

Uncommon Pathogen: *Achromobacter xylosoxidans* Infection Following Total Knee Arthroplasty

Mukund Madhav Ojha¹, Mohd. Akhtar Ali Ansari¹, Ritvik Janardhanan¹, Vijay Kumar¹

Learning Point of the Article:

Achromobacter xylosoxidans is a pathogen capable of causing prosthetic joint infection even in immunocompetent patients.

Abstract

Introduction: *Achromobacter xylosoxidans* is an uncommon opportunistic organism, mainly causing infection in immune-compromised hosts. *A. xylosoxidans* is a non-fermenting Gram-negative bacillus. Being closely associated with *Alcaligenes* species was also called *A. xylosoxidans*.

Case Report: A few cases of periprosthetic infection by *A. xylosoxidans* have been reported outside India. A periprosthetic infection with *A. xylosoxidans* following a total knee arthroplasty is reported in a female.

Conclusion: *A. xylosoxidans* is a pathogen capable of causing prosthetic joint infection even in immunocompetent patients. Thorough debridement and appropriate antibiotic treatment is essential for the success of revision surgery.

Keywords: Prosthetic joint infection, total knee arthroplasty, *Achromobacter xylosoxidans*.

Introduction

Achromobacter xylosoxidans is an uncommon opportunistic organism, mainly causing infection in immune-compromised hosts. *A. xylosoxidans* is a non-fermenting Gram-negative bacillus. Being closely associated with *Alcaligenes* species was also called as *Alcaligenes xylosoxidans* [1]. First identified and described by Yabuchi and Ohya in 1971 from seven cases of chronic otitis media, it belongs to the family alcaligenaceae and genus *achromobacter* [2], with two subspecies, namely *xylosoxidans*, and *denitrificans*. Few cases of periprosthetic infection by *A. xylosoxidans* have been reported outside India [3]. Here is a case of periprosthetic infection with *A. xylosoxidans* following a total knee arthroplasty is reported in a female.

Case Report

A 61-year-old non-diabetic, non-hypertensive female was admitted complaining of pain, swelling, and pus discharge from her right knee. She was operated on outside our institute for bilateral knee end-stage arthritis with bilateral total knee arthroplasty (TKA) done 1 year ago. She underwent debridement and liner exchange 2 months back for an infected right TKA outside our institute. On pre-operative physical examination, the thigh and calf muscles were wasting, and a healed surgical scar with one discharging sinus with seropurulent discharge in the infrapatellar region was present.

Pre-operative x-rays of the right knee show loosening of tibial and femoral components (Fig. 1). Blood investigations were done showing raised erythrocyte sedimentation rate (ESR) and C-

Access this article online

Website:
www.jocr.co.in

DOI:
<https://doi.org/10.13107/jocr.2024.v14.i05.4422>

Author's Photo Gallery



Dr. Mukund Madhav Ojha



Dr. Mohd. Akhtar Ali Ansari



Dr. Ritvik Janardhanan



Dr. Vijay Kumar

¹Department of Orthopaedic, AIIMS, New Delhi, India.

Address of Correspondence:

Dr. Mukund Madhav Ojha,
Department of Orthopaedic, AIIMS, New Delhi, India.
E-mail: mukund1203@gmail.com

Submitted: 12/02/2024; Review: 26/03/2024; Accepted: April 2024; Published: May 2024

DOI: <https://doi.org/10.13107/jocr.2024.v14.i05.4422>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License <https://creativecommons.org/licenses/by-nc-sa/4.0/>, 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



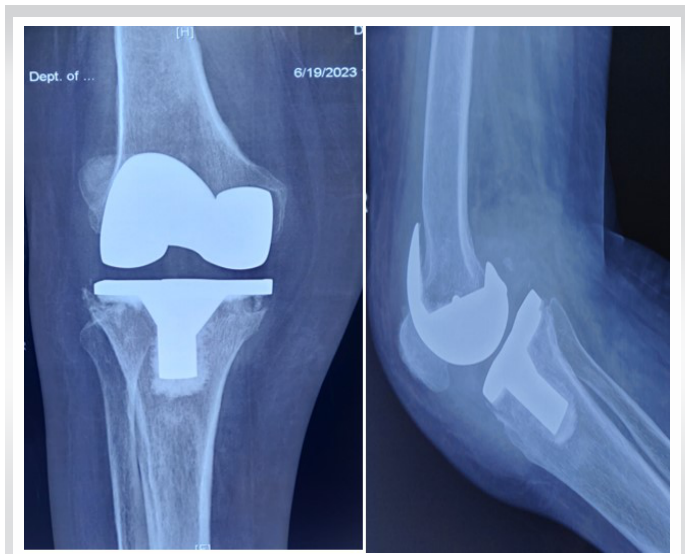


Figure 1: Pre-operative radiograph with loosening of total knee arthroplasty implant.

