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Renal Oncocytoma: Report of Two Cases and Review of the Literature

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Authors' contributions

This work was carried out in collaboration among all authors. Author EOO did the entire write up of the manuscript. Authors AAA and PM put the case notes together. Author KA read the histology and provided details of the slides. Authors BABA and EGI managed the literature searches. Author GAR proofread and edited the entire manuscript. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Introduction: Renal oncocytomas are benign tumours arising from the intercalated cells of the collecting ducts and account for 3% to 7% of primary renal tumours. It was first described by Zippel in 1942. Oncocytomas are mostly asymptomatic and often discovered incidentally. They are often diagnosed postoperatively due to clinical and radiographic challenges in differentiating them from renal cell carcinoma.
Presentation of Case: The present study reports two cases of renal oncocytoma in a 61-year-old man who was asymptomatic and a 73-year-old woman who was symptomatic. Relevant clinical and imaging data on the two patients were reviewed. Both patients underwent nephrectomy via flank incisions.
Discussion: The typical morphologic features of oncocytoma were observed on histological examination of the excised kidney specimens. The postoperative course of each patient was

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uneventful and they were discharged 14 and 6-days post-surgery, respectively. In addition, the present study reviews the literature regarding the clinical, radiological and pathological characteristics of renal oncocytoma.

Conclusion: Renal oncocytoma though is benign and has an excellent prognosis, the preoperative diagnostic challenges invariable warranted radical nephrectomy.

Keywords: Oncocytoma; renal neoplasms; renal cell carcinoma; histology.

1. INTRODUCTION

Renal oncocytoma (RO) is a rare tumour originating from cells of the distal renal tubule and first recognized by Zippel in 1942 [1]. It usually occurs as a solitary mass and represents 3% to 7% of all primary renal tumours [2,3]. Though oncocytoma is often considered a benign tumour in most cases with excellent long-term outcomes, there is one documented case of liver metastasis in literature [4]. Oncocytomas usually occur as a unifocal mass, but multifocal and bilateral presentations and concomitant renal cell carcinoma (RCC) have been reported [4,5] Clinically, most are asymptomatic on presentation but a few symptomatic patients may present with initial signs of haematuria, flank pain or palpable flank mass [6].

The varied presentations of renal oncocytoma as well as the overlap of radiographic characteristics with other renal lesions usually complicate their clinical differentiation [5]. The computed tomography (CT) or magnetic resonance imaging (MRI) report on the appearance of a typical central stellate scar of oncocytoma can sometimes be mimicked by necrosis in other renal cancers, this feature is therefore not considered specific [7-9]. Histologically, oncocytomas consist of round-to polygonal-shaped cells with an abundant finely granular, eosinophilic cytoplasm [5,10]. However, fine needle aspiration cytology (FNAC) and biopsy often offer no diagnostic clarity due to oncocytoma having similar histopathologic features as various eosinophilic variants of RCC [11]. Therefore, a special focus on the pathologic features and the adjunctive use of immunostains can aid in discriminating oncocytoma from other renal tumours characterized by granular, eosinophilic cytoplasm, especially chromophobe renal cell carcinoma [11]. Due to the preoperative diagnostic challenge of differentiating between oncocytomas and RCC, most patients invariably undergo radical nephrectomy.

The Urology unit of the Cape Coast Teaching Hospital Surgery Department has diagnosed only two renal oncocytomas over a period of five (5) years (between 2014 and 2019) among fifteen (15) patients who underwent nephrectomy on account of renal tumour diagnosed on contrast-enhanced CT scans. This case report highlights the difficulty in the preoperative diagnosis of contrast-enhancing renal masses and emphasizes the need to include of renal oncocytoma in the differential diagnosis of these renal lesions. The clinical, radiographical and pathological findings of the two cases are discussed.

