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Chromophobe renal cell carcinoma: a morphologic and immunohistochemical study of 45 cases

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ABSTRACT

The aim of this study was to evaluate the morphological spectrum of chromophobe renal cell carcinoma (CRCC) and diagnostic utility of a panel of three immunohistochemical stains. All cases of CRCC reported between 2002 and 2012 in the Section of Histopathology, Aga Khan University Hospital, were retrieved. A total of 45 cases were identified. Slides were reviewed and immunohistochemical stains (CK7, CD117, and vimentin) were performed. Ages ranged from 18 to 90 years (mean, 48.5 years). Male-to-female ratio was 0.8:1. The tumor was located in the left kidney in 24 patients and the right kidney in 20 patients. The tumor size ranged from 3.5 to 22 cm (mean 10 cm). Histologically, 4 were classic, 22 were eosinophilic, 16 were mixed, and 3 were sarcomatoid type. Morphologic patterns included broad alveolar, solid, nested, tubular, tubulocystic, trabecular, papillary, and microglandular. Binucleation and perinuclear halos were seen in all cases. Nuclear grooves and pseudoinclusions were seen in 17 and 6 cases, respectively. Multinucleated cells were seen in 19 cases. Mitoses ranged from 1 to 11/10 HPFs (mean 3/10 HPFs). Hyalinized stroma was seen in 38 cases and calcification in 26 cases. Necrosis was seen in 18 cases. Palisading of smaller cells around the broad alveolar pattern was noted in 5 cases. The Furhman's nuclear grade was I (11), II (26), III (5), and IV (3). Hale's colloidal iron was positive in all cases. Immunohistochemical stain CK7 and CD117 were positive in 100% and 95.5% of cases respectively. Vimentin was negative in all cases, except in the sarcomatoid areas of 3 cases. In conclusion, chromophobe renal cell carcinoma has certain unique morphological features and immunohistochemical profile which help to distinguish it from conventional renal cell carcinoma and oncocytoma. We identified nuclear pseudoinclusions, microglandular pattern and palisading of smaller cells, which have not been reported earlier.

1. Introduction

Chromophobe renal cell carcinoma (CRCC) comprises 6% to 11% of all renal epithelial tumors [1] and is the third most prevalent form of renal cell carcinoma (RCC) behind conventional RCC and papillary RCC. CRCC was first described by Thoenes et al.[2] in 1985. It has a better prognosis compared to conventional renal cell carcinoma [1,3–6] and has distinct morphological, histochemical, immunohistochemical, ultrastructural, genetic, molecular, and clinical characteristics [1]. It originates from the intercalated cells of the cortical segments of the distal collecting ducts [7], whereas conventional RCC originates from the proximal renal tubular epithelium [8].

In 1988 Thoenes et al.[2] described the eosinophilic variant of CRCC, in which the cells had eosinophilic cytoplasm and overlapping features with benign (oncocytoma) and malignant (eosinophilic variant of conventional renal cell carcinoma) renal tumors. Because of treatment and prognostic implications, an accurate diagnosis of CRCC is imperative [6]. Very few studies have studied the morphologic spectrum of CRCC [6]. The aim of this study was to evaluate morphological features of CRCC and to investigate diagnostic utility of CK7, CD117, and vimentin in CRCC.

2. Materials and methods

All cases of chromophobe renal cell carcinoma (on the basis of morphology, histochemical and certain immunohistochemical stains) diagnosed between 2002 and 2012 in the Section of Histopathology, Department of Pathology and Microbiology ,Aga Khan University Hospital, were identified from case files. Slides and blocks of all cases were retrieved and hematoxylin and eosin slides were reviewed. The diagnosis of CRCC was confirmed by established criteria [3,4]. A panel of 3 immunohistochemical stains (CK7, CD117, and vimentin) was performed on paraffin-embedded blocks, except in the cases where they were already performed. Clinical data (age, sex) and gross features (tumor size, laterality, and appearance) were collected from the surgical reports.

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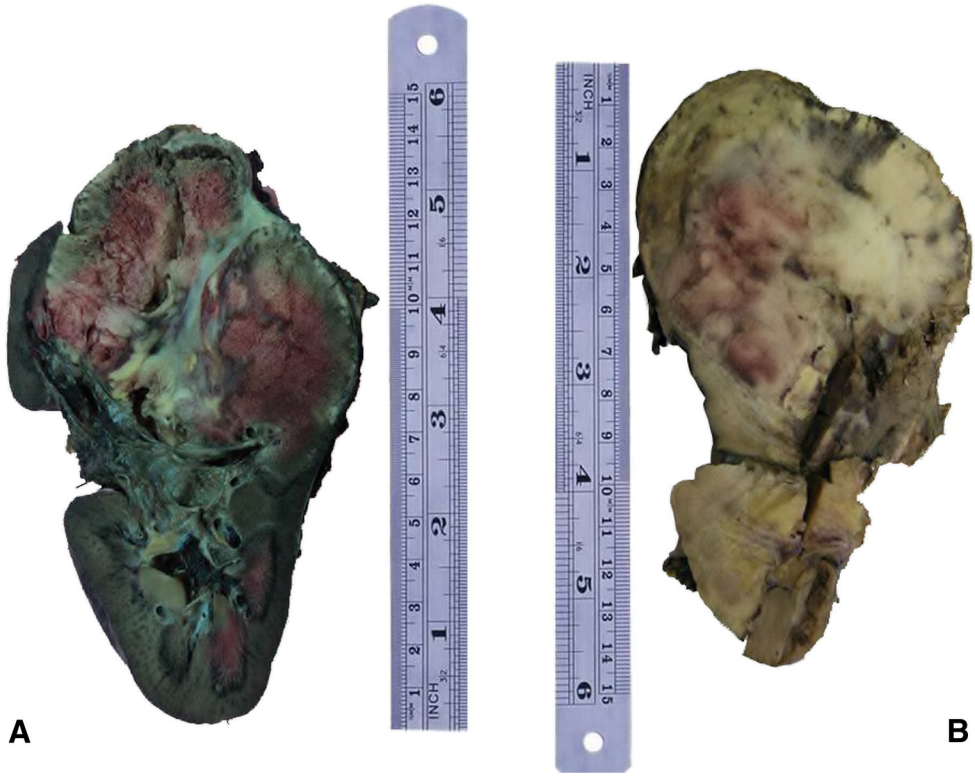

Fig. 1. Gross appearance of CRCC. Classic type with circumscribed tan brown tumor (A); Variegated solid cut surface in sarcomatoid CRCC (B).

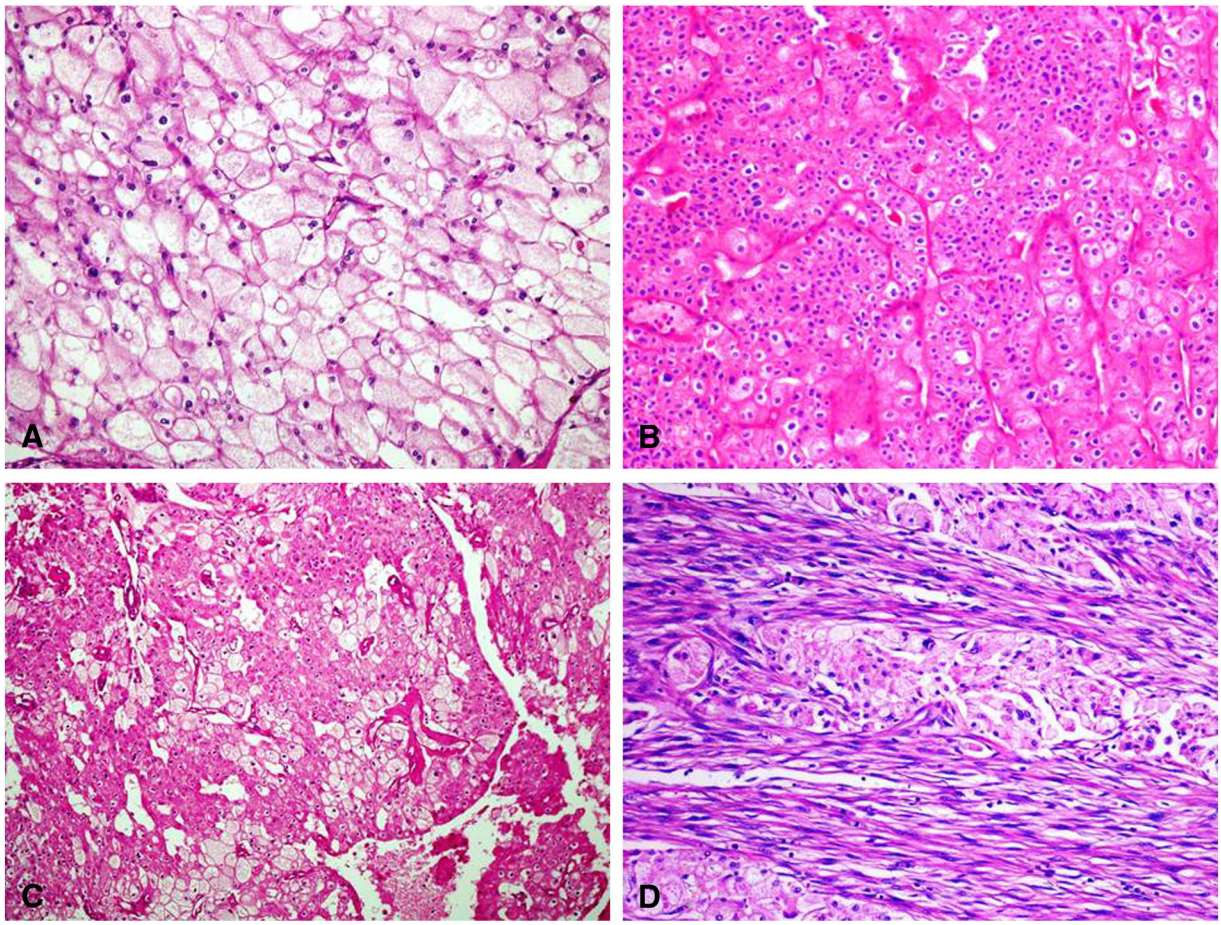

Fig. 2. Classic CRCC with large pale cells having distinct membranes and reticulated cytoplasm (A). Eosinophilic CRCC with nested and tubular growth pattern and perinuclear halos (B). Large cells with clear cytoplasm and smaller cells with eosinophilic cytoplasm in mixed type CRCC (C). Sarcomatoid CRCC with distinct admixture of CRCC and a high grade spindle cell sarcoma with increase mitoses (D).