



Fungal Periprosthetic Joint Infection in Total Knee Arthroplasty - Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. Author VM designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors VSG, NOG and AW managed the analyses of the study. Author AA managed the literature searches. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Introduction: Fungal prosthetic joint infection (PJI) is a rare but devastating complication following total knee arthroplasty. We are reporting a case of prosthetic joint infection caused an emerging resistant yeast pathogen.–Candida auris which was successfully treated by a staged revision TKR and antifungal bead insertion and had a good clinical outcome. Resection arthroplasty with delayed re-implantation (two-stage revision) combined with specific culture directed antifungal therapy and supportive care can be used to successfully treat such serious infections.

Aim of Article: Our aim is to ascertain the importance of looking for a fungal source of on infection in all failed knee replacement so that effective treatment can be started early.

Case: 70 yr old male presented with pain and swelling left knee for 1 year. TKR was done in a staged manner left first followed by right. He underwent Two-stage revision TKR. On evaluation he was diagnosed to have infection of left knee prosthesis and was planned on Revision TKR (Staged). Although he improved clinically, he had reactivation of infection and ended up in arthrodesis of knee joint.

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Conclusion: Two-stage revision TKR with appropriate antimicrobial treatment can give good results in patients with a fungal PJI. Fungal etiology should be considered in patients with negative cultures or if host immunity is compromised. The present case also highlights the need for more studies and evidence-based recommendations in the management of fungal PJI especially with respect to dosing and duration of therapy.

Keywords: Prosthetic joint infection; *Candida auris*; TKR.

1. INTRODUCTION

Prosthetic joint infections [PJI] are complex debilitating complication among which fungal infections are rare. Phelan et al. reported the primary case of candida PJI in 1979 [1]. *Candida Albicans* is the commonest pathogenic fungus, we are reporting a case of *Candida auris* fungal infection in a prosthetic knee. PJI due to *Candida spp* is rare and offers a treatment challenge as no specific treatment guidelines have been established or published and case reports vary widely in therapeutic approach.

2. CASE PRESENTATION

70 yr old male presented with pain and swelling left knee for 1 year. He had pain both knees (Left >Right), diagnosed to have osteoarthritis both knees for which. Bilateral TKR (total knee replacement) was done in a staged manner at outside hospital. Three months following which he developed pain and swelling in the left knee. The knee joint was aspirated and found to be normal, but pain and swelling persisted. He underwent debridement and washout for the same and intraop cultures were negative. But

since the swelling and pain persisted and purulent aspirate was obtained subsequently, he was diagnosed to have infection of left knee prosthesis and was planned on Revision TKR (Staged).

He underwent stage 1 revision at nearby hospital and presented to us 2 weeks (Fig. 1) after stage 1 with pain and swelling over the knee. The intra op cultures performed at nearby hospital during stage 1 was MRSA (Methicillin-resistant *Staphylococcus aureus*). We aspirated the knee joint and send for culture and sensitivity, which was sterile and he was advised to continue the antibiotics started from nearby hospital after consultation with the infectious disease department. [Inj Teichoplanin 400 mg 1-0-1 x 4 weeks followed by tab Linezolid 600 mg 1-0-1 x 2 weeks] and was given for 2 months in total He is a known diabetic on treatment since 30 yrs. On examination: left knee there was gross swelling with no local rise of temperature Healed scar was present over anterior aspect of knee. There was gross limitation of movement with no distal neuro vascular deficit Right knee there was healed scar present no swelling, no limitation of movement and was normal clinically.



Fig. 1. Pre op X ray – with spacer *in situ*

He underwent stage II revision TKR left under epidural anesthesia on (BP hinge implants), (Fig. 2) intra operative cultures were taken which showed growth of *Candida auris*, (Fig. 3) for which antifungal susceptibility testing of the isolate revealed a high level of resistance with fluconazole, voriconazole and was only susceptible against caspofungin. Considering the susceptibility and lack of guidelines for management of *Candida auris* PJI, it was decided to treat the infection with a high dose of caspofungin. There was improvement in wound with antifungal treatment wound was healing ,but he got secondary wound soakage after 2 weeks he underwent wound debridement and anti fungal [Amphotericin B] stimulan insertion after 4 weeks. Intra op cultures yielded heavy growth of *Klebsiella spp* sensitive to meropenam. Sensitive antibiotics were started and wound improved; soakage reduced. Sutures were removed after 2 weeks. Antifungal (Caspofungin) and antibiotics (Septran DS) were given for 2 months. Knee range of movements improved (Fig. 4) Repeat cultures from the knee was sterile. Wound

healed well He was doing well on further follow up (Fig. 5) and was leading a normal life but 1.5 year later he started having pain and swelling again on the left knee which on evaluation was found to have infection and underwent arthrodesis at outside center.