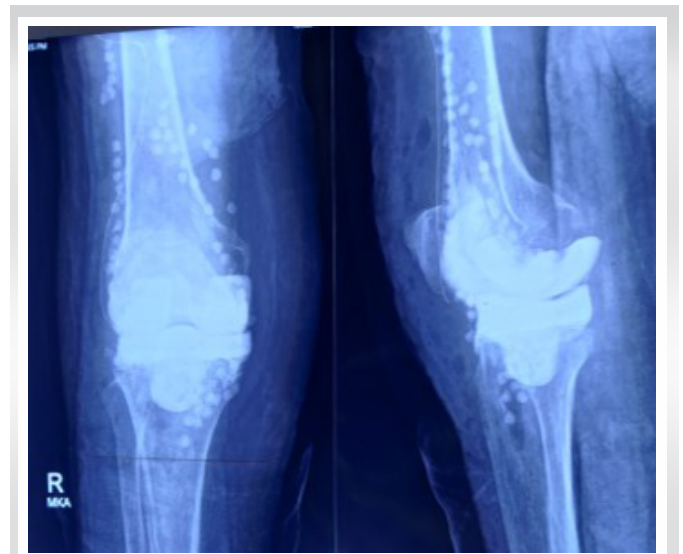


Figure 2: Post-operative radiograph with articulating spacer and calcium sulfate pellets.

reactive protein (CRP) levels and raised total leukocyte count (TLC). Synovial fluid analysis shows increased leukocyte numbers and more than 90% of neutrophils. Under the impression of deep prosthesis infection, a two-stage revision TKA operation was planned, and the patient underwent Stage I revision of the right TKA. Antibiotics were stopped 2 weeks before Stage I surgery to increase the efficacy of culture results.

TKA prosthesis removal was done with debridement and irrigation with a temporary articulating knee cement spacer with antibiotics (vancomycin 1 g + colistin 1 MIU) and calcium sulfate pellets application (Fig. 2). Extracted implants were sent for sonication, synovial fluid specimens, and five deep tissue samples from the medial and lateral gutter, posterior capsule, and supra and infrapatellar region were taken and divided into two and sent for aerobic and anaerobic cultures at the time of debridement. The patient was mobilized postoperatively with a knee ROM brace. Postoperatively alternate day basis, ESR and CRP were done and showed a decreasing trend. The operative specimen's implants and synovial tissue cultures revealed *A. xylosoxidans* as the causative organism. The patient then received intravenous antibiotics (cefoperazone + sulbactam 2 g iv BD) according to the results of the antibiotic sensitivity testing and after consulting with the infectious department medical team. Clinically, the knee was cool, non-tender, and showed no external signs of infection. The CRP decreased after treatment with cefoperazone + sulbactam, pain, and wound discharge improved and the patient was planned for 6-week IV antibiotics coverage. The patient underwent Stage II revision after 8 weeks when CRP and ESR were within normal limits.

After 3 months of follow-up, patient is doing well with no local and systemic signs and symptoms of infections (Fig. 3).

Discussion

A. xylosoxidans is a Gram-negative bacillus widespread in the natural environment [4]. It is an opportunistic human pathogen. Those whose immune response is weakened or who have underlying diseases linked to immunodeficiency are particularly vulnerable [5]. A review of the literature identified one case of septic arthritis caused by this organism after TKA. In this case, the patient had rheumatoid arthritis and was on high doses of prednisone, both conditions contributing to a weakened immune system [6]. A rare case of *A. xylosoxidans* septic arthritis in immunocompetent child patients has been reported in India. *A. xylosoxidans* is a rarer etiology of septic arthritis in pediatric patients [7]. The most familiar invasive manifestations of *A. xylosoxidans* are pneumonia, device-related infections, and primary uncomplicated bacteremia. Eshwara et al. have reported the first pancreatic pseudocyst report and local wound infection of metastatic ductal carcinoma due to *A. xylosoxidans* [1] and perinephric abscess case is reported by Vinod et al., from India [8]. A case of *A. xylosoxidans* septic arthritis was found in adult that too in immunocompromised systemic lupus erythematosus patients [9]. In our case, the synovial fluid culture might have been falsely negative because antibiotics were used before the joint aspiration from outside the institute. In addition, the value of microbiological cultures for diagnosing late periprosthetic infections is limited, standard methods may fail to detect



