

# *Candida albicans* Prosthetic Joint Infection After Total Knee Arthroplasty: A Rare Case Report

Mohammad Mahdi Sarzaeem, Amin Norouz Beigi, Reza Tavakoli Darestani, Farzad Amuzadeh Omrani, Mojtaba Baroutkoub, Alireza Manafi Rasi

Department of Orthopedic, School of Medicine, Imam Hossein Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

## Abstract

In this article, a 75-year-old patient with pain in left knee and restricted range of motion following total knee arthroplasty (TKA) is presented. Serological evaluation and aspiration of knee joint suggested a fungal prosthetic joint infection. After the diagnosis was confirmed, treatment started with antifungal drugs, removing prosthesis, exhaustive debridement, and revision of TKA after efficient antifungal treatment. At one-year follow-up, she has a painless motion range of 10 to 90 degrees, and there was no recurrence of infection observed.

**Keywords:** Arthroplasty, *Candida*, infections, joint, knee, prosthetic

**Address for correspondence:** Dr. Alireza Manafi Rasi, 7<sup>th</sup> Floor, Bldg No. 2 SBUMS, Arabi Ave, Daneshjoo Blvd, Velenjak -19839-63113, Tehran, Iran.

E-mail: drmanafi54@yahoo.com

**Submitted:** 30-Sep-2021; **Revised:** 16-Jul-2022; **Accepted:** 20-Jul-2022; **Published:** 26-Dec-2022

## INTRODUCTION

Prosthetic joint infections (PJIs) are dreaded complications following total joint arthroplasty, which causes revision surgery. Gram-positive bacteria, including staphylococci, are the major inducers of PJIs<sup>[1]</sup> but fungal infection are rare yet devastating and represents 1% of all PJIs and the prevalence has increased in recent decade.<sup>[2-4]</sup> Risk factors of the fungal PJI are immunosuppressive conditions due to disease and drugs, drug abuse, prolonged use of antibiotics, and many more.<sup>[5,6]</sup> The diagnosis of fungal PJI may be challenging and repetitious joint aspiration might be required.<sup>[7]</sup> Furthermore, managing fungal PJI can be associated with further challenges considering the difficult treatment and high possibility of persistent infection.<sup>[8-11]</sup> Also, considering its low frequency, no standard guidelines are described for diagnosing and treating these infections.<sup>[7]</sup> Relatively different treatment regimens have been described in few literary reviews and case reports for fungal PJI.<sup>[7-11]</sup>

Therefore, fungal PJI is rare complication of total joint arthroplasty that has not been frequently investigated. In this study, a case of fungal PJI with *Candida tropicalis* is reported, who was successfully treated despite all the challenges.

## CASE REPORT

In January 2020, a female patient with 75 years of age was referred to our hospital with swelling, pain in the left knee, and difficulty in walking for the last four weeks. She had history of left total knee arthroplasty (TKA) surgery in April 2019 for post-traumatic degenerative joint disease. She had car accident two years earlier in January 2016. After 2.5 months, she presented with pain in left knee (following exertion the pain incremented and it was reduced with rest) and restricted range of motion and during the past days, the pain markedly increased. The patient went through a healthy period after the TKA. She was also diagnosed with diabetes mellitus and ischemic heart disorder and had no history of cancer, rheumatoid diseases, renal diseases, tuberculosis, hepatitis, or human immunodeficiency virus infection. Her drug history was metformin, glibenclamide, metoral, nitrocantin, and aspirin.

On physical examination, a 15-cm vertical healed surgical scar of the primary TKA was observed on the anterior side of left knee [Figure 1]. Her body temperature was 37.8 cg, blood

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Sarzaeem MM, Norouz Beigi A, Tavakoli Darestani R, Amuzadeh Omrani F, Baroutkoub M, Manafi Rasi A. *Candida albicans* prosthetic joint infection after total knee arthroplasty: A rare case report. Adv Biomed Res 2022;11:111.

### Access this article online

Quick Response Code:



Website:  
www.advbiores.net

DOI:  
10.4103/abr.abr\_302\_21

pressure 135/80 mmHg and heart rate 96 bpm. The cardiac sounds had no anomalies or murmurs, and the lung fields were clear to auscultation. The electrocardiography demonstrated normal sinus rhythms. The local skin temperature was raised with wound drainage and the motion range was limited in flexion. Also, flexion of the knee caused pain. There was no sign of malformation. The patient's neurological health was observed to be unharmed, and distal pulses were clearly felt.

An inflammatory syndrome was observed via the laboratory tests; white blood cell (WBC) was 12000 mm<sup>3</sup>, polymorphonuclear leucocytes (PMN) 87%, C-reactive protein (CRP) 81 mg/L, and erythrocyte sedimentation rate (ESR) 46 mm/hr). Also, negative results were observed regarding antinuclear antibody, rheumatoid factor, anti-streptolysin O, and **human leukocyte antigens**–B27.

