

# Unclassified High-Grade Sarcoma Associated with an Orthopedic Implant: A Case Report of a Rare Complication

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## Abstract

Metal implants are commonly used in orthopedics for treating degenerative conditions and fractures. These materials are generally considered non-toxic. However, rare instances of malignancy linked to certain implants have been documented in the literature. The formation of high-grade sarcoma on orthopedic implants is an exceptionally rare complication. In this report, we present the case of an unclassified high-grade sarcoma in a 51-year-old patient to highlight the rarity of this condition and the challenges associated with its diagnosis.

**Keywords:** Sarcoma, Metal, Implants, Case report.

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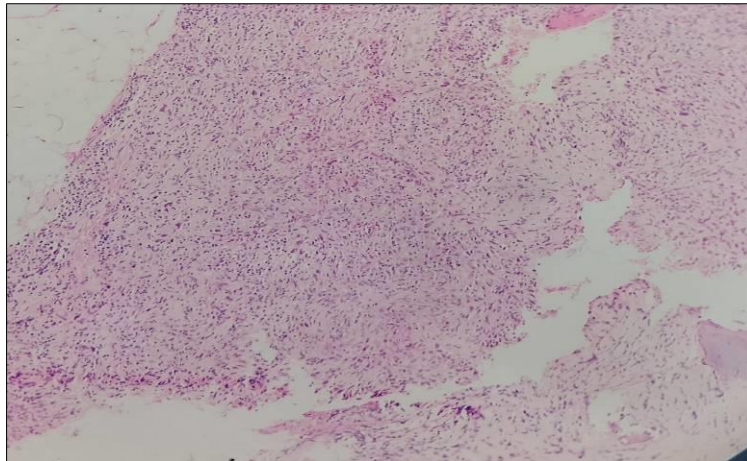
## INTRODUCTION

Metallic orthopedic materials have been used for decades to repair skeletal defects and replace joints, leading to clear improvements in patient outcomes. However, these implants have been shown to carry associated neoplastic risks. The development of sarcoma in association with a prosthesis or metallic orthopedic material is an uncommon complication. Only a few cases have been documented in the literature [1]. It is important to suspect its presence in order to avoid diagnostic errors that could delay treatment and compromise the prognosis. We report the case of an unclassified high-grade sarcoma in a 51-year-old patient, highlighting the rarity of this condition and the diagnostic challenges involved.

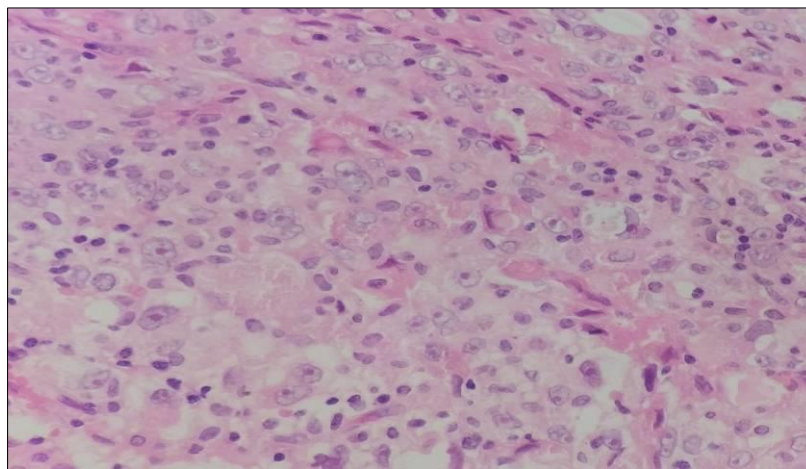
## CASE REPORT

This is a 51-year-old patient who, 30 years ago, underwent osteosynthesis of the lower end of the left

femur following a fracture. Currently, the patient has been experiencing left knee pain, stiffness, and functional limitation for the past 2 months. Physical examination reveals swelling in the distal half of the thigh with limited range of motion. Frontal and lateral X-rays of the knee showed a suspicious process at the lower end of the femur. An excisional biopsy was performed at our institution. The anatomical-pathological examination revealed bone tissue largely infiltrated by a necrotic tumor process (Figure 1), composed of layers of cells that are occasionally rounded and at other times spindle-shaped, with moderate to severe cytological atypia (Figure 2). Immunohistochemical staining was negative for PS-100, CD34, AML, Desmin, and EMA, leading to the diagnosis of unclassified high-grade sarcoma and excluding other soft tissue tumors. The patient's postoperative course was uneventful, with no signs of recurrence 12 months after the operation.



**Figure 1: Microscopic examination showing bone tissue infiltrated by tumor proliferation (hematoxylin and eosin staining; × 100)**



**Figure 2: Microscopic examination showing cells that are occasionally rounded and at other times spindle-shaped, with moderate to severe cytological atypia (hematoxylin and eosin staining; ×400)**

## DISCUSSION

Unclassified high-grade sarcoma is a rare malignant tumor, and its association with metallic orthopedic implants is a serious and extremely rare complication. From 1950 to 2001, only 31 cases of sarcomas associated with metal implants were reported. Undifferentiated pleomorphic sarcoma (UPS), previously called malignant fibrous histiocytoma, was the most common type, followed by osteosarcoma, with only one case of unclassified high-grade sarcoma reported [1].

Certain components of these implants, such as nickel, stainless steel, chromium, cobalt, iron, manganese, zinc, and silicon, have been shown in animal and human studies to have carcinogenic properties [2, 3]. Additionally, other authors speculate that implant-induced osteonecrosis may contribute to the development of sarcoma [4].

However, the fact that malignancies have arisen in close proximity to metallic implants provides strong evidence of a potential relationship. The tendency for sarcomas to develop in the femur is likely due to the fact

that it is the most commonly treated bone with orthopedic implants [5]. The age range of patients who developed implant-related sarcomas is between 11 and 87 years (mean age 50). Sarcomas typically develop between 6 months and 30 years after implant placement, with an average interval of 9 years [1].

Clinically, it can be challenging to distinguish non-neoplastic reactions associated with implants, such as infections and reactions to prosthetic wear debris, highlighting the importance of early diagnosis. The histological diagnosis of unclassified high-grade sarcoma can only be made after excluding all possible lineages of differentiation: pleomorphic cells, round cells, epithelioid cells, and spindle cells.

## CONCLUSION

The association of unclassified high-grade sarcoma with metallic orthopedic implants is a rare complication with a poor prognosis. The diagnosis is made through histopathology and immunohistochemistry. A delay in diagnosis worsens the prognosis, leading to a high risk of mortality.

**Declaration of Conflicting Interests:** The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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