

Osteolytic Pseudotumor After Cemented Total Knee Arthroplasty

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Abstract

Wear debris leading to local inflammatory reactive changes and osteolysis is a common complication after total knee arthroplasty (TKA). While massive osteolytic lesions may be commonly encountered in the revision setting, the appearance and location of these lesions rarely mimic expansile bone lesions. We report a case of severe osteolysis in a cemented TKA design, which presented as a pseudotumor of the fibular head. The diagnostic work-up and pathologic analysis are included in this report of a pseudotumor secondary to wear debris osteolysis.

Wear debris osteolysis is a well-described complication after total knee arthroplasty (TKA).¹⁻⁶ The particulate debris activates a foreign body tissue reaction resulting in resorptive osteolysis and an increased risk for aseptic loosening.^{7,8} While lesions in close proximity to the fixation interfaces are not uncommon, rare cases

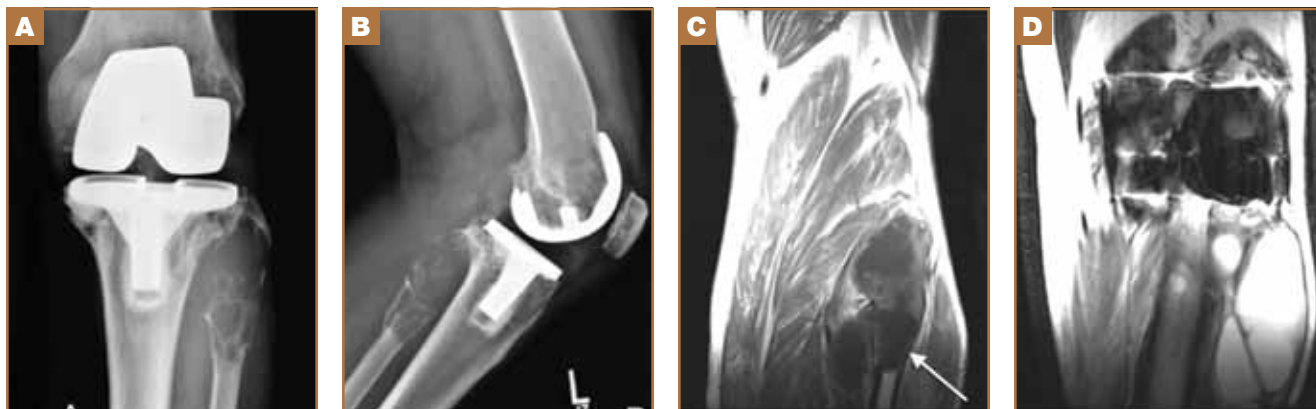
involving lesions extending to distant sites have been reported.¹⁻³ In these cases, the lesion may mimic a lytic bone tumor that requires additional diagnostic interventions to confirm benign etiology.

We report a case of massive osteolysis in a cemented TKA design, which presented as a pseudotumor of the fibular head. The diagnostic work-up and pathologic analysis are included in this report of this pseudotumor secondary to wear debris osteolysis. The case report was reviewed and approved by our institution's ethical review board and granted waiver of informed consent.

Case Report

A 67-year-old retired steel mill worker with a past medical history significant for obesity (BMI, 34), diabetes mellitus, polysubstance abuse, an infrarenal abdominal aortic aneurysm, a left foot drop status post-multiple lumbar spinal surgeries, and a 60-pack-year smoking history, presented to our clinic with left knee pain for 1 year. He had undergone bilateral total knee arthroplasty at an outside facility 24 years previously. Approximately 1 year prior to presentation, he reported falling and subsequently developing the insidious onset of left knee symptoms. The pain was localized over the anterior and lateral aspects of the knee; he denied instability.

Figure 1. Oblique (A) and lateral (B) radiographs of the left knee status post total knee arthroplasty demonstrating periprosthetic radiolucencies and a large lytic lesion of the fibular head. Magnetic resonance imaging T1-weighted spin echo and T2-weighted coronal sequences (panels C and D, respectively) revealing the septate nature of the fibular lesion. The arrow in panel C depicts one of the well-circumscribed osteolytic collections, with extension into the surrounding soft tissues.



Authors' Disclosure Statement: The authors report no actual or potential conflict of interest in relation to this article.

In addition, he did not report fevers, chills, constitutional symptoms, or night pain.

The erythrocyte sedimentation rate was 10 mm/hr (normal, 0-30 mm/hr) and C-reactive protein was less than 0.5 mg/dL (normal, <0.8 mg/dL). Radiographs of the left knee revealed a large, septated, expansile lytic lesion involving the left proximal fibula, as well as lytic defects about the tibial and femoral prostheses (Figure 1A, 1B). Magnetic resonance imaging with metal subtraction sequencing was obtained with and without contrast to further characterize the lesion (Figure 1C, 1D; Figure 2A-C). This imaging demonstrated an expansile multi-loculated lesion in the region of the fibular head. Based on the concern for potential malignant process, the patient was referred for biopsy by our orthopedic oncology service and a percutaneous biopsy of the left fibular head was obtained. Intra-operative frozen sections revealed findings consistent with an inflammatory reactive process, and thin preparation cytopathology showed evidence of fibrinous material with few multinucleated giant cells and macrophages with no malignant cells. Final pathology confirmed the diagnosis of polyethylene wear debris osteolysis based on the presence of fibrous tissue with lymphohistiocytic infiltrate, foreign body giant cell reaction about wear particles, and fibrinous debris (Figure 3A, 3B). A biopsy aspirate was also sent for gram stain and culture, which revealed no growth at final analysis. The white blood cell count of the fluid was 267 with 86% mononuclear cells.

