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# Primary renal osteosarcoma: A case report



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## KEYWORDS

Extra-osseous osteosarcoma;  
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## Abstract

Primitive renal osteosarcoma is a rare sarcoma of the kidney with only 27 cases reported in the literature. Its histogenesis is poorly understood. It occurs at an older age between the fifth and seventh decade of life with a male predominance. The clinical features are similar to other renal diseases. Imaging shows calcifications within a lumbar or flank mass. Histology describes a sarcomatous proliferation producing osteoid, most often at an advanced stage (pT4), which implies a poor prognosis. We report on the clinical and pathologic features of a case of primary renal osteosarcoma in a 56-year-old man with stage IV disease. This is the 28th case of primitive renal osteosarcoma reported in the literature, confirming the highly malignant nature of this tumor and the need for early diagnosis.

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## Introduction

Extra-osseous osteosarcoma is a rare malignant tumor representing 1–2% of soft tissue sarcomas and less than 4% of osteosarcoma [1,2]. It grows outside of the bone skeleton and is composed of malignant osteoblastic cells producing bone or cartilage material. Its traditional locations are at the soft parts of the limbs and in the retroperitoneum [3,4]. Other rare locations, however, have been described, among these the testicles [5], hand [6], brain, mediastinum, diaphragm, lung and heart [1]. The kidney is also a rare site to be affected by extra-osseous sarcoma with, to date, only 27 cases reported in the literature. We report an additional case of primary renal osteosarcoma in a 56-year-old man.

## Case report

A 56-year-old man was admitted with a painless left flank mass and a seven-month history of intermittent total hematuria without weight loss. Physical examination revealed a large non-inflammatory left lumbar mass extending to the flank and the hypochondriac and periumbilical regions. Urography displayed a calcified left kidney tumor sized 28 cm with dilatation of the renal pelvis and calyx. The cortical index was less than one millimeter. Laparoscopic radical nephrectomy was performed. Gross examination showed a necrotic, hemorrhagic and polychrome solid and cystic neoplasm measuring 23 × 14 × 13 cm (Fig. 1). It had completely destroyed the renal parenchyma and infiltrated the renal capsule and perirenal fat without involvement of the adrenal gland. Histological examination of 23 sections in total (one section per centimeter of tumor) showed a largely necrotic and infiltrating malignant proliferation consisting of sheets of pleomorphic cells, globular, spindle-shaped or giant multi-nucleated osteoclast-type cells with variable amounts of calcified osteoid production and foci of cartilaginous differentiation

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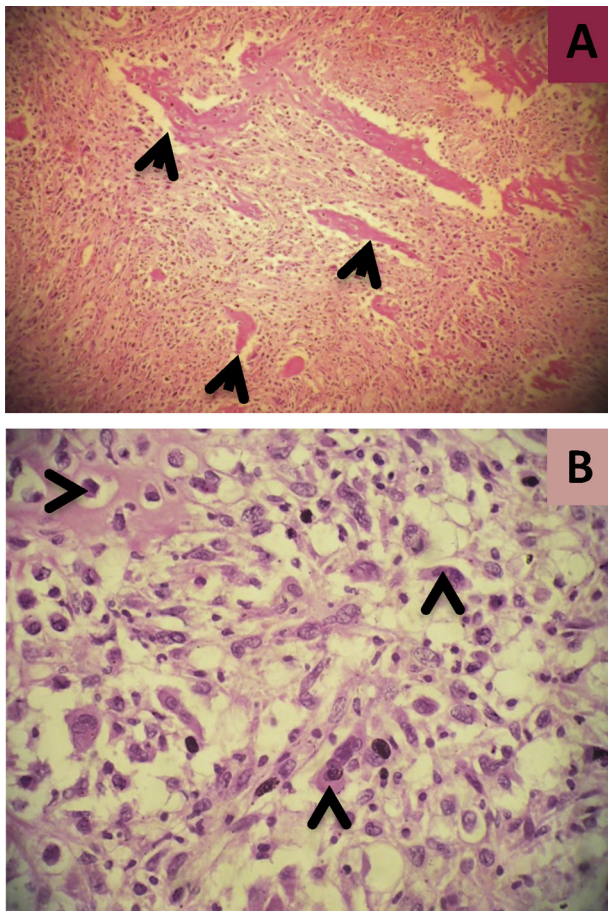
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**Figure 1** Gross examination (A) Renal nodular formation measuring 23 × 14 × 13 cm. (B) Two cut sections: necrotic, hemorrhagic solid and cystic neoplasm.

