

# Severe Metallosis-Induced Osteolysis and Polyethylene Liner Dissociation as a Cause of Total Knee Replacement Failure

Jipin Gopi<sup>1</sup>, Abdulla Harafan<sup>1</sup>, Shisham Hashim Roshan<sup>1</sup>, M Aswin Ravindran<sup>1</sup>, Adarsh<sup>1</sup>, N R Fijad<sup>1</sup>

## Learning Point of the Article:

Metallosis-related osteolysis, though rare in knees, should be considered in patients with long-standing prostheses presenting with instability, swelling, and pain. Early revision surgery with synovectomy prevents catastrophic implant failure.

## Abstract

**Introduction:** Metallosis is a rare but recognized complication following total knee replacement (TKR). It is characterized by metallic particle deposition within periprosthetic tissue, triggering chronic inflammation, progressive osteolysis, and implant loosening.

**Case Report:** A 63-year-old female with bilateral TKRs, performed 12 and 15 years earlier, presented with pain, swelling, and restricted flexion of the right knee following a fall. She had a history of recurrent instability and locking for 3 years. Imaging revealed extensive osteolysis, polyethylene liner dissociation, and loosening of the tibial component. She underwent one-stage revision with implant removal, synovectomy, and implantation of a constrained modular revision prosthesis. Postoperatively, she showed stable function without recurrence.

**Conclusion:** Although uncommon in knee arthroplasty, metallosis can lead to catastrophic implant failure if undetected. Timely recognition and revision surgery with thorough synovectomy are essential to restore function and prevent further bone loss.

**Keywords:** Metallosis, Osteolysis, Polyethylene liner dissociation, Total knee replacement failure, Revision arthroplasty

## Introduction

Metallosis refers to the deposition of metallic wear particles in periprosthetic tissues, most commonly seen in metal-on-metal hip prostheses but less frequently in total knee replacement (TKR) [1,2]. It is associated with chronic inflammation, synovitis, and osteoclastic bone resorption, which may culminate in aseptic loosening of implants [3,4].

In TKR, metallosis may develop due to polyethylene liner wear or dissociation, failure of metal-backed components, or trauma leading to direct metal-on-metal articulation [5,6,7]. We present a case of severe metallosis-induced osteolysis and polyethylene liner dissociation causing failure of TKR, managed successfully

with revision arthroplasty.

## Case Report

A 63-year-old female presented with pain, swelling, and reduced flexion in the right knee following a fall 2 months earlier. She also reported a 3-year history of recurrent instability, sudden locking, and restricted motion, which she occasionally relieved by self-manipulation. She had undergone bilateral TKR (left knee 15 years ago and right knee 12 years ago) using the Stryker Duracor system. At a local hospital, X-ray imaging, as shown in Figs. 1 and 2, revealed tibial component loosening, polyethylene liner dissociation, and marked osteolysis. Laboratory parameters

Access this article online

Website:  
[www.jocr.co.in](http://www.jocr.co.in)

DOI:  
<https://doi.org/10.13107/jocr.2026.v16.i01.6654>

## Author's Photo Gallery



Dr. Jipin Gopi



Dr. Abdulla Harafan



Dr. Shisham Hashim Roshan



Dr. M Aswin Ravindran



Dr. Adarsh



Dr. N R Fijad

<sup>1</sup>Department of Orthopaedics, Malabar Medical College, Kozhikode, Kerala, India.

### Address of Correspondence:

Dr. Abdulla Harafan,  
Department of Orthopaedics, Malabar Medical College, Men's Hostel Room No. F-18, Modakkallur, Kozhikode, Kerala, India.  
E-mail: abdullaharafan123@gmail.com

Submitted: 15/10/2025; Review: 20/11/2025; Accepted: December 2025; Published: January 2026

DOI: <https://doi.org/10.13107/jocr.2026.v16.i01.6654>

© 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:** There is osteolysis, dislocation, and implant loosening in the right knee, whereas the left knee appears normal in anteroposterior X-ray.



**Figure 2:** Dislocation is well noted in the lateral right knee X-ray, whereas the left knee appears normal.

(complete blood count, erythrocyte sedimentation rate, and C-reactive protein) were normal, excluding infection.

On admission to our center, she had persistent swelling and pain with restricted mobility. A one-stage revision TKR was performed, involving implant removal, extensive synovectomy, and reconstruction with a constrained modular revision system. Intraoperative images, as per Fig. 3, show metallic debris and a worn-out polyethylene liner, which gives us a diagnosis of metallosis. Post-operative radiographs confirmed stable implants without evidence of loosening, as shown in Fig. 4.

At follow-up, the patient reported resolution of pain and improved mobility, with no recurrence of instability.