Figure 3: 3-month follow-up radiograph.

biofilm-forming sessile or other fastidious slow-growing bacteria [10]. *A. xylosoxidans* strains frequently resistant to

aminoglycosides, ampicillin, 1st and 2nd-generation cephalosporins, and chloramphenicol. However, they typically respond to anti-pseudomonas third-generation cephalosporins, carbapenems, and trimethoprim-sulfamethoxazole [11].

Conclusion

This case demonstrates that *A. xylosoxidans* is a pathogen capable of causing prosthetic joint infection even in immunocompetent patients and implies that to cure the infection of late stage, removal of implant, thorough debridement and appropriate antibiotic treatment are essential for the success of revision surgery.

Clinical Message

Uncommon pathogens like *A. xylosoxidans* can also lead to periprosthetic joint infection.

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

- Eshwara VK, Mukhopadhyay C, Mohan S, Prakash R, Pai G. Two unique presentations of *Achromobacter xylosoxidans* infections in clinical settings. *J Infect Dev Ctries* 2011;5:138-41.
- Yabuuchi E, Yano I, Goto S, Tanimura E, Shiito T, Ohyama A. Description of *Achromobacter xylosoxidans* Yabuuchi and Ohyama 1971. *Int J Syst Evol Microbiol* 1974;24:470-7.
- Taylor P, Fischbein L. Prosthetic knee infection due to *Achromobacter xylosoxidans*. *J Rheumatol* 1992;19:992-3.
- Reverdy ME, Freney J, Fleurette J, Coulet M, Surgot M, Marmet D, et al. Nosocomial colonization and infection by *Achromobacter xylosoxidans*. *J Clin Microbiol* 1984;19:140-3.
- Ramos JM, Domine M, Ponte MC, Soriano F. Bacteremia caused by *Alcaligenes (Achromobacter) xylosoxidans*. Description of 3 cases and review of the literature. *Enferm Infecc Microbiol Clin* 1996;14:436-40.
- Lee SC, Nam CH, Park IS, Yoon JY, Jung KA, Hwang SH. *Achromobacter xylosoxidans* infection following total knee arthroplasty. *J Korean Orthop Assoc* 2014;49:385-8.
- Suryavanshi TK, Lalwani SK. Uncommon pathogen: Serious manifestation: A rare case of *Achromobacter xylosoxidans* septic arthritis in immunocompetent patient. *Indian J Pathol Microbiol* 2015;58:58-3.
- Vinod V, Kumar A, Sanjeevan KV, Dinesh KR, Karim S. Perinephric abscess due to *Achromobacter xylosoxidans* following de-roofing of renal cyst. *Surg Infect (Larchmt)* 2013;14:422-3.
- San Miguel VV, Lavery JP, York JC, Lisse JR. *Achromobacter xylosoxidans* septic arthritis in a patient with systemic lupus erythematosus. *Arthritis Rheum* 1991;34:1484-5.
- Schäfer P, Fink B, Sandow D, Margull A, Berger I, Frommelt L. Prolonged bacterial culture to identify late periprosthetic joint infection: A promising strategy. *Clin Infect Dis* 2008;47:1403-9.

11. Gales AC, Jones RN, Andrade SS, Sader HS. Antimicrobial susceptibility patterns of unusual nonfermentative gram-negative bacilli isolated from Latin America: Report from the

SENTRY antimicrobial surveillance program (1997-2002). Mem Inst Oswaldo Cruz 2005;100:571-7.

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

Ojha MM, Ansari MAA, Janardhanan R, Kumar V. Uncommon Pathogen: *Achromobacter xylosoxidans* Infection Following Total Knee Arthroplasty. Journal of Orthopaedic Case Reports 2024 May;14(5):28-31.