

First Reported Case of Periprosthetic Fungal Knee Joint Infection Caused by *Candida viswanathii*: A Case Report

Satyajeet Joshi¹, Suresh Patil¹, Mahesh Kulkarni¹, Megh Shaligram²,
Shivaram Muthiah¹, Rasika Joshi³

Learning Point of the Article:

Persistent or culture-negative periprosthetic knee infections warrant consideration of rare fungal pathogens such as *Candida viswanathii*, whose identification requires use of modern diagnostic techniques like MALDI-TOF assay enabling targeted antifungal therapy.

Abstract

Introduction: Periprosthetic joint infection (PJI) is a serious and potentially devastating complication of total knee arthroplasty (TKA). While bacterial pathogens account for the majority of cases, fungal PJI is exceedingly rare, representing <1% of all prosthetic joint infections. Among fungal organisms, *Candida albicans* is the most commonly implicated species. *Candida viswanathii* is an extremely rare fungal pathogen, and to the best of our knowledge, there are no previously reported cases of periprosthetic knee joint infection caused by this organism. We report the first such case, highlighting its clinical presentation, diagnostic challenges, and management.

Case Report: We report the case of an 80-year-old non-immunocompromised male who developed a periprosthetic fungal knee joint infection following TKA. The clinical presentation was atypical, causing significant soft-tissue destruction with rupture of the arthrotomy and dislocation of the patella. After negative bacterial cultures and failed debridement procedures, repeat joint aspiration at our institute revealed *C. viswanathii*, confirmed using matrix-assisted laser desorption ionization–time-of-flight mass spectrometry. The patient subsequently underwent staged revision surgery with placement of amphotericin B–impregnated cement spacers and received prolonged systemic antifungal therapy. Due to extensive soft-tissue destruction and persistent intramedullary infection, knee arthrodesis using a novel cement rod (K-nail) static spacer technique was performed. Clinical and laboratory improvement was observed on follow-up.

Conclusion: To our knowledge, this is the first reported case of periprosthetic knee joint infection caused by *Candida viswanathii*, a rare non-*albicans* *Candida* species, presenting with significant soft-tissue destruction and an atypical clinical course. Early suspicion, advanced microbiological identification, aggressive surgical management, and prolonged targeted antifungal therapy are critical for achieving successful outcomes.

Keywords: Fungal periprosthetic joint infection, *Candida viswanathii*, total knee arthroplasty, antifungal-loaded cement, knee arthrodesis, MALDI-TOF mass spectrometry.

Introduction

Periprosthetic joint infection (PJI) remains one of the most serious complications following total knee arthroplasty, often resulting in implant failure, prolonged morbidity, and impaired

function. Accurate and timely identification of rare causative pathogens is challenging but critical. Matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS) has emerged as a state-of-the-art tool in

Access this article online

Website:
www.jocr.co.in

DOI:
<https://doi.org/10.13107/jocr.2026.v16.i11.8400>

Author's Photo Gallery



Dr. Satyajeet Joshi



Dr. Suresh Patil



Dr. Mahesh Kulkarni



Dr. Megh Shaligram



Dr. Shivaram Muthiah



Dr. Rasika Joshi

¹Department of Orthopaedics, Deenanath Mangeshkar Hospital, Pune, Maharashtra, India,

²Department of Orthopaedics, KEM Hospital, Pune, Maharashtra, India,

³Department of Infectious Diseases, Deenanath Mangeshkar Hospital, Pune, Maharashtra, India.

Address of Correspondence:

Dr. Satyajeet Joshi,
Department of Orthopaedics, KEM Hospital, 489, Moodliar Road, Rasta Peth, Pune - 411038, Maharashtra, India.
E-mail: joshi.satya.v@gmail.com

Submitted: 17/08/2026; Review: 26/09/2026; Accepted: October 2026; Published: November 2026

DOI: <https://doi.org/10.13107/jocr.2026.v16.i11.8400>

© The Author(s). 2026 Open Access. This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and non-commercial reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated.





Figure 1: Clinical image of right knee after primary implant dislocation showing swelling and local signs of inflammation.

advanced microbiology laboratories, allowing rapid, species-level identification even in culture-negative or chronic infections [1,2].