Based on these findings, management options, including potential revision TKA, were discussed in detail with the patient. Due to the patient's poor functional status, ipsilateral foot drop with use of a modified ankle-foot orthosis, and elevated surgical risk due to multiple co-morbidities, the patient elected for no immediate intervention. The patient is presently being followed with serial radiographs and clinical examinations.

Discussion

Though previous work has shown the low incidence of osteolysis in cemented TKA designs,^{4,6} this case confirms the finding that cemented designs can produce sufficient wear-debris particulates to induce massive osteolytic changes. Wear debris in this case was of sufficient quantity, and over several decades since index TKA, to produce a pseudotumor appearance. The authors of a prior report on pseudotumor presentation using a cementless design speculated that a possible egress mechanism of debris to the fibula was from drilling for tibial fixation screws.¹ We report involvement of the fibular head in our cemented TKA report when no screws were placed. The cause of this egress of debris is unknown, but an alternate mechanism may be a connection from the knee joint through a subpopliteal recess and soft tissue defect seen in the perifibular space in 27.5% of patients.⁹

The radiographic finding of an expansile lytic lesion raises numerous possible diagnoses, including infection, aneurysmal bone cyst, giant cell tumor, plasmacytoma, or a primary or metastatic malignant process.^{2,10} Furthermore, with the

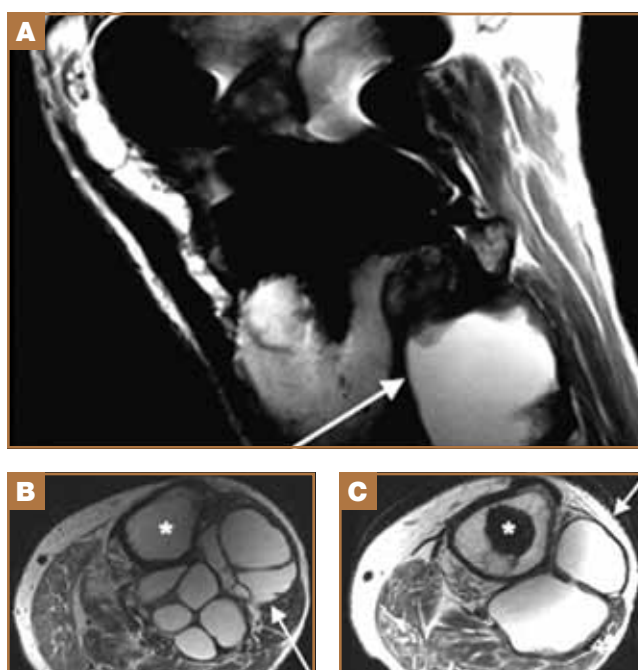


Figure 2. T2-weighted sagittal (A) and axial (B, C) MRI sequences of the left knee further defining the extent of the destruction. The arrows in the respective panels denote the discrete regions of osteolysis.

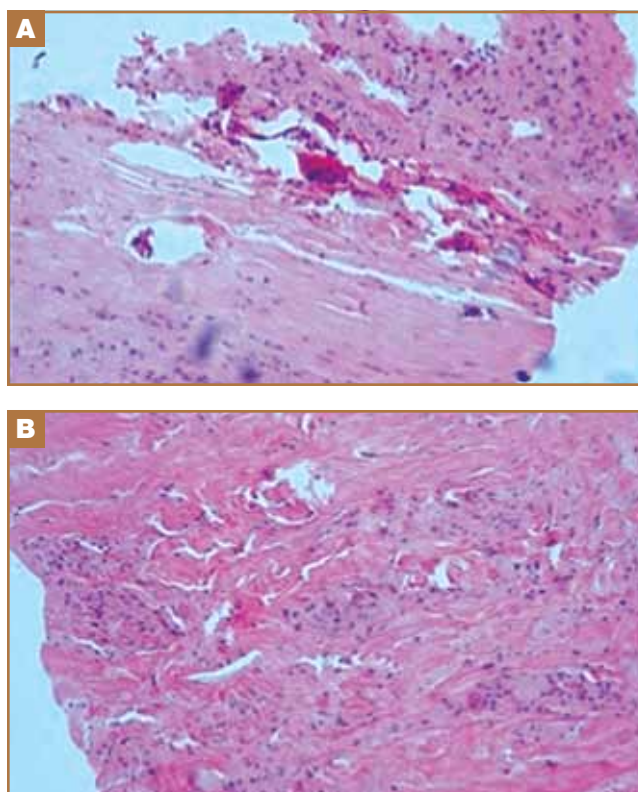


Figure 3. Fibular biopsy (A, B) at 100x magnification showing a lymphohistiocytic infiltrate, foreign body giant cell reaction about wear debris, and fibrinous debris consistent with a benign osteolytic process.

presence of risk factors including age and long smoking history, metastatic disease must also be considered in the work-up of similar lesions.

Conclusion

Osteolysis continues to be a challenging dilemma in TKA patients, both in cemented and cementless designs. Advanced imaging and biopsy may be required in such dramatic cases to obtain a definitive diagnosis. Furthermore, as a body of evidence grows, it becomes increasingly important that physicians be aware of the potential for wear-debris osteolysis after TKA presenting as a periprosthetic pseudotumor.

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This paper will be judged for the Resident Writer's Award.