2. CASE REPORTS

2.1 Asymptomatic Renal Oncocytoma

A 61-year-old Ghanaian man was first seen at the urology clinic of the hospital in January, 2014 with complaints of post-voidal dribbling, frequency of micturition, sensation of incomplete emptying of the bladder and splitting of the urine stream into two. He had no weight loss, feeling of abdominal or flank mass or pain, hematuria, dysuria, hesitancy or urgency. He was hypertensive diagnosed four (4) years earlier and had had appendectomy done two (2) years prior to presentation. He neither smoked cigarettes nor drunk alcohol. He worked for short periods as a teacher and as a petroleum gas filling station attendant in Sierra Leone six (6) years prior to presentation. He had no personal or family history of any urological malignancy. On physical examination, he weighed 71 kg, was not pale, afebrile, anicteric and had no lymphadenopathy. His chest was clinically clear with blood pressure of 140/80 mmHg, pulse of 86 bpm, regular and of good volume. His abdomen was soft with a palpable non-tender left kidney measuring about 10 cm x 8 cm in size. A digital rectal examination (DRE) revealed an enlarged prostate with benign features.

Abdominopelvic ultrasound done revealed an enlarged left kidney measuring 16.62 cm x 10.55 cm in size with a hyperechoic mass with central hypoechogenicity in the left kidney measuring 11.76 cm x 9.09 cm x11.18 cm in size. The right kidney was normal with good corticomedullary differentiation. The prostate gland was homo-

genously enlarged with a volume of 269 g and post void residual urine volume of 35.4 mls. The ultrasound findings were consistent with renal cell carcinoma and prostate enlargement.

A contrast-enhanced abdominal CT scan done showed enlarged left kidney measuring 11.7 cm x 11.6 cm x 8.9 cm in size and a large heterogeneously enhancing mass within the left kidney with necrotic center arising from the lower half of the kidney measuring 10.7 cm x 9.6 cm in size. There was no evidence of metastasis and the right kidney was normal. The mass was consistent with renal cell carcinoma on the CT scan. His electrocardiogram, chest radiograph, complete blood count, kidney function test and liver function test done were normal.

He successfully underwent left nephrectomy of the left kidney via a flank incision with an uneventful recovery. He was discharged on post-operative day 14.

A left kidney measuring 12 cm x 13 cm x 9.5 cm in size was respected and weighed 1.1 kg. Macroscopically, the renal mass was well encapsulated within the renal pelvis with distortion of the calyces and measured 11 cm x 10 cm x 9 cm in size. The tumour had dark brown colour with central yellow areas.

Microscopic examination of hematoxylin and eosin (H&E)-stained sections of the nephrectomy specimen showed a well circumscribed tumour limited by a pseudocapsule. The tumour showed areas of autolysis with loss of cellular details in those areas. The tumour was composed of monomorphous cells with small rounded regular nuclei and abundant eosinophilic cytoplasm growing as nests with a pseudo alveolar pattern in areas (Fig. 1). The tumour did not involve the adjacent renal parenchyma and did not breach the capsule. The renal vessels and ureter were not involved by the tumour. The features were consistent with an oncocytoma.

Five (5) years post-surgery he is doing well with no signs of complications. He is still being managed for his prostate enlargement and chronic hypertension.

2.2 Symptomatic Renal Oncocytoma

A 73-year-old Ghanaian female was first seen at the hospital in December, 2015 with complaints of feeling of a left flank mass of one-year duration. She had observed progressive increase in size of the mass during this period. There was no associated abdominal pain, hematuria, dysuria, frequency of micturition and weight loss. She was not hypertensive or diabetic and did not drink alcohol or smoke cigarette. She was weaving hand bags as an occupation. She had no personal or family history of any urologic and gynecologic malignancy. On physical examination, she weighed 72 kg, was not pale, afebrile, anicteric and no lymphadenopathy. She had a blood pressure of 130/80 mmHg and the chest was clinically clear despite with a dull percussion note on the left lower lung zone. Her abdomen was soft and had a huge left kidney mass extending from the left hypochondrium to left flank, non-tender, ill-defined and measuring about 15 cm x 20 cm in size.

A suspicion of Left renal tumour with possible lung metastasis was made and investigations requested for her.

A contrast-enhanced abdominal CT scan done showed a large heterogenous soft tissue mass involving the whole of the kidney measuring 16.9 cm x 15.0 cm x 11.1 cm in size. The mass also had non-enhancing hypodense areas likely due to necrosis or hematoma occupying the lower pole of the kidney. There were fluid density cystic areas involving the lower pole calyces of kidney likely cysts or calyceal ectasia due to mass effect of the renal lesion (Fig. 2). The left renal artery and vein invasion was not visible. Peri-renal fatty stranding noted. Very scanty normal parenchyma was noted. There was significant mass effect pushing adjacent loop of bowel, pancreas and spleen. Arteriosclorotic changes of the abdominal aorta. No evidence of lymphadenopathy.