## Discussion

Metallosis results from the accumulation of metallic wear debris within periprosthetic tissues, triggering a chronic inflammatory cascade mediated by cytokines such as interleukin (IL-1), IL-6, IL-8, and tumor necrosis factor- $\alpha$  [3, 8]. This immune reaction promotes synovitis, osteolysis, and progressive implant loosening. Although crepitus is a hallmark of hip prostheses, it is rarely described in knees [3].

In TKR, common etiologies include polyethylene liner wear, dissociation, or patellar component failure [6, 7]. Rader et al. observed metallosis in 7 of 30 cases with metal-backed patellae, and more than half also showed liner dissociation [6]. In our case, tibial liner dissociation led to direct metal-on-metal contact, accelerating wear and osteolysis.



**Figure 3:** Metallic debris, a worn-out polyethylene liner, gives us a diagnosis of metallosis.



**Figure 4:** Post-operative X-ray following revision total knee replacement of the right knee.

Management requires revision arthroplasty combined with meticulous synovectomy, since conservative measures are ineffective [9]. Alternative prosthetic materials, such as oxinium, have been introduced to reduce metallic ion release and limit hypersensitivity reactions [10].

**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

1. Wigren A, Fischer T. Allergic cobalt reaction (metallosis) following knee arthroplasty with vitallium endoprosthesis ad modum Walldius (author's transl). *Z Orthop Ihre Grenzgeb* 1975;113:273-4.
2. Pritchett JW. Metallosis of the resurfaced hip. *Orthopedics* 2005;28:869-72.
3. Rader CP, Löhr J, Wittmann R, Eulert J. Results of total knee arthroplasty with a metal-backed patellar component. A 6-year follow-up study. *J Arthroplasty* 1996;11:923-30.
4. Sculco TP, Greenfield R, Walter RD. Metallosis after total knee replacement: Radiological-pathological conferences of the Massachusetts general hospital. *Radiology* 1998;208:345-8.
5. McGovern TF, Moskal JT. Radiographic evaluation of periprosthetic metallosis after total knee arthroplasty. *J South Orthop Assoc* 2002;11:18-24.
6. Chang JD, Lee SS, Hur M, Seo EM, Chung YK, Lee CJ. Revision total hip arthroplasty in hip joints with metallosis: A single-center experience with 31 cases. *J Arthroplasty* 2005;20:568-73.
7. Niki Y, Matsumoto H, Otani T, Tomatsu T, Toyama Y. Five types of inflammatory arthritis following total knee arthroplasty. *J Biomed Mater Res A* 2007;81:1005-10.
8. Romesburg JW, Wasserman PL, Schoppe CH. Metallosis and metal-induced synovitis following total knee arthroplasty: Review of radiographic and CT findings. *J Radiol Case Rep* 2010;4:7-17.
9. Schiavone Panni A, Vasso M, Cerciello S, Maccauro G. Metallosis following knee arthroplasty: A histological and immunohistochemical study. *Int J Immunopathol Pharmacol* 2011;24:711-9.
10. Viveganathan B, Shah R, Karuppiah AS, Karuppiah SV. Metallosis in a total knee arthroplasty. *BMJ Case Rep* 2014;2014:bcr2013202801.
11. Sharareh B, Phan DL, Goreal W, Schwarzkopf R. Metallosis presenting as knee pain 26 years after primary total knee

Our case reinforces the importance of vigilance even years after primary arthroplasty, as delayed metallosis-related osteolysis can compromise outcomes [4,11,12,13].

## Conclusion

Severe metallosis following TKR is uncommon but can cause rapid osteolysis and catastrophic implant failure. Long-term surveillance of TKR patients is essential. Revision with thorough synovectomy and prosthetic replacement remains the definitive management.

## Clinical Message

Metallosis should be suspected in patients with late-onset pain, instability, and swelling after TKR. Revision surgery is the only effective treatment to prevent further destruction and restore function.

arthroplasty. *J Orthop Case Rep* 2015;5:62-5.

12. La Verde L, Fenga D, Spinelli MS, Campo FR, Florio M, Rosa MA. Catastrophic metallosis after tumoral knee prosthesis failure: A case report. *Int J Surg Case Rep* 2017;30:9-12.

13. Patel V. Metallosis following knee arthroplasty: A case report and review of literature. *J Clin Orthop Trauma* 2019;10:785-9.

**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**

Gopi J, Harafan A, Roshan SH, Ravindran MA, Adarsh, N R Fijad. Severe Metallosis-Induced Osteolysis and Polyethylene Liner Dissociation as a Cause of Total Knee Replacement Failure. *Journal of Orthopaedic Case Reports* 2026 January;16(01): 208-211.