Management of extensive PJI in frail or elderly patients with significant soft-tissue damage, patellar dislocation, and rupture of the arthrotomy poses additional surgical challenges. In cases where conventional revision strategies are inadequate due to severe soft-tissue or bone compromise, novel surgical techniques such as K-nail arthrodesis provide a reliable limb-salvage option. This technique offers stable fixation, facilitates

local antifungal delivery, and provides functional support while reducing the risk of reinfection [3,4,5,6].

While bacterial pathogens account for the majority of PJIs, fungal infections are uncommon, representing <1% of cases, and are associated with delayed diagnosis, higher recurrence rates, and poorer outcomes [7,8].

Among fungal pathogens, *Candida albicans* is most frequently reported, followed by other non-*albicans* *Candida* (NAC) species [9,10]. *Candida viswanathii* is an exceptionally rare organism, previously described only in a few clinical scenarios, including non-orthopedic cases such as fatal meningitis [11]. To the best of our knowledge, no cases of periprosthetic knee joint infection caused by *C. viswanathii* have been reported to date.

This case report illustrates the diagnostic complexity and surgical decision-making involved in managing a periprosthetic knee infection caused by *C. viswanathii*, highlighting the role of advanced microbiological identification and innovative arthrodesis techniques.

Case Report

An 80-year-old, well-nourished, non-immunocompromised male underwent bilateral total knee arthroplasty for advanced osteoarthritis. The initial post-operative course was uneventful. However, 2 months following surgery, the patient developed persistent knee swelling and recurrent joint effusion. He underwent multiple joint aspirations and debridement procedures at an outside institution. Initial microbiological cultures were negative, and empirical antibiotic therapy was

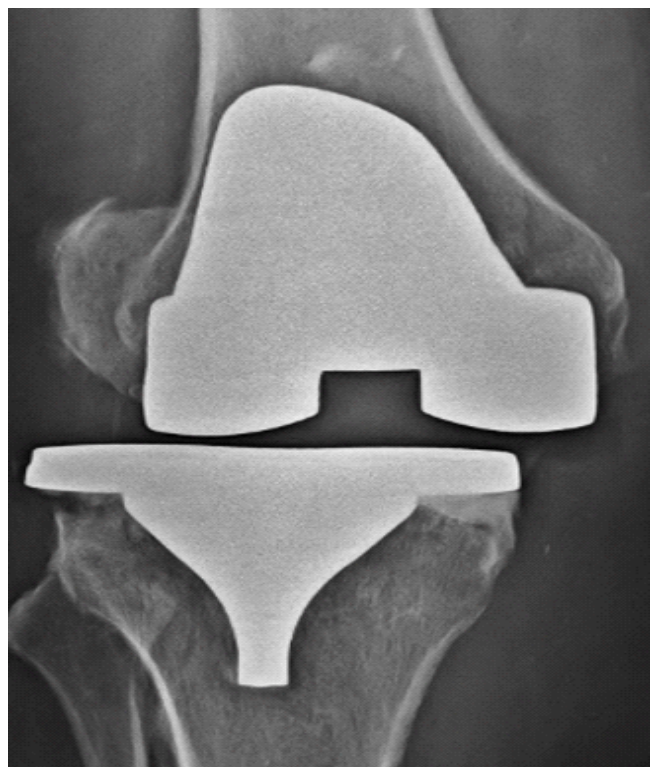


Figure 2: X-ray of the right knee in coronal (anteroposterior) view showing prosthesis instability with patellar dislocation.

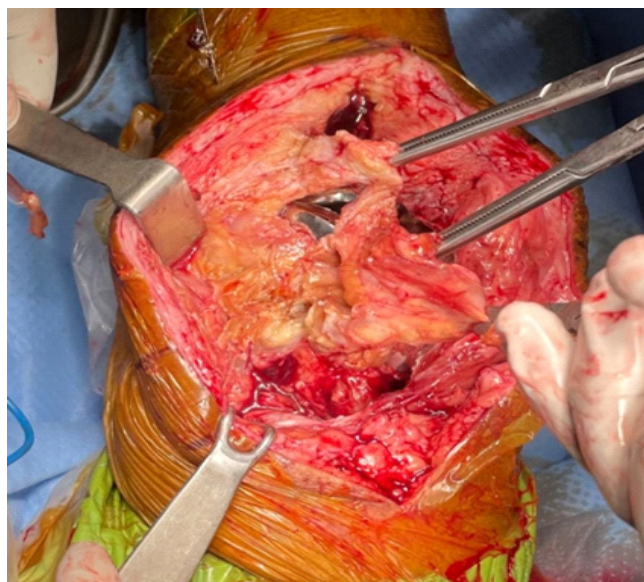


Figure 3: Intraoperative image during removal of primary implants and insertion of cement spacer showing extensive soft-tissue destruction, arthrotomy rupture, and patellar dislocation.



