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## Catastrophic metallosis after tumoral knee prosthesis failure: A case report

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## ABSTRACT

**INTRODUCTION:** Metallosis is a condition characterized by an infiltration of periprosthetic soft tissues and bone by metallic debris resulting from wear or failure of joint arthroplasties.**PRESENTATION OF CASE:** Authors describe a case of a 45-year-old man treated for an osteosarcoma of the distal femur with a modular prosthesis when he was 18 years old, he developed massive metallosis with skin dyspigmentation after 17 years. His medical/surgical history was remarkable for a left tumoral knee prosthesis implanted 21 years ago. Two years before revision, the patient had a car accident with a two-points prosthesis breakage and despite the surgeon's advice, the patient refused surgery. In two years, prosthesis malfunction caused a progressive catastrophic soft tissues infiltration of metallic debris. **DISCUSSION AND CONCLUSION:** Authors suggest that if prosthesis fracture is detected, revision surgery should be attempted as earlier as possible.© 2016 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

Metallosis is an uncommon condition in which there is infiltration of periprosthetic soft tissues and bone by metallic debris resulting from wear of joint arthroplasties. Complications due to metallosis include osteolysis, tissue necrosis and formation of pseudo tumors [1]. The management of metallosis may represent a challenge for the Orthopedic surgeon, due to the variety of presenting symptoms.

We describe a case of severe metallosis in the setting of a tumoral knee prosthesis (TKP) failure presenting with massive soft tissues infiltration and skin dyspigmentation.

## 2. Presentation of the case

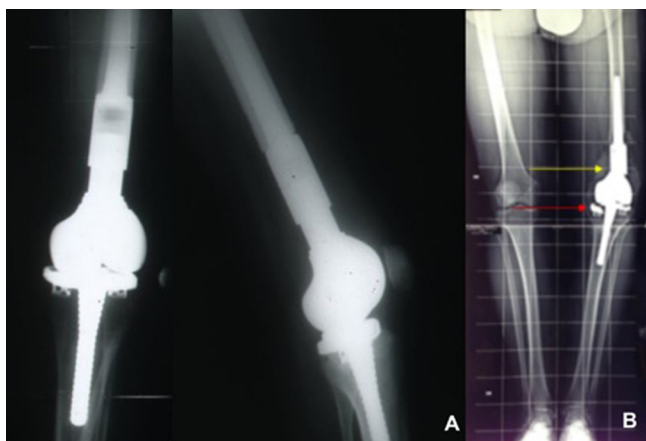
In year 1995, an 18-year-old male patient was operated for a chondroblastic osteosarcoma of the left distal femur knee with an intraarticular resection and a modular prosthetic replacement of the distal femur, after a neo-adjuvant therapy. After surgery following the protocol he underwent also to the adjuvant therapy.

At CT-scans the lung were free from metastasis. No perioperative complications were reported; the patient was followed until the 5th year after surgery. At the last follow-up there were no local recurrence of the oncologic disease and the prosthesis showed no signs of mobilization (Fig. 1A). In November 2010 the patient reported a car accident, with a direct trauma to the left lower limb. The X-ray showed a two-point prosthesis breakage (femur and medial tibial plateau) and a femoral stem subsidence (Fig. 1B). However, he was able to walk independently and with moderate pain. Despite surgeon advice, the patient refused revision surgery for personal reasons. In December 2012, the patient returned to the outpatient clinic, with an increasing pain in his left knee and with lower limb length discrepancy. The clinical examination revealed a massive black dyspigmentation of the skin (Fig. 2C), moderate swelling, mild warmth and tenderness. Clinical assessment revealed the left (surgical) leg was 2 cm shorter than the right. The range of motion was 5°–35°, severely decreased compared to previous examinations. Plain X-rays (Fig. 2A–B), that confirmed the lower limb discrepancy, were suspicious for metallosis: presence of radio-dense line ("cloudy sign"), associated with "the bubble sign" described by Su [2] and the "metal-line sign" a thin rim of linear increased density in the suprapatellar pouch region described by Weissman [3].

The laboratory investigations showed leukocyte count = 9600 cell per cubic millimeter, C-reactive protein = 78 mg/L, and erythrocyte sedimentation rate = 46 mm/h. The patient accepted surgery and was scheduled for revision of his TKP. In January 2012, the patient was operated in supine position without the use of

