

PSEUDOTUMOR AFTER METAL FIXATION OF A FRACTURE SURGERY

A Case Report

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The present report describes an unusual complication after surgical treatment of a femoral fracture. Metal particles, produced by mechanical damage to an intramedullary rod by the insertion of screws perpendicular to the rod, were found to have initiated a tumor-like change in the soft tissues 4 years after removal of the metal implants. Conventional X-ray, angiography and CT-scan showed adjacent to the healed fracture a large tumor mass, which was interpreted as a soft tissue sarcoma. However, histopathological assessment revealed extensive necrotic changes around scattered metal particles in the biceps femoris muscle, which may be assumed to have been induced either chemically or bacterially.

Key words: femoral fractures; fracture fixation, intramedullary; neoplasm; soft tissue

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Aseptic necrosis or infection after surgery using metal implants are well known complications (Contzen 1973, Grasser 1972, Knöfler 1975, Schuster 1974, Winter 1974). However, the development of tumors or tumor-like changes after the insertion of metal implants for stabilizing fractures is most uncommon (Delgado 1958, Dube & Fischer 1972, McDougall 1956, Tayton 1980). A case of pseudotumor developing adjacent to a healed femoral fracture 4 years after surgical treatment is presented.

CASE HISTORY

An 18-year-old Swedish girl, visiting Paris in June 1974, was run over by a car and sustained a closed fracture of the left femur. She was immediately admitted to hospital, where X-ray revealed a short oblique fracture of the left femoral mid-shaft (Figure 1a). An intramedullary Küntscher nail and a lateral 6-screw metal plate were inserted. Postoperative X-ray showed good alignment of the fragments (Figure 1b). The patient was dis-

charged from hospital 1 week later in good condition, without any signs of infection, and returned to Sweden for further treatment. She used crutches until November 1974 and 3 months later the nail and plate were removed at her home hospital (Figure 1c). The patient completely recovered except for a feeling of numbness about the left thigh for a couple of months.

In August 1978 (4 years later), the patient noticed a progressive swelling in the left mid-thigh. A month later this became painful and knee flexion was impaired. The patient sought medical advice in October 1978. On physical examination, a tender and indurated swelling of the dorsolateral aspect of the distal half of the thigh was palpated. Local skin temperature was increased. The soft tissue mass was about 18 cm long and 6 cm wide. There was a 6 cm circumferential difference between the thighs. Apart from the healed femoral fracture, X-ray revealed a large soft tissue expansion dorsolaterally in the distal half of the thigh. Angiography confirmed this finding, but in addition several pathological vessels were found, indicating malignant tumor growth (Figure 2). The patient was immediately transferred to the Oncology Section of our Department. Laboratory tests showed normal sedimentation rate and normal white blood cell count, while an electrophoretic serum test showed a moderate elevation of the polyclonal IgG fraction, indicating a slight inflammatory

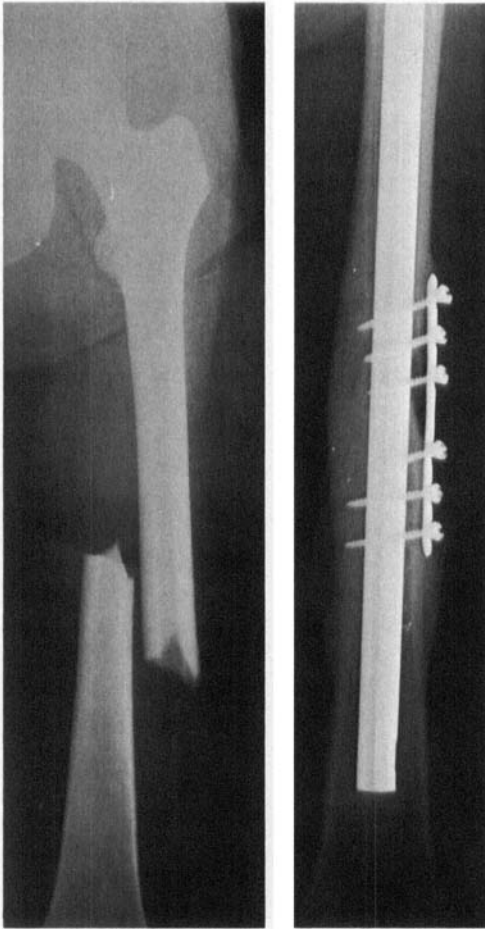


Figure 1a, b. Radiographs of left femur before (a) and after (b) stabilization of the fracture by a rod and a 6-screw metallic plate.