There was also normal right kidney, liver, pancreas, spleen, bowel, urinary bladder, uterus and ovaries. There was no evidence of metastasis and no ascites. The mass was consistent with renal cell carcinoma on the CT scan with significant mass effect.

An electrocardiogram, chest radiograph, complete blood count, kidney function test, liver function test and Urine routine examination done were normal.

She successfully underwent left nephrectomy via flank incision with an uneventful post-operative period. She was discharged on post-operative day 6.

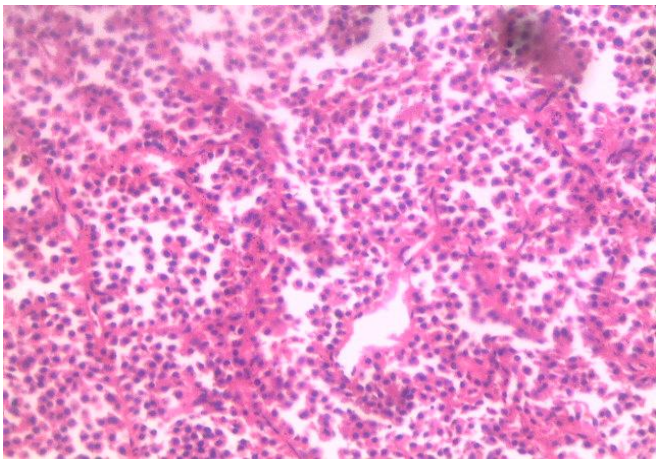

Fig. 1. H&E stain slide showing monomorphous round tumour cells with abundant pink cytoplasm and centrally placed nuclei forming nests with pseudo alveolar pattern in areas. The round nuclei that appear to be centrally placed within the cells is typical of oncocytoma (Magnification x100)

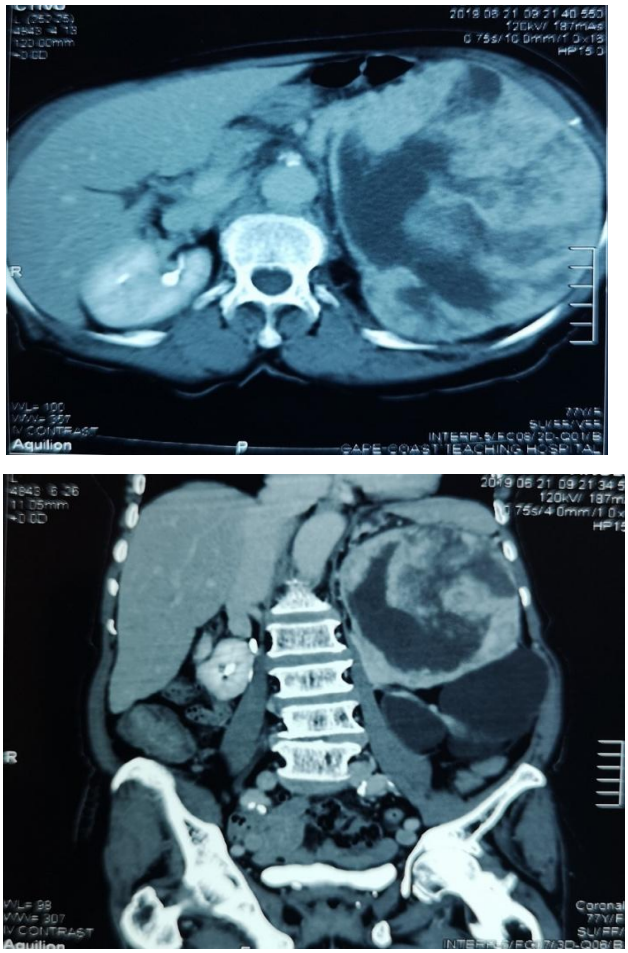

Fig. 2. Contrast enhancing CT images of the abdomen showing a huge, well delineate, heterogeneously enhancing mass of the left kidney

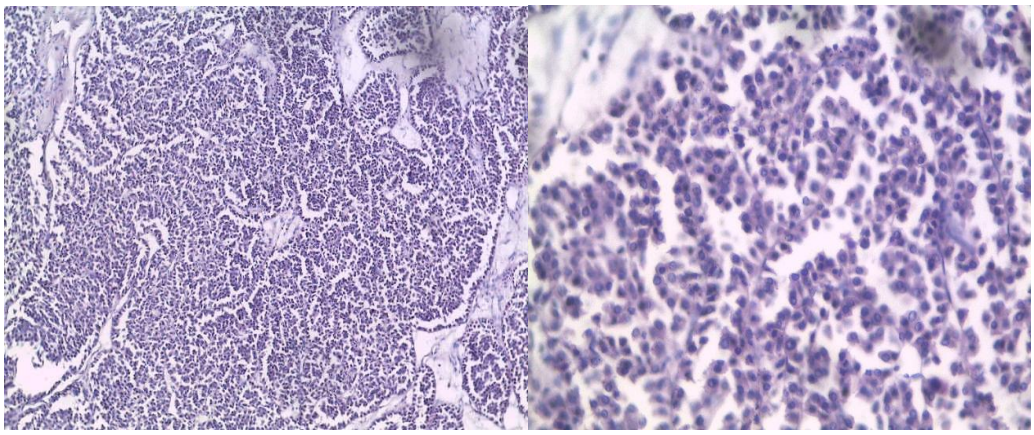

Fig. 3. H&E stain slides showing an arrangement identical to that seen in the earlier micrograph, again with cells showing abundant granular cytoplasm (Magnification x 40 and x 100 respectively)

A left kidney measuring 18 cm x 16.5 cm x 10 cm in size was resected and weighed 1.6 kg. Macroscopically, the renal tumour was located in the pelvic region of the left kidney and measured 15 cm x 12 cm x 10 cm in size with an intact capsule. The tumour had dark brown and mahogany brown areas. Parts of the tumour were cystic and the renal pelvis was similarly cystically dilated in areas where it was compressed by the tumour.

Microscopic examination of hematoxylin and eosin (H&E)-stained sections of the nephrectomy specimen showed a well encapsulated tumour composed of bland groups of cells with abundant granular cytoplasm growing as nests and islands with alveolar morphology in areas (Fig. 3). There were scattered myxoid areas within the stroma. The adjacent parenchyma showed chronic inflammatory changes. The tumour did not involve the adjacent renal parenchyma and did not breach the capsule. The vessels were free of tumour. These features were consistent with oncocytoma.

3. DISCUSSION

Renal oncocytoma is the second most common benign renal neoplasm [12]. It is more common in men usually in the seventh decade of life and is often diagnosed incidentally [2] as was the situation in the first case presentation. It is rarely associated with renal failure usually due to multiple tumours or large bilateral tumours [13]. Both of our cases had normal renal functions and unilateral tumours.

Distinguishing between renal oncocytoma and renal cell carcinoma in clinical practice often poses a diagnostic challenge, due to its similarity in appearance to especially the chromophobe variant of renal cell carcinoma on both pathology and imaging [12]. RO and chromophobe RCC share a common cellular origin from intercalated cells of the collecting duct. [14]. There are current researches that have made attempt to distinguish between these two (2) tumours. One of such studies is the use of the imaging finding of “segmental enhancement inversion” on CT scan, that has been shown to have acceptable specificity but tends to be reliable in a size-dependent manner [12]. Again, this finding has shown low sensitivity, ranging from 15 to 21% in magnetic resonance imaging (MRI) and CT scan respectively [15]. In view of this, the accuracy of clinically distinguishing between RO and RCC cannot be solely based on imaging.

Similarly, the usefulness and practical role of biopsy in the diagnosis of renal oncocytoma has been a focus of study in recent times. There are inconsistent data to both support and refute the use of a core biopsy or FNAC prior to deciding upon management. Results have been dependent on the adequacy of the tissue obtained, therefore the pathologist can report the result as either a specific subtype of RCC, RO, or a mix of both, called hybrid oncocytic/ chromophobe tumours (HOCT). Interestingly, when the pathologists cannot differentiate between chromophobe RCC and oncocytoma, the description of “oncocytic neoplasm” is often used [16]. Yet again, the clinical dilemma on the appropriate management for these patients is not made any clearer. Hence all patients eventually end up with radical nephrectomy erring on the side of malignancy. However, some advocate

for laparoscopic nephron-sparing surgical approaches (partial nephrectomy, enucleation or wedge resection) to treat some selected patients [4,10] followed on with active surveillance protocols.

Oncocytomas appear light brown, mahogany or brownish yellow, homogenous, well circumscribed and often unencapsulated, solid tumours as was observed in the macroscopic appearance of our cases. Consequently, this feature is consistent with the benign behavior of this tumour. The tumour very rarely invades the renal parenchyma and collecting system even if it is quite large. However, invasion of the perinephric tissue is reported in 11% to 20% of cases [4,17]. Interestingly in these cases, the tumour still exhibited benign behavior [17,18]. Then also a stellate central scar is commonly reported with incidence of 33% to 54% [4] usually observed in larger tumours. Clearly, this central scarring is suggestive but definitely not pathognomonic for oncocytoma. Hemorrhage is found in 20% to 30% of cases [17] which was not evident in our case report.

Microscopically, the basic component of oncocytoma tumour is the “oncocyte”, a large, round, or polygonal neoplastic cell with a granular eosinophilic cytoplasm. Oncocytic tumors were reported outside the kidney in the thyroid, parathyroid, salivary glands, and other tissues. The oncocytes are abundant with mitochondria that confer their characteristic staining features. Oncocytomas are arranged in nesting, alveolar or tubular growth pattern that shows closely packed cells at the periphery and more separated cells centrally [19]. The stroma may be myxoid or hyalinized as was observed in the case reported. Other microscopic features of oncocytomas may include cellular atypia, prominent nucleoli and pleomorphism that are clearly manifestations of malignancy. However, oncocytomas with these features still maintain benign behavior. Consequently, within the oncocytoma tumor it is possible to find a small population of cells that exhibit cytoplasmic clearing that may also coexist in chromophobe type RCC [17].

In some cases, differentiating among the tumours becomes difficult, especially among the eosinophilic variant of chromophobe RCC, the granular variant of conventional RCC and oncocytoma [20,21]. and thereby immune-histochemistry is employed to confirm the diagnosis. The most useful markers for differentiating these renal tumours are vimentin (positive in conventional renal cell carcinoma and negative in chromophobe cell carcinoma and oncocytoma), CK7 (positive in chromophobe cell carcinoma and negative in oncocytoma and conventional renal cell carcinoma), RCC marker and CD10 (positive in conventional renal cell carcinoma and negative in chromophobe cell carcinoma and oncocytoma) and Hale's colloidal iron staining with diffuse reticular pattern and perinuclear halo (which is present in chromophobe cell carcinoma but absent in oncocytoma and conventional renal cell carcinoma) [22-25]. Also, the distal nephron proteins claudin-7 and claudin-8 have potential use as immunohistochemical biomarkers in the differential diagnosis of chromophobe renal cell carcinoma and oncocytoma [22]. In our case, it was possible to establish the diagnosis of oncocytoma on microscopy and hence, since immunohistochemistry studies confer additional cost to the patients, it was not done. However, in subsequent studies, immunohistochemistry will be done on all specimens to clarify any diagnostic challenges.

In addition, the chromophobe RCC which is a distinct histology subtype of renal cell carcinoma, has the eosinophilic variant that was first described in 1988 [26]. Grossly, the eosinophilic variant of chromophobe RCC also has a light brown or mahogany brown appearance resembling renal oncocytoma [4,27] Microscopically, they may have nested, alveolar or sheet-like architecture with large tumour cells composed predominantly of fine, peripherally accentuated, eosinophilic granules of the cytoplasm, perinuclear halo, wrinkled raisinoid nuclei, frequently binucleated and coarse chromatin (resembles koilocytes) [28]. Chromo-phobe RCC, unlike renal oncocytoma, is malignant with metastatic potential [18,29] therefore the ability to make a clear preoperative diagnosis is crucial in the management of the tumour so as not to offer ever patient radical nephrectomy.

4. CONCLUSION

Renal oncocytoma though is benign and has an excellent prognosis but the preoperative diagnostic challenges based on clinical and imaging studies invariable warranted radical nephrectomy for the cases reported in this series.

CONSENT

As per international standard or university standard written patient consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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