(Fig. 2). There was a breach of the renal capsule and infiltration of the perirenal fat. The hilum was also infiltrated by the tumor. Immunohistochemical examination revealed no positive cytokeratin reaction, but heterogeneous expression of muscle-specific actin by the neoplastic cells (Fig. 3). The neoplasm was diagnosed as pT4 high-grade primary osteoblastic osteosarcoma of the kidney. The outcome was unfavorable; the patient died one month after surgical excision of the tumor.



**Figure 2** Hematoxylin-eosin stain (A) Magnification ×20, osteoid production by neoplastic cells (arrows: osteoid production). (B) Magnification ×40, malignant proliferation made of sheets of pleomorphic cells (arrow: pleomorphic cells).

## Discussion

Sarcomas account for approximately 1% of primary renal malignancies in adults [7]. Different types of primary renal sarcoma have been described, such as Ewing's sarcoma [8], primary neuroectodermal tumors [9], synovial sarcoma [10] and leiomyosarcoma [11]. The latter is the most frequent primitive renal sarcoma reported within this group [7,11]. Renal osteosarcoma is a rare entity with, to date, only 27 reported cases in the literature [12]. The male-to-female ratio in primary renal osteosarcoma is 2:1, with the tumor occurring more frequently during the fifth to seventh decade of life [12]. The clinical symptoms are similar to renal pathologies in general and show no specificity. They may consist of a palpable flank mass, lumbar pain, weight loss, and, rarely, gross hematuria. Our patient had an insidious symptomatology just presenting as total gross hematuria without other signs. As in the present case, calcifications are found within the tumor in the majority of reported cases [13]. The current World Health Organization (WHO) classification of urogenital tumors defines osteosarcoma as a proliferative process in which the neoplastic cells produce osteoid in stroma [14]. Its physiopathology remains unclear. These cells have the ability to differentiate into fibroblastic, chondroblastic and osteoblastic cells according to the classic Virchow theory regarding the metaplastic transformation of connective tissue into primitive mesenchyme with the ability to differentiate into osteoblasts [15]. Histologically, osteosarcoma corresponds to a sarcomatous proliferation producing osteoid. Pleomorphic osteosarcoma is the predominant subtype (40%); the osteoblastic and chondroblastic subtypes are described less frequently [12]. In our case, it was an osteoblastic subtype. Immunohistochemistry is of little value in the diagnosis because it shows no specificity, but it can remove the ambiguity of a carcinoma [16]. In fact, some authors suggest a relationship between osteosarcoma and carcinosarcoma where the mesenchymal component overgrows the epithelial component and virtually makes it disappear [17]. In cases with proven positivity for cytokeratin, even focally, the tumor is most likely to be a sarcomatoid renal cell carcinoma (carcinosarcoma) with a predominant osteosarcomatous component or with the carcinoma component overgrown by the sarcoma [17]. As sarcomatoid carcinomas are far more common than primary osteosarcoma, care must be taken to ensure the correct diagnosis. In our case, a large number of samples from the tumor were examined. As the malignant cells did not express cytokeratin, a carcinomatous component could be excluded. However, focal muscle-specific actin expression was seen which complies with the findings of other studies [18]. Like in our case, all the reports in the literature (with one

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