal of entry was noted on clinical examination. There is some evidence supporting the idea that bacteria from a distant site such as the oral cavity could spread to the joints in cases of rheumatoid arthritis or osteoarthritis [6]. This patient had hip



**Figure 3:** Three-phase bone scintigraphy showing increased uptake in the right hip.



**Figure 4:** Anteroposterior pelvis radiograph after total hip arthroplasty.

Table 1: Reports of *F. nucleatum* septic arthritis in adults

Author	Age	Sex	Infection Site	Presentation	Medical treatment	Surgical treatment	Probably source
Gonzalez-Gay (1993)	34	Male	Knee	knee and thigh pain, fever	Antibiotherapy + needle drainage	-	-
Verma (2012)	52	Male	Hip (PJI)	hip pain, fever	Antibiotherapy	Revision surgery	Sickle cell-beta thalassemia
Rodriguez Duque (2018)	72	Female	Hip (PJI)	hip pain, fever	Antibiotherapy	Revision surgery	Hemochromatosis
Corona (2018)	75	Female	Knee (PJI)	knee pain, fever	Antibiotherapy	Revision surgery	-
Shenoy (2018)	48	Male	Knee	knee pain, calf muscle pain, fever	Antibiotherapy	Arthroscopic debridement	-
Nishi (this report)	56	Male	Hip	Hip pain, fever	Antibiotherapy	Surgical drainage	-

osteoarthritis and a history of Perthes' disease, which may have contributed to the development of hip septic arthritis.

The diagnosis of *F. nucleatum* is sometimes difficult because of the difficulty in isolating the organism. In our case, *F. nucleatum* was only isolated from the sample when utilizing anaerobic conditions. We recommend that it is necessary to check for anaerobic cultures in patients with septic arthritis, because many physicians may not routinely submit anaerobic cultures of the synovial fluid.

The treatment of hip septic arthritis in adults typically involves antibiotics and the removal of purulent tissue from the affected joint, either by arthrocentesis or surgical drainage [12]. Regarding antimicrobial therapy,  $\beta$ -lactam agents, clindamycin, and metronidazole are commonly used for treating *Fusobacterium*-related infections. However, there is evidence of emerging resistance to penicillins, carbapenems, and clindamycin in some *Fusobacterium* isolates [13, 14]. In our case, the isolate was resistant to penicillin.

In previous reports regarding the treatment of septic arthritis due to *F. nucleatum*, four of the five cases were also treated with surgical debridement and antibiotic therapy (Table 1).

Management of septic arthritis by arthroplasty using the present protocol involves two stage total joint replacement in the case of evolutive arthritis and one-stage total joint replacement in case of quiescent arthritis [15]. Since our case involved evolutive septic arthritis, we planned two-stage revision surgery. There are some reports about two-stage revision surgery for deep infection following septic hip arthritis

where the first stage involves debridement and lavage of the joint, followed by resection of the femoral head and replacement of cement spacer antibiotics. We initially attempted to preserve the femoral head because the patient's groin pain was not severe; however, eventually, we performed a femoral head resection and two-stage THA. This explains why surgical drainage was performed 3 times.

There are several reports of THA after septic arthritis. Bauer et al. [16] reported that 26 of the 30 cases (87%) of evolutive septic arthritis were successfully followed up for a mean period of 5 years. Chen et al. [17] found a re-infection rate of 14% and a complication rate of 36% in 28 cases, at an average follow-up period of 77 months. In this case, there was no implant loosening or infection relapse after 3 years of follow-up, although further follow-up is warranted.

## Conclusion

We treated a rare case of hip septic arthritis due to *F. nucleatum* with two-stage revision surgery in addition to a prolonged course of antimicrobial therapy based on susceptibility testing. The exact duration of therapy depends on sufficient debridement, the severity of illness, clinical response, and normalization of inflammatory markers. Clinicians should be aware that *F. nucleatum* could be the etiologic agent of hip septic arthritis in an immunocompetent patient.

## Clinical Message

*F. nucleatum* can be the cause of septic arthritis, even in an immunocompetent patient, requiring surgical debridement, and appropriate antibiotic therapy. As with other hip septic arthritis in adult, two-stage revision surgery is effective.

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**Conflict of Interest:** Nil  
**Source of Support:** Nil

**Consent:** The authors confirm that informed consent was obtained from the patient for publication of this case report

#### How to Cite this Article

Nishi M, Yoshikawa Y, Kaji Y, Okamoto S, Inagaki K. Isolated Septic Arthritis of the Hip Due to *Fusobacterium nucleatum* in An Immunocompetent Adult: A Case Report and Review of the Literature. *Journal of Orthopaedic Case Reports* 2021 April;11(4): 37-40