3. DISCUSSION

Fungal prosthetic joint infections are rare. Its known to occur in immunocompromised patients. *C.albicans* is the most common cause for fungal PJI reported in English literature [2]. No extra articular source of *Candidal* infection was identified in our case. Debridement with successful retention of the implants and suppressive antifungal therapy has been reported [3]. In few initial reports, surgeons performed debridement and resection arthroplasty alone, but this led to poor functional outcomes [3]. Delayed reimplantation offers the best chance to a successful functional outcome [1,2,3,]. We followed the same protocol and performed a staged revision arthroplasty.

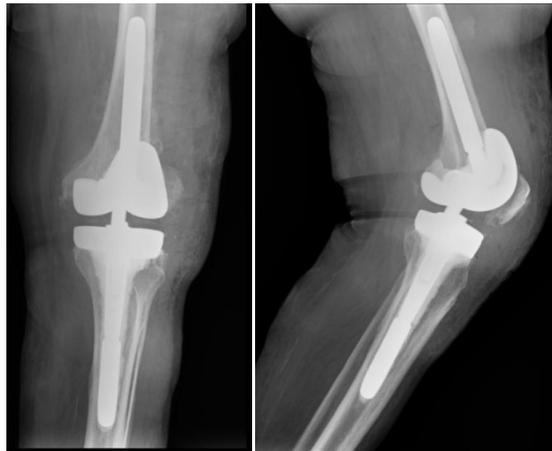


Fig. 2. Post op x-ray left knee



Fig. 3. Candida Auris growth from the patient and gram stain



Fig. 4. Clinical picture 1-year post surgery



Fig. 5. X-ray bilateral Knee at 1 year follow up

It is evident from several studies published recently [4] that *C. auris* in routine microbiology laboratories remains an emerging pathogen, which is often misdiagnosed or undiagnosed. About 90% of the isolates characterized by commercial biochemical identification systems are misidentified primarily because of a lack of the yeast in their databases [4].

The first 3 cases of nosocomial fungemia due to *C. auris* reported in 2011 from South Korea highlighted the fact that this yeast is commonly misidentified as *C. haemulonii* and *Rhodotorula glutinis* by the commercial identification systems VITEK (BioMérieux, Marcy l'Etoile, France) and API-20C AUX (BioMérieux), respectively [5].

Patients with *C. auris* infections have risk factors similar to those of other *Candida* spp. infections, including abdominal surgery (25%–77%), broad-spectrum antibiotics (25%–100%), ICU admission (58%), diabetes mellitus (18%),

presence of central venous catheters (25%–94%), and malignancies (11%–43%) [3,6].

The primary challenge in combating *Candida auris* infection is the multi drug resistance of the organism to the commonly used antifungals, and the secondary bacterial infection which can occur, as of our case which was secondarily infected by *Klebsiella species*. One *in vitro* study on fungal biofilm has shown *C. albicans* producing more biofilm than *Candida parapsilosis*, *Candida glabrata* and *C. tropicalis*. These films have rapidly developed resistance [7].

The mainstay of treatment in such cases would be a staged TKR with re debridement and culture driven antimicrobial therapy, repeat evaluation, ensuring immune competence of the patient by adequate blood sugar control and proper supportive care until the wound heals preventing complications like septic loosening and implant failure. Although the chances of reactivation of infection is high and majority of cases end up in arthrodesis.

4. CONCLUSION

Staged revision TKR with appropriate antimicrobial treatment can give good results in patients with a fungal PJI. Fungal cause of infection should be considered in patients with negative bacterial cultures or if host immunity is compromised. Obtaining the appropriate cultures and timing of re implantation are essential for a successful outcome. It has been recommended that in cases of PJI with unusual or virulent organisms, the period between resection and reimplantation should be prolonged [8].

Even with appropriate antifungal there was high chance of reactivation of infection and finally ending up in arthrodesis of the joint. Correction of nutritional and laboratory status should also be made in order to optimize host immunity before and after treatment of this group of patients.

Diagnostic criteria and management guidelines need to be established. As per studies [9] resection arthroplasty with antifungal therapy followed by delayed reimplantation offers the best possible result [9]. Despite this, further modalities of treatment including options during 1st stage of revision TKA, the choice and total duration of antifungal therapy and time of reimplantation needs to be explored. Dutronc et al. [10] reported the need for amputation for control of fungal infection was around 16%. If

timely intervention are taken dreaded complications like amputation for control of infection can be avoided.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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