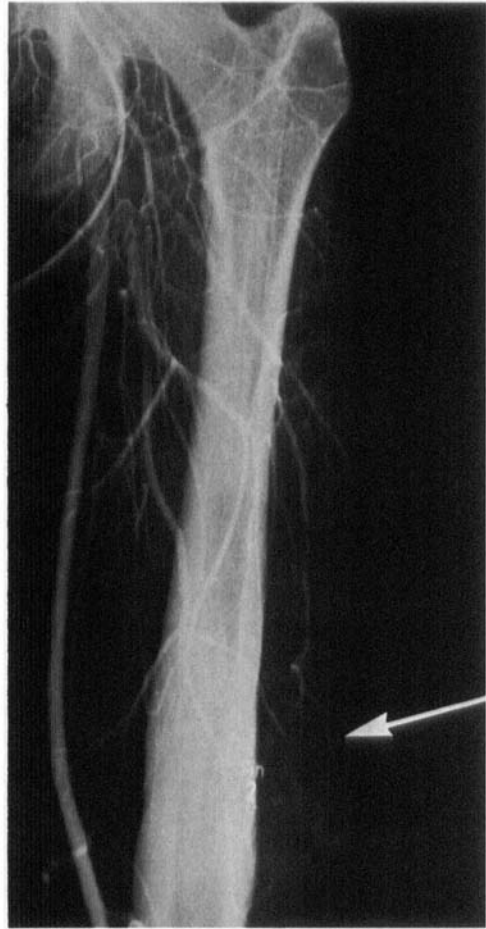


Figure 2. Angiography showing irregular pathological vessels along the lateral aspect of the left thigh.

reaction. Computerized tomography revealed a 20-cm-long tumor with a maximum diameter of 4 cm confined to the biceps femoris muscle in the distal half of the thigh (Figure 3). Soft tissue sarcoma was suggested as the most probable diagnosis.

At biopsy, the subcutaneous tissue was found to be indurated and macroscopically suggestive of infiltrating tumor growth. At further incision, a cavity corresponding to the biceps femoris muscle was found filled with necrotic muscle tissue and a greyish-yellow fluid. Histopathological examination of the specimens showed reactive granulation tissue with acute and chronic purulent infection without any signs of tumor growth. Bacterial culture was *staph. albus* positive, but quantitatively non-significant. At surgical exploration 1 week later a multiloculated fibrous cavity with interconnecting fistulas filled with necrotic muscle tissue was found. A total excision of the short biceps femoris mus-

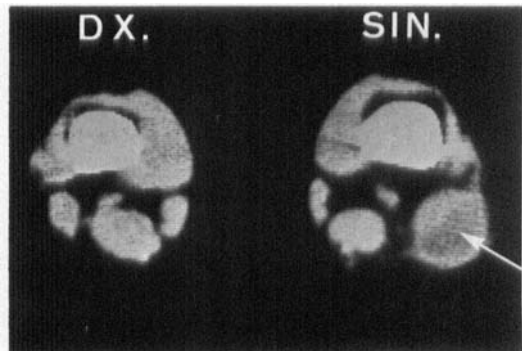


Figure 3. Computerized tomography showing proximal cross-sectional area of the right and left mid-thigh. A soft tissue mass can be seen dorso-laterally in the left thigh confined to the biceps femoris muscle.