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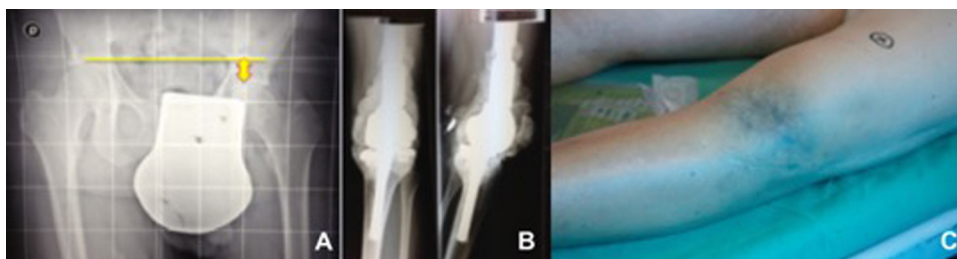
**Fig. 1.** (A) Radiographs taken at 5-year follow-up (year 2000) showing a cementless Kotz modular femoral and tibial reconstruction (KMFTR) in an acceptable positioning. (B) An anteroposterior standing radiograph of the lower left limb showing fracturing of the proximal femoral stem (yellow arrow) and medial tibial plateau (red arrow).

tourniquet. The TKP was approached through a modified midvastus approach, extended proximally to the femur to allow a soft tissue debridement. Revision knee surgery confirmed the presence of

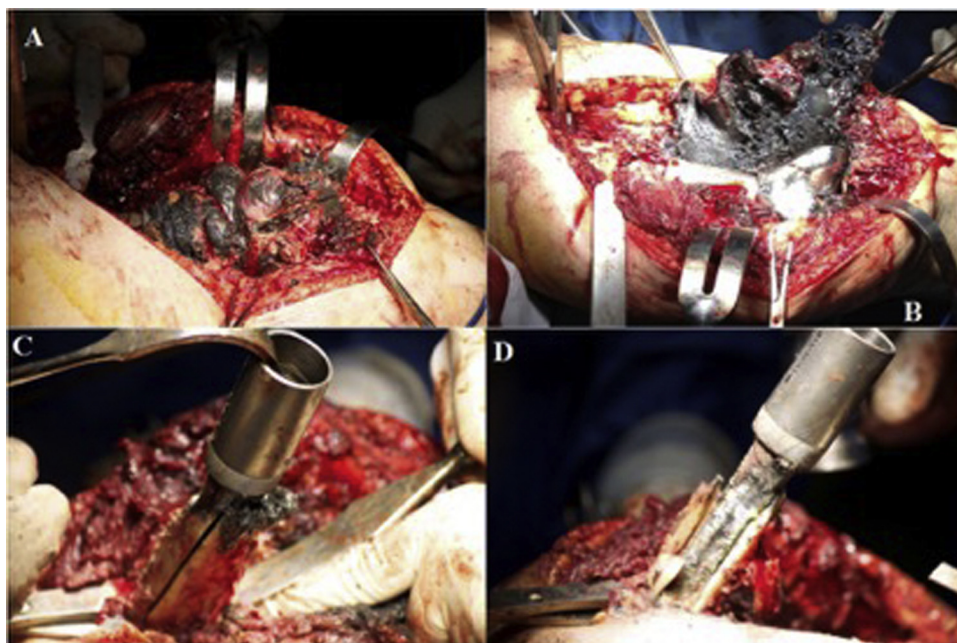
massive soft tissue metallosis of the distal femur and the proximal tibia (Fig. 3A–B). However, there was not osteolysis, both prosthetic stems resulted still well bone-integrated (Fig. 3C–D). The revision surgery was not more difficult than any others revision procedure. It was more difficult to identify anatomic structures due to soft tissue pigmentation. After prosthesis components removal, both femoral and medial tibial plateau fracture were confirmed and an extensive polyethylene wear and deformation distributed asymmetrically over the medial and lateral joint surfaces was detected (Fig. 4).

During the revision procedure periprosthetic tissue samples were retrieved from the joint neo-capsule, muscular and bony sites. Samples were fixed in 4% buffered formalin for twenty-four hours and subsequently included in paraffin. Paraffin-embedded specimens were sectioned to a thickness of 5 mm, stained with hematoxylin and eosin (H&E) and examined with a light microscope. Microbiological tests of intraoperative specimens, including cultures and Gram stain, were sterile.

Pathologic examination of the excised tissue showed large areas of bland necrosis surrounded by a reactive fibrosis. Numerous black, irregular, metallic particles aggregates were associated with dense granulomatous reaction. Inflammatory cells were composed predominantly of lymphoplasmacytes showing perivascular aggregates followed by macrophages and eosinophils. Specimens were graded as 3+ (jet-black histiocytes/>100 visible metal



**Fig. 2.** (A) Patient presented a large area of cutaneous metallosis characterized by dyspigmentation of the skin overlying the joint space affected. (B) anteroposterior standing radiograph demonstrating dismetry: left (surgical) leg was 2 cm shorter than the right with a deviation in varus of the knee. (C) A-P and L-L X-rays showing the typical amorphous, increased density material defined as “cloud sign” of metallosis.



**Fig. 3.** Intraoperative photographs show (A–B) massive metallosis of the soft tissue adjacent to the prostheses, and (C–D) absence of osteolytic reaction with the femoral prosthetic stem well integrated to bone.

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