Figure 4: Intraoperative image showing the prepared dynamic cement spacer (femoral and tibial component).

administered.

Five months postoperatively, the patient presented to our institution with worsening pain, swelling, patellar dislocation, arthrotomy rupture, and significant functional limitation. Clinical examination revealed poor quadriceps function and reduced range of motion, with marked soft-tissue compromise, including arthrotomy rupture and patellar dislocation (Fig. 1). Radiological evaluation demonstrated prosthetic instability with extensive periarticular soft-tissue damage (Fig. 2).

Antibiotics were withheld for 2 weeks, and repeat joint aspiration was performed. Fungal cultures revealed growth of *C. viswanathii*, which was confirmed using MALDI-TOF MS. This established the diagnosis of fungal PJI and represented the first reported case of *C. viswanathii* infection following total knee arthroplasty.

The patient underwent first-stage revision arthroplasty with removal of the prosthesis (Fig. 3) and placement of a dynamic spacer impregnated with amphotericin B (Fig. 4) to achieve high local antifungal concentrations. Under infectious disease specialist guidance, systemic antifungal therapy was initiated with oral posaconazole and later changed to voriconazole and 5-fluorocytosine. On review 3 months postoperatively, the patient was noted to have recurrent patellar dislocation associated with arthrotomy dehiscence (Fig. 5). Erythrocyte sedimentation rate (ESR) was 116 mm/h, and C-reactive protein (CRP) level was 11.1 mg/L.

Despite aggressive management, progressive soft-tissue destruction was noted. Given the persistence of infection, severity of soft-tissue loss and instability, and the overall frail clinical condition of the patient, revision to a static spacer was planned. A novel cement rod (K-nail) technique was used, with the construct fixed into the distal femur and proximal tibia using amphotericin B-impregnated cement.

Novel Surgical Management Technique – Knee Arthrodesis with Intramedullary Polymethylmethacrylate (PMMA) Cemented K-Nail Construct – Described by Author Dr Suresh Patil

Antimicrobial therapy was withheld prior to surgery to aid intraoperative microbiological diagnosis, and antifungal treatment was initiated only after obtaining adequate deep tissue and fluid samples. Following surgical exposure, the femoral, tibial, and patellar components were removed, and all residual cement was meticulously cleared. Extensive intraoperative soft-tissue destruction and bone loss were noted (Fig. 6a and b). An extensive synovectomy was performed, along with thorough debridement of necrotic bone and soft tissue until healthy bleeding tissue was encountered after tourniquet release. The femoral and tibial intramedullary canals were opened, and multiple intraoperative samples were obtained for fungal culture and histopathological examination. The canals were subsequently brush-irrigated to remove infected and devitalized material.

A cement-coated rod (K-nail) construct was then fashioned using a metallic rod of appropriate length to achieve stable intramedullary fixation within the femur and tibia while maintaining slight valgus and flexion alignment. Amphotericin



Figure 5: Radiological image: X-ray of the right knee in coronal (anteroposterior) view showing dislocation of the spacer with patellar dislocation.

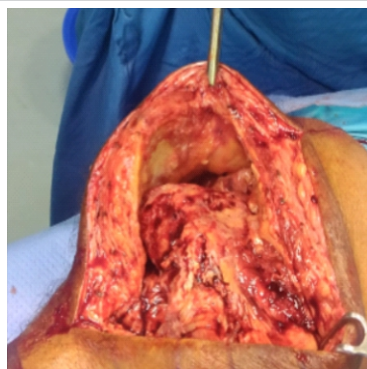


Figure 6a



Figure 6b

Figure 6: (a and b) Intraoperative images showing removal of the dynamic cement spacer and progressive soft tissue damage with arthrotomy rupture.

B-impregnated PMMA cement was hand-mixed and applied once a suitable working consistency was achieved. The rod was inserted retrograde into the femur and antegrade into the tibia, ensuring central positioning across the knee joint.

