Journal of
Health Education Research & Development

Qingwen, et al., J Health Edu Res Dev 2015, 3:2
DOI: 10.4172/2380-5439.1000131

Case Report Open Access

Diagnosis and Treatