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Catastrophic Full Thickness Wear of Oxinium Knee Implants: A Case Report and Analysis of Failure Mechanisms

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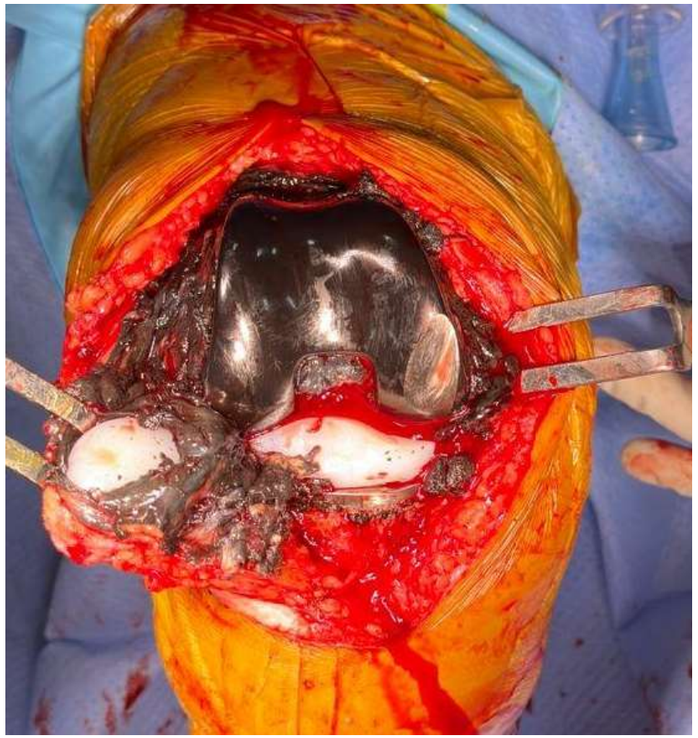
Faculty Disclosure Information

- Nothing to disclose

Background

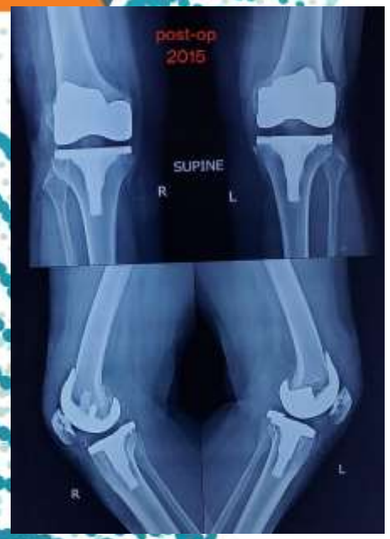
- Oxinium (oxidized zirconium) implants
  - For patients with metal hypersensitivity
  - Improved wear resistance in knee arthroplasty
- Multiple reports of catastrophic wear
- Mechanism of failure not clear



Case Report – History and Presentation

- 63-year-old female,
- 9 years post bilateral knee arthroplasty with oxinium implants.
- Symptoms: Progressive right knee pain and instability starting 2 years post-surgery.
- Radiographs: Medial joint space narrowing and metal debris suggestive of metallosis

Sequential Xrays



2015

2017

2023

2024

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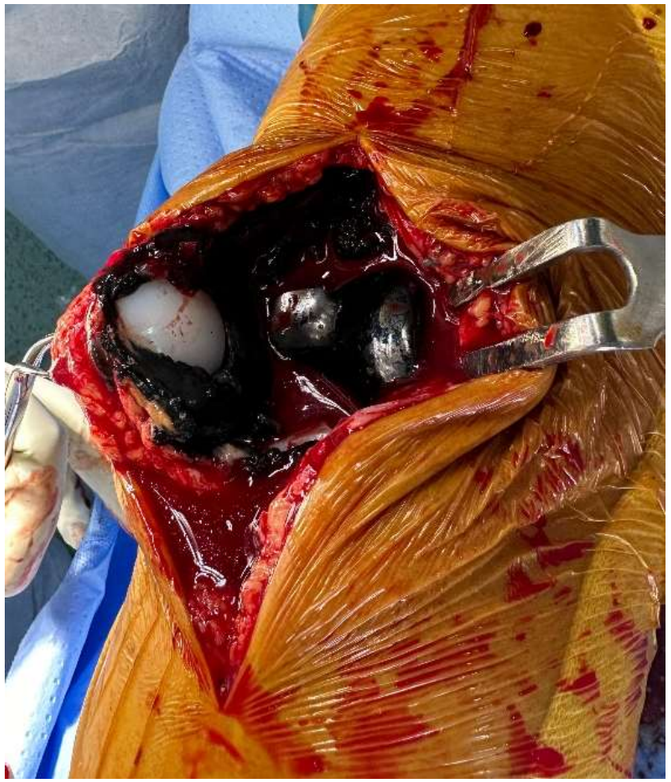
Intraoperative Findings

- Complete polyethylene wear on postero-medial aspect.
- Scratched oxinium surface.
- Black metallosis throughout joint.



Mechanism of Failure

1. Polyethylene Wear:
   - Led to metal-on-metal articulation
2. Edge Loading:

- Scratched the oxinium surface

- Exposed softer zirconium core

3. Metallosis:

- Triggered inflammation, causing synovitis and bone loss

4. Surgical Technique and Implant Design:

- Possible improper polyethylene seating.

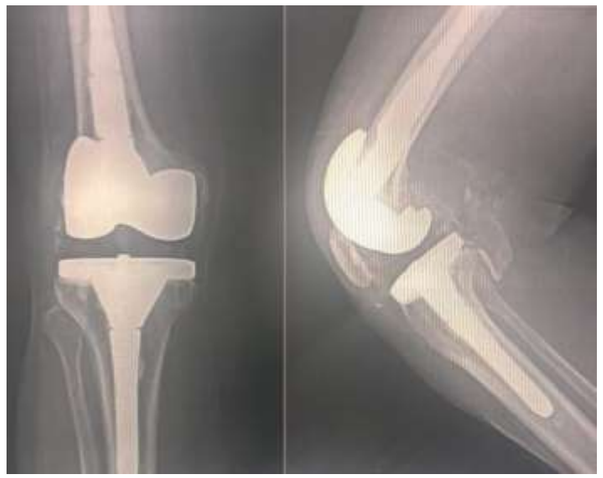
- Unbalanced gaps contributed to early failure

Revision Surgery and Outcome

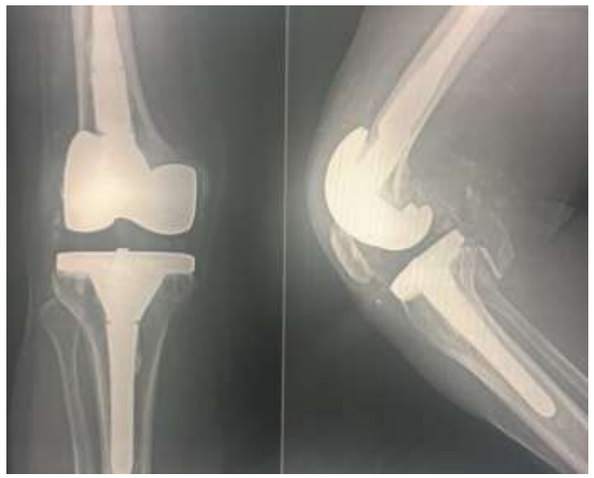
- LCCK-like implant used with distal and posterior femoral augments
- All visible metallosis debrided except posterior recess
- Patient allowed full weight bearing from day 1
- At 6 months: 0-70° ROM, no pain or instability
- At 1 year: 0-80° active ROM, 0-110 ° passive ROM, no pain or instability

Post operative Xrays

Immediate Post-op

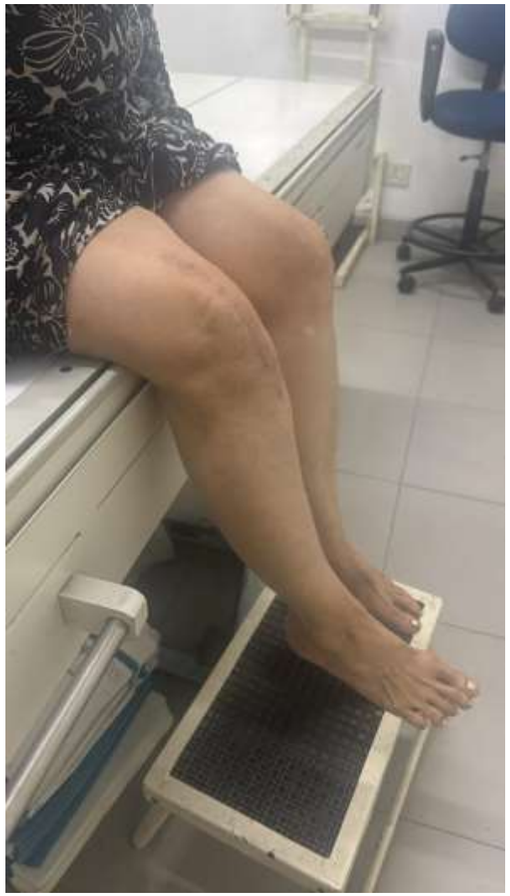


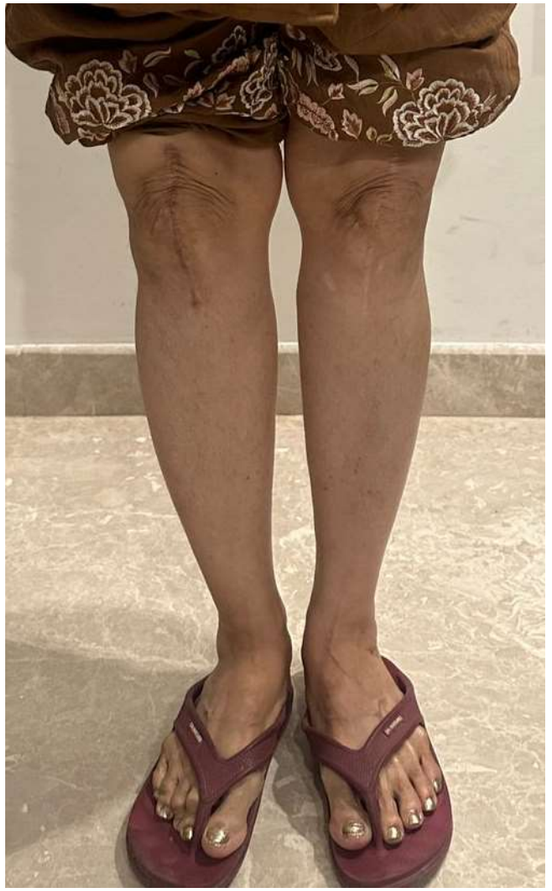
6 month follow-up



1 year follow-up

Clinical picture at 6 months





Lessons and Recommendations

- Early detection and polyethylene insert exchange may prevent catastrophic failure

- Frequent radiographic follow-up is essential

- Oxinium implant patients should be monitored closely, especially after trauma

- Surgical handling of implants must be meticulous

Summary and Conclusion

- Oxinium offers good wear resistance but can catastrophically fail when zirconium is exposed

- This case illustrates the cascade from polyethylene wear to metallosis

- Preventive strategies and better implant design are needed

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