Additional antifungal-loaded cement was applied around the rod within the metaphyseal regions of the femur and tibia to enhance construct stability and provide high local antifungal delivery. A flat cement spacer was molded within the joint space to minimize soft-tissue adherence and facilitate potential future exposure. Limb alignment and distraction were maintained until complete cement polymerization, with continuous saline irrigation used to limit thermal injury and protect posterior neurovascular structures.

After cement hardening, the construct was found to be stable. Wound closure was performed over deep suction drains in layers, with satisfactory soft-tissue coverage achieved without undue tension. Post-operative radiographic imaging was performed, and a stable construct was noted (Fig. 7). Postoperatively, the patient was mobilized with assistive devices based on clinical stability and soft-tissue condition. Systemic antifungal therapy was continued under infectious disease guidance, with inflammatory markers monitored during follow-up. Intravenous micafungin 150 mg once a day for 6 months was advised. The biomarkers of the patient immediately postoperatively were as follows: CRP (4.2 mg/L), ESR (96 mm/h). On regular 3-monthly follow-up examinations, the patient demonstrated clinical improvement with reduction in pain and swelling and normalization of inflammatory markers, including CRP. At 3 months following surgery, the biomarkers for this patient were as follows: CRP (4.7 mg/L), ESR (34 mm/h). At 7 months following surgery, the biomarkers for this patient were as follows: CRP (4.2 mg/L), ESR (28 mm/h). At 1-year follow-up, the patient was able to perform a successful straight leg raise (Fig. 8).

Discussion

Fungal PJI and *C. viswanathii*

Fungal PJI is a rare but devastating complication of total knee arthroplasty and is associated with significant diagnostic delays and poor outcomes [7,8]. Approximately 90% of invasive candidiasis is caused by five common species (*Candida albicans*, *Candida tropicalis*, *Candida glabrata*, *Candida krusei*, and *Candida parapsilosis*). The incidence of PJI due to NAC species is rising and is often associated with aggressive local tissue destruction and marked antifungal resistance.

C. viswanathii is a rare pathogen, with limited literature describing its virulence, clinical manifestations, mycological properties, and management. First described in India in 1959 [11], the incidence of *C. viswanathii* remains sporadic. Most documented cases originate from South and Southeast Asia. The largest published case series of *C. viswanathii* infections, spanning 4 years in India, documented 23 cases [12]. A major challenge associated with *C. viswanathii* is accurate and timely diagnosis. Non-specific clinical presentation and low sensitivity of routine laboratory markers pose challenges in early recognition and treatment. A high index of suspicion is required even in immunocompetent individuals. Uncommon *Candida* species may be absent from routinely used laboratory databases, leading to delayed identification or inadequate therapy. Culture



Figure 7: Radiological image: X-ray of the right knee in coronal (anteroposterior) and sagittal (lateral) views showing the insertion of the static spacer using an intramedullary polymethylmethacrylate-cemented K-nail construct.



Figure 8: Clinical image showing the status of the patient at 1-year post-operative follow-up, showing the patient's ability to perform a successful straight leg raise test.

of multiple joint aspirates and intraoperative tissue samples remains the gold standard, while advanced identification techniques such as MALDI-TOF MS are crucial for detecting rare fungal organisms.

Data on the antifungal susceptibility of *C. viswanathii* (2015) are shown in Table 1 [12].

MALDI-TOF MS in identification of *C. viswanathii*

Uncommon organisms may be misidentified or remain unidentified unless expanded or custom reference libraries are used, including curated online resources such as MicrobeNet [1,2]. Although published data specifically addressing MALDI-TOF MS identification of *C. viswanathii* are limited, available reports suggest that this species can be distinguished from closely related taxa, such as *C. tropicalis*, when relevant spectra are present in the database [1,2]. MALDI-TOF MS has become an important tool in clinical mycology for rapid species-level identification of yeast isolates, including *Candida* species [13,14]. The technique identifies organisms by analyzing characteristic protein spectra from cultured isolates and matching them with reference databases, allowing timely species-level identification in routine practice. While this tool demonstrates high accuracy for common *Candida* species when appropriate reference spectra are available, identification of rare or emerging species may be limited by incomplete database representation (Fig. 9) [15].