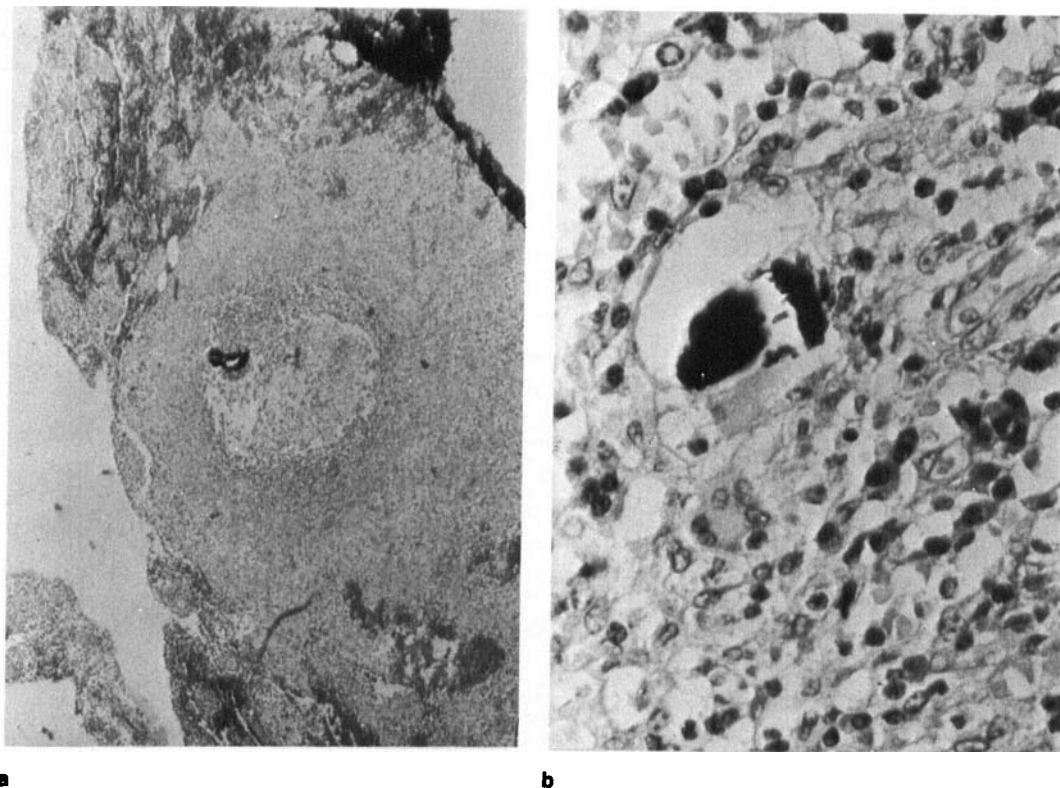


Figure 4. Histological sections stained in hematoxylin and eosin, showing (a) focal necrosis adjacent to black metal particles and (b) round cell infiltration including a multinucleated giant cell around two metal particles.

cle and a partial excision of the long biceps femoris muscle was performed. Adjacent to the healed fracture, numerous small metal particles were found in the soft tissues. Histopathological examination of the specimens essentially confirmed the findings of the initial biopsy. In a highly vascular fibrous tissue numerous foreign bodies within necrotic foci surrounded by foreign body cells and inflammatory cells were seen (Figure 4a-b). The bone specimen exhibited nothing but normal bone tissue.

The postoperative course was uneventful. The patient was well, without any signs of recurrence, 2 years later.

Fortunately, the internal fixation material removed in 1975 had been preserved (Figure 5). On examination, five deep grooves were found in the Küntscher nail. This mechanical damage had obviously been caused by the insertion of the screws perpendicular to the nail at the initial fracture surgery in 1974. This explained the occurrence of numerous metal particles found both at surgical exploration and on histopathological examination. Whether these metal particles, representing a locus minoris resistentiae, caused a secondary low-grade infection or chemically induced an aseptic necrosis, could not be determined with certainty. Although

laboratory tests were normal and bacterial culture was only weakly positive, infection as indicated by histopathological examination seems the most likely explanation. Nevertheless, regardless of the pathogenesis, the metal particles may be considered the etiologic factor which initiated the pathological changes in the soft tissues.

DISCUSSION

The present report illustrates the risk of using metal plates in combination with rods, since the insertion of screws, perpendicular to an intramedullary rod, is likely to cause mechanical damage to the rod, although the described complication probably is uncommon. This case report also illustrates the risk of misinterpreting angiography and CT-scan. It is interesting to note that vessels in newly formed vascular reactive connective tissue may angiographically resemble pathological tumor vessels. In this particular case

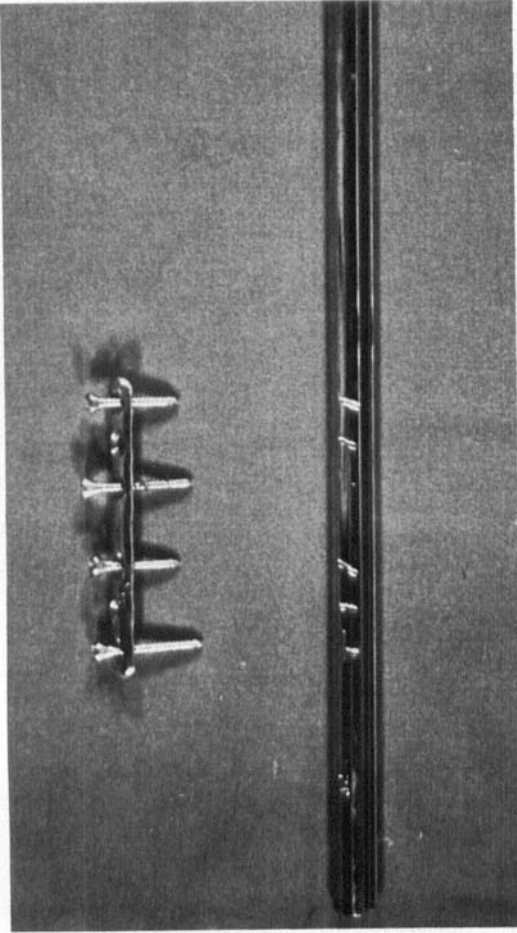


Figure 5. The removed internal fixation material showing five deep grooves in the rod.

histopathological examination proved to be of crucial importance for diagnosis. It has been proposed that soft tissue tumors exhibiting malignant features as suggested by clinical his-

tory, clinical examination and radiography should be surgically treated as sarcomas without previous biopsy to avoid tumor cell dissemination, provided functional loss by extensive surgery is acceptable (Stener 1978, 1979). However, the present study clearly illustrates the necessity of adopting a multidisciplinary approach to the diagnosis of sarcoma, including histopathological examination, before surgical treatment.

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