Radiological evaluation showed the osteolysis over the posterior femoral condyles, anterior femoral cortex, and under the tibial base plate.

Therefore, PJI of the knee was suspected according to the laboratory results, radiological and physical evaluations. Aspiration of knee joint was performed in sterile conditions and 5 ml of the fluid was sent for analyzes. The fluid was dull with low viscosity, WBC count was 16,000/cubic mm, with 72% PMN. Gram staining was negative, however, 10% KOH mount was positive, which suggested possible fungal infections.

Then, device removal and debridement with local antibiotics and local antifungals including vancomycin, amphotrypsin done, and finally, a spacer with cement containing gentamicin (4.8 g), vancomycin (4 g), and targocid (1.2 g) was placed.

For the patient during hospitalization antibiotic in cloud (vancomycin (4 g), imipenem, meropenem, and rifampin) plus antifungal (amphotericin B and voriconazole) was done [Figure 2]. Fungal culture was positive for *Candida tropicalis* and bacterial culture was negative. After almost 4 months, including Six weeks of injectable antibiotics and ten weeks of oral antibiotics, including fluconazole 150 mg twice a day, ciprofloxacin 500 mg orally three times a day, and clindamycin 150 mg three times a day with the subsidence of the patient's symptoms and negative inflammatory markers TKA was reimplanted after the spacer was removed with a new hinged prosthesis [Figure 3]. Also, several tissue samples were obtained preoperatively and sent for culture.

After surgery, the patient received antibiotic with combination of intravenous voriconazole (with a loading dosage of 6 mg/kg two times a day and a maintenance dosage of 4 mg/kg two times a day). The patient was discharged after seven days, and follow-up was performed at weekly intervals. Following 14 weeks, the ESR and CRP were within normal limits. Adequate improvements at the surgical wound site and after physiotherapy, a motion range of the knee was associated with no pain and functional impairments. Now, the swelling and effusion was seen on knee examination and the patient is under antifungal (Fluconazole 150 mg/daily) therapy.



**Figure 1:** Swelling and vertical midline healed surgical scar



**Figure 2:** X-rays showing antibiotic impregnated PMMA (polymethyl methacrylate) spacer and intramedullary rods as after prosthesis removal



**Figure 3:** Anteroposterior (a) and lateral (b) radiography of left knee joint at 12 months follow-up showing implant at 12 months follow-up showing implant

## DISCUSSION

PIJ is a devastating complication which threatens both function and life. Fungal PJI is rarely reported worldwide especially in Iran and occur in patients with

immunocompromised condition, such as underlying systemic illness (diabetes mellitus, rheumatoid arthritis), malignancy, or inappropriate use of antibiotics, indwelling catheters, and many others.<sup>[11-14]</sup> and our patient had diabetes mellitus as a risk factor. Moreover, Wu and Hsu studied a case with preoperative cutaneous candidiasis who had fungal PJI,<sup>[14]</sup> while no initial source of fungal infections was observed in our case; therefore, underlying systemic illness was the main risk factor for fungal PJI in our case.

In previous case reports, *Candida albicans* was observed to be the most frequent pathogen in fungal PJI followed by *Candida parapsilosis*.<sup>[6]</sup> While, we found *Candida tropicalis* as agent for fungal PJI in our case.

Established studies have shown that the major clinical signs and symptoms of fungal PJI include pain, erythema, swelling or wound discharge, fever, or shivering.<sup>[11]</sup> In the present study, the patient's primary symptoms were clear and we observed pain and restricted range of motion with increased local skin temperature and wound discharge with low grades of fever.

Due to insufficient study and data on the specific serological parameters, we could not evaluate or perform. However, some studies showed that following a fungal PJI, nonspecific serological infectious parameters (CRP, ESR, and WBC count) increase.<sup>[11-14]</sup> Fungus culture is not performed as a routine test in various hospitals like ours. In most cases with negative bacterial culture from synovial fluid aspiration, especially *Mycobacterium tuberculosis*, may not be excluded but based on patient condition and risk factors for developing fungal PJI (such as immunosuppressants, catheterization, and cutaneous fungal infections), we should consider fungal infection. As mentioned in our study, aspiration of the respective knee is the major method of detecting fungal PJI, especially with a sufficient incubation duration of 5-14 days. Suitable media for promotion fungal isolations are Sabouraud Dextrose Agar and ChROMagar *Candida*.<sup>[13]</sup>

Considering low prevalence of fungal PJI, there are no guidelines on the suitable treatment of fungal PJI.<sup>[12]</sup> Moreover, fungal PJI is difficult to eradicate, due to indolent clinical presentation and delayed diagnosis. But several different treatment methods with variable outcomes have been reported including administration of antifungal agents, resection arthroplasty, debridement with maintained prosthesis, single-stage or double-stage exchange arthroplasty, and arthrodesis.<sup>[10]</sup>

In the presented case, we administrated antifungal drugs after the complete debridement (a significant part of the influenced tissue was removed). Then after evaluating the risk of complications for the patient, we decided to perform revision of TKA for avoiding the complications of long-term immobilization and infection. Following that radiography was performed and successful fusion was observed after one year.

The type and the duration of antifungal treatment after surgery are still unclear. Fluconazole and Amphotericin B are the most

frequently implemented antifungal agents; however, their complications are greater than itraconazole and voriconazole in toxicity.<sup>[8]</sup> In a recent report, Brooks DH *et al.*<sup>[13]</sup> studied a patient with *Candida* PJI after TKA, and the therapy with a combination of micafungin and voriconazole was successful. In another article, a long-term study of *Candida* demonstrated that fluconazole has an appropriate antifungal efficacy with fewer complications.<sup>[11]</sup> The related discrepancies in terms of the types of antifungal treatment demonstrate that more studies are required in this regard for optimizing the protocols of managing fungal PJI.

Various findings were obtained in this study. Initially, in case of suspecting a primary fungal PJI, we should perform a comprehensive evaluation for confirming the diagnosis, such as a thorough serological evaluation (e.g., ESR, CRP), radiographic exploration, and knee joint aspiration to obtain joint fluid for culture. Following confirmation of the diagnosis, treatment must be initiated with antifungals. After that, if the infection disappears, revision of TKA can be carried out.

## CONCLUSION

In general, it was concluded that fungal PJI is a serious complication and its management may be associated with more challenges than bacterial PJI. *Candida* PJI after TKA can be appropriately treated by antifungals, prosthesis removal, exhaustive debridement, and revision of TKA after efficient antifungal treatment.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Lentino JR. Infections associated with prosthetic knee and prosthetic hip. *Curr Infect Dis Rep* 2004;6:388-92.
2. Darouiche RO, Hamill RJ, Musher DM, Young EJ, Harris RL. Periprosthetic candidal infections following arthroplasty. *Rev Infect Dis* 1989;11:89-96.
3. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. *J Bone Joint Surg Am* 2007;89:780-5.
4. Schoof B, Jakobs O, Schmidl S, Klatte TO, Frommelt L, Gehrke T, *et al.* Fungal periprosthetic joint infection of the hip: A systematic review. *Orthoped Rev* 2015;7:5748.
5. Gebauer M, Frommelt L, Achan P, Board TN, Conway J, Griffin W, *et al.* Management of fungal or atypical periprosthetic joint infections. *J Arthroplasty* 2014;29:112-4.

6. David MP, Douglas RO, Michael RK, Arlen DH. Delayed reimplantation arthroplasty for candidal prosthetic joint infection: A report of 4 cases and review of the literature. *Clin Infect Dis* 2002;34:930-8.
7. Belden K, Cao L, Chen J, Deng T, Fu J, Guan H, *et al.* Hip and knee section, fungal Periprosthetic joint infection, diagnosis and treatment: Proceedings of international consensus on orthopedic infections. *J Arthroplasty* 2019;34:S387-91.
8. Nace J, Siddiqi A, Talmo CT, Chen AF. Diagnosis and management of fungal periprosthetic joint infections. *J Am Acad Orthop Surg* 2019;27:e804-18.
9. Kuiper JW, Van Den Bekerom MP, Van Der Stappen J, Nolte PA, Colen S. 2-stage revision recommended for treatment of fungal hip and knee prosthetic joint infections: An analysis of 164 patients, 156 from the literature and 8 own cases. *Acta Orthop* 2013;84:517-23.
10. Jakobs O, Schoof B, Klatte TO, Schmidl S, Fensky F, Guenther D, *et al.* Fungal periprosthetic joint infection in total knee arthroplasty: A systematic review. *Orthop Rev* 2015;7;5623.
11. Hwang BH, Yoon JY, Nam CH, Jung KA, Lee SC, Han CD, *et al.* Fungal peri-prosthetic joint infection after primary total knee replacement. *J Bone Joint Surg Br* 2012;94:656-9.
12. Azzam K, Parvizi J, Jungkind D, Hanssen A, Fehring T, Springer B, *et al.* Microbiological, clinical, and surgical features of fungal prosthetic joint infections: A multi-institutional experience. *J Bone Joint Surg Am* 2009;91(Suppl 6):142-9.
13. Brooks DH, Puppato F. Successful salvage of a primary total knee arthroplasty infected with *Candida parapsilosis*. *J Arthroplasty* 1998;13:707-12.
14. Hennessy MJ. Infection of a total knee arthroplasty by *Candida parapsilosis*. A case report of successful treatment by joint reimplantation with a literature review. *Am J Knee Surg* 1996;9:133-6.