This highlights the value of MALDI-TOF

MS in recognizing rare fungal pathogens in prosthetic joint infections, provided adequate reference data are available, and underscores the importance of correlating microbiological findings with clinical and operative features.

Susceptibility of *C. viswanathii* to antimicrobial therapy

C. viswanathii has been associated with elevated minimum inhibitory concentrations to fluconazole, increasing the risk of treatment failure with routine antifungal drugs [12]. Resistance or reduced susceptibility to commonly used antifungals may contribute to persistent infection, invasive disease, and potential nosocomial transmission, particularly in vulnerable populations. These factors highlight the importance of maintaining a high index of suspicion for persistent invasive infections not responding to antibiotic therapy, prompting early and precise mycological diagnosis combined with antifungal susceptibility testing. Prompt recognition of resistance patterns allows timely modification of antifungal regimens, which is crucial for optimizing outcomes and preventing complications [7,8].

Management of chronic fungal PJI remains challenging due to delayed diagnosis, aggressive local tissue destruction, and high rates of recurrence. Persistent intramedullary infection, soft-tissue destruction, and failure of staged debridement and spacer placement precluded reimplantation with a revision prosthesis. Knee arthrodesis thus remained a pragmatic and effective limb salvage strategy. Intramedullary fixation using cemented (PMMA) "K-nail" constructs provides stability, allows early ambulation, and facilitates canal debridement and high local delivery of antimicrobial agents, which is crucial for clearing

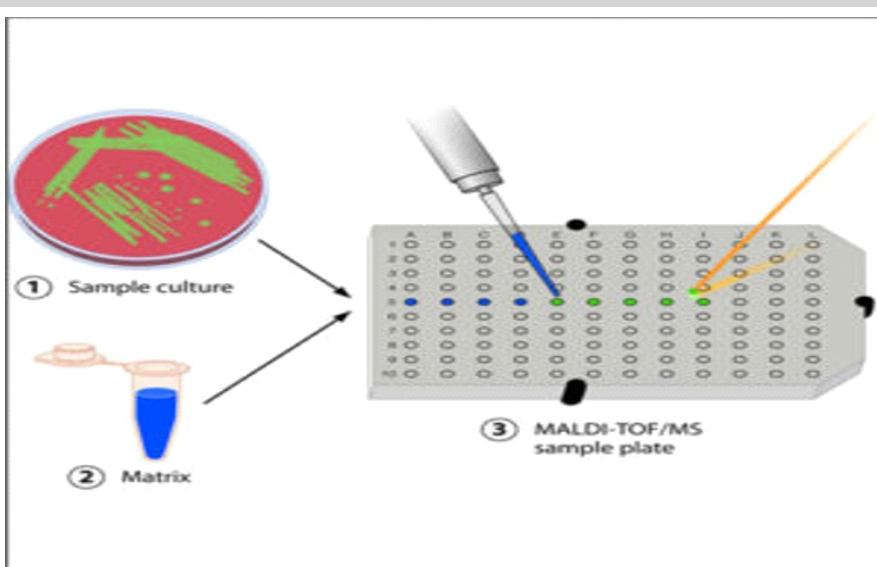


Figure 9: Demonstrating apparatus and technique for matrix-assisted laser desorption ionization–time-of-flight mass spectrometry.

Table 1: Demonstrating antifungal susceptibility of *Candida viswanathii* through minimum inhibitory concentration (MIC) range for various antifungal agents

Organism/Year (n)	Antifungal agent	MIC range	MIC ₅₀	MIC ₉₀
<i>Candida viswanathii</i> 2015 (n=16)	Amphotericin B	0.06–0.25	0.125	0.25
	Itraconazole	0.03–1	0.25	0.25
	Fluconazole	0.5–64	64	64
	Voriconazole	0.03–8	1	2
	Micafungin	0.125	0.125	0.125
	Caspofungin	0.125–1	0.5	0.5
	Anidulafungin	0.125–1	0.5	1
	Posaconazole	0.0321–0.5	0.25	0.25

persistent intramedullary fungal pathogens. Amphotericin B remains the most commonly recommended agent for local delivery due to its broad antifungal spectrum and heat-stable characteristics. Fusion rates are comparable – reported between 70% and 90% in chronically infected total knee arthroplasty. The use of a cement rod arthrodesis construct in our case allowed effective infection control while maintaining limb length and alignment, despite extensive soft-tissue compromise and failure of initial spacer-based management. Our case further supports the role of this technique as a definitive second-stage procedure following unsuccessful initial revision in rare and aggressive fungal infections.

