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Case Report

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Clear Cell Renal Carcinoma with Focal Osseous Metaplasia: A Case Report and Review of the Literature

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Osseous Metaplasia; Renal Cell Carcinoma; Carcinoma; Ossification

1. Abstract

Osseous metaplasia in clear cell renal carcinoma (RCC) is uncommon with few cases reported. We present a case of a 66year-old male in which a right renal lesion in a colorrectal screening was incidentally identified. Computed tomography scan revealed a heterogeneous enhanced mass lesion having areas of hemorrhagic and specks of calcification. Clinicoradiological diagnosis of RCC was made and right partial nephrectomy was performed. Histological sections revealed features of clear cell carcinoma Fuhrman grade-1 with a focal areas of metaplastic bone formation. The prognostic implications of osseous metaplasia and calcification are not very clearly mentioned in the literature but probably these patients present with early stage disease and a favorable prognosis.

2. Introduction

The renal cell carcinoma (RCC) is usually a neoplasm affecting adults with a mean age at diagnosis 55-60 years [1]. RCC exhibits various associated secondary changes that include necrosis, edema, hemorrhage, fibrosis, and focal calcification [1]. A sarcomatoid component occurs in approximately 8% of all RCC cases [2], while metaplastic bone formation is an uncommon situation [2,3]. The mechanism of such ossification in tumors is unclear. There are some hypotheses that include osseous metaplasia secondary to ischemia, necrosis or inflammation in the tumor, and induction of osteoblastic differentiation by bone morphogenetic protein 2 (BMP-2) [4]. BMP-2 may play an inhibiting role in RCC neoplastic stem cells [5,6]. These studies suggest that BMP-2 inhibits growth of RCC as well as causes induction of osseous bone formation. Further research is needed to determine the relationship between inhibition of cell proliferation and bone induction [7].

Patients with osseous metaplasia often present with early-stage disease and favorable prognosis [8]. However, some reports suggest that ossification may also be associated with high-grade tumors and poor prognosis [9]. Here, we report a case of RCC with osseous metaplasia. A review of the literature is made as well.

3. Case Report

A 66 year-old male in which a right renal lesion in a colorrectal screening was incidentally identified. The patient was submitted an ultrasound reno-vesico-prostatic where a slightly exophytic lesion in the anterior cortex of the interpolar region of the right kidney measuring 2 x 1.7 cm, with a solid ultrasound appearance, echogenic with small hypoechoic foci and vascularized foci of calcification, was identified. A TC scan determined that these lesion was probably neoplastic. A laparoscopic partial right nephrectomy was performed.

Gross examination of the nephrectomy specimen revealed a 1,9 x1,6 cm renal tumor. It was a solitary well circumscribed mass separated from adjacent renal parenchyma by a fibrous wall. The cut surface of the tumor was yellowish with intermingled hemorrhagic foci.

Histopathoplogical examination of the tumor revealed a solid tumor with cystic focal areas and features of clear cell carcinoma Fuhrman-1 (nucleolus absent o smallest and basofilic to 400x) with osseous metaplasia forming trabeculaes intermingled in the tumor parenchyma containing erythroid cells and focal foamy histiocytes. The tumor did not infiltrate the surrounding normal kidney (Figure 1).

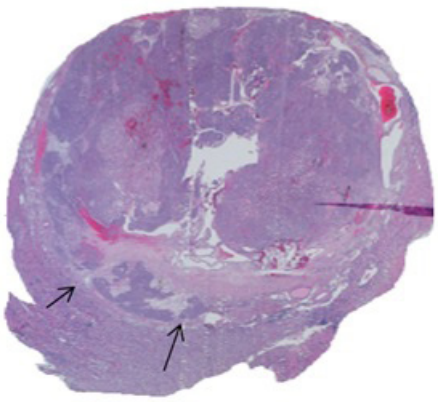

Figure 1: HEx4.0, Panoramic of the tumor without invasion of surrounding kidney (marked with arrows).

Thus, this case was reported as renal cell clear carcinoma with osseous metaplasia containing bone marrow. In this case we only did inmunohistochemical stains with e-cadherina with positive in tumor cells and mieloperoxidasa to demostrate the myeloid cells in osseous metaplasic bone.

4. Discussion

Calcifications are present in a variety of renal lesions both benign and malignant such as vascular, infectious (schistosomiasis, tuberculosis, xanthogranulomatous pyelonephritis), cystic as well as many benign and malignant tumors of kidney such as oncocytomas, metanephric adenoma, Wilms, neuroblastoma and sarcomas [10]. Around 10-20% of RCC contain focal calcification tending to be large, and associated with a comparatively low pathologic stage and slow growth [11,12,13]. The rates of calcifications were 38% and 8- 18% in chromophobe subtype and conventional type RCC, respectively [11].

Osseous metaplasia in contrast to calcifications has rarely been reported in RCC [4,11] and its production mechanism has not been yet elucinated. One hypothesis suggests simple production of bone by tumor cells secondary to ischemia, necrosis, inflammation or secondary ossification in preexisting focus of calcification [4]. It has been suggested that RCC with bone or calcifications tend to be hypovascular and that may predispose the tumors to ischemia and subsequent bone metaplasia [13,14].

Recently, there was a study that reported the role of bone morphogenic protein 2 (BMP-2) that is located on the bone formation pathway in patients with RCC [5]. In RCC, bone can originate through either the dedifferentiation of neoplastic cells into a sarcomatous proliferation (osteosarcomatous component),

or the production of a dense collagenous matrix by mesenchymal cells with subsequent mineralization and organization into bone (osseous metaplasia) [15,16].

Clinically, several possibilities should be considered in these type of lesions such as mature cystic teratoma, adrenal neoplasm, soft tissue sarcoma, adrenal myelolipoma, extraesqueletal osteosarcoma, angiomyolipoma and metastatic carcinoma [11,13,17]. The histological apperance of the tumor directly ruled out these possibilities.

It is unknown whether the presence of osseous metaplasia in renal cell carcinoma affects the prognosis due to the low number of cases [2]. However, several studies demonstrated that ossification is a significant prognostic marker for patients which generally present with early stage disease without invasion or metastasis [8,17].

Our case support a favorable prognosis as it was of Furham grade-1 and had no evidence

of metastatic disease at presentation. Currently, the patient remains free of recurrence of his disease and without metastasis (Figure 2).

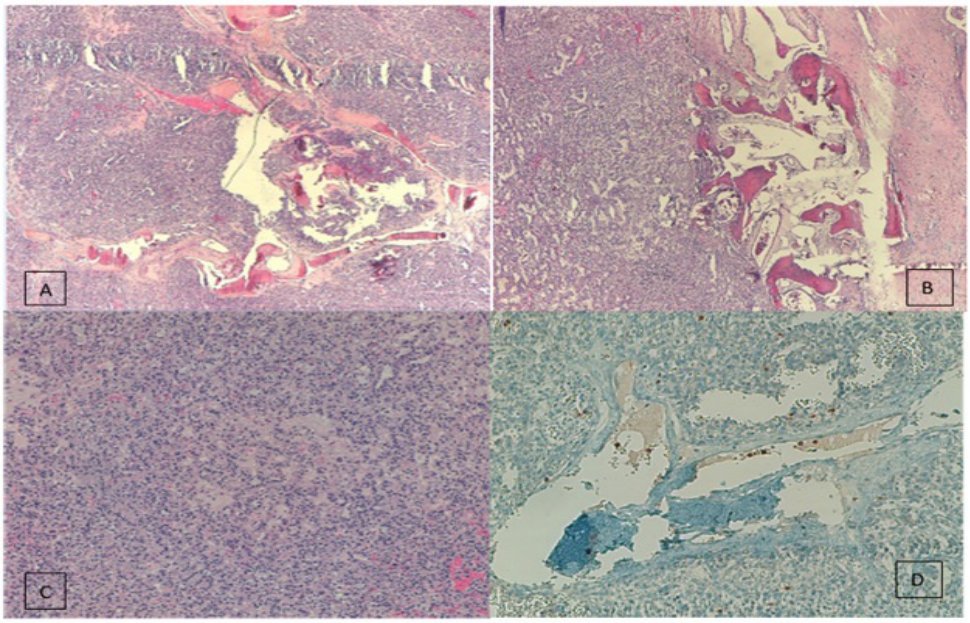

Figure 2: A) y B) HEx10: Renal cell carcinoma with focal areas of metaplastic bone formation adyacent and intermingled with the tumor. C) HEx20: Histological section from the grown revealed features of clear cell carcinoma Furhman grade-1. D) HEx20: Inmunohistochemical for mieloperoxidasa with positive in focal erytroid cells in an area of bone metaplasia.

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