Conclusion

Fungal PJI caused by *C. viswanathii* is extremely rare and poses significant diagnostic and therapeutic challenges. This case emphasizes the importance of maintaining a high index of suspicion in persistent or culture-negative PJIs. Advanced microbiological identification using MALDI-TOF MS assay, aggressive surgical management, antifungal-loaded cement, and prolonged systemic antifungal therapy are essential for successful outcomes.

Clinical Message

Persistent or culture-negative periprosthetic knee joint infections should prompt consideration of rare fungal pathogens, including *C. viswanathii*, especially in frail elderly patients. Early use of advanced diagnostic tools such as MALDI-TOF MS requires state-of-the-art laboratories, microbiological expertise, and reference databases for accurate identification and targeted antifungal therapy. In cases with severe soft-tissue compromise or failed revision surgery, antifungal-loaded cement knee arthrodesis using a novel fusion technique can serve as an effective limb-salvage strategy.

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

Conflict of interest: Nil **Source of support:** None

References

- Centers for Disease Control and Prevention (CDC). MicrobeNet: Bacterial and Fungal Identification Database. Available from: <https://www.cdc.gov/microbenet/> [Last accessed on 2026 Oct 12].
- Bader O. MALDI-TOF-MS-based species identification and typing approaches in medical mycology. *Proteomics* 2013;13:788-99.
- Anagnostakos K, Kelm J, Schmitt E, Jung J. Fungal periprosthetic hip and knee joint infections: Clinical experience with a 2-stage treatment protocol. *J Arthroplasty* 2012;27:293-8.
- Marra F, Robbins GM, Masri BA, Duncan C, Wasan KM, Kwong EH, et al. Amphotericin B-loaded bone cement to treat osteomyelitis caused by *Candida albicans*. *Can J Surg* 2001;44:383-6.
- 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.
- Conway JD, Mont MA, Bezwada HP. Arthrodesis of the knee. *J Bone Joint Surg Am* 2004;86:835-48.
- 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. *Acta Orthop* 2013;84:517-23.



8. 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.
9. Ramamohan N, Zeineh N, Grigoris P, Butcher I. *Candida glabrata* infection after total hip arthroplasty. *J Infect* 2001;42:74-6.
10. Phelan DM, Osmon DR, Keating MR, Hanssen AD. 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.
11. Randhawa HS, Mishra SK, Damodaran VN, Prakash A, Chowdhary A, Khan ZU. Pathogenicity of *Candida viswanathii* for normal and cortisone-treated mice. *J Mycol Med* 2015;25:287-92.
12. Shankarnarayan SA, Rudramurthy SM, Chakrabarti A, Shaw D, Paul S, Sethuraman N, et al. Molecular typing and antifungal susceptibility of *Candida viswanathii*, India. *Emerg Infect Dis* 2018;24:1956-8.
13. Marklein G, Josten M, Klanke U, Müller E, Horré R, Maier T, et al. Matrix-assisted laser desorption ionization-time of flight mass spectrometry for fast and reliable identification of clinical yeast isolates. *J Clin Microbiol* 2009;47:2912-7.
14. Dhiman N, Hall L, Wohlfiel SL, Buckwalter SP, Wengenack NL. Performance and cost analysis of matrix-assisted laser desorption ionization-time of flight mass spectrometry for routine identification of yeast. *J Clin Microbiol* 2011;49:1614-6.
15. Sendid B, Ducoroy P, François N, Lucchi G, Spinali S, Vagner O, et al. Evaluation of MALDI-TOF mass spectrometry for the identification of medically important yeasts in the clinical laboratories of Dijon and Lille hospitals. *Med Mycol* 2013;51:25-32.

Conflict of Interest: Nil
Source of Support: Nil

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

How to Cite this Article

Joshi S, Patil S, Kulkarni M, Shaligram M, Muthiah S, Joshi R. First Reported Case of Periprosthetic Fungal Knee Joint Infection Caused by *Candida viswanathii*: A Case Report. *J Orthop Case Rep*. 2026 November;16(11):92-98. doi: 10.13107/jocr.2026.v16.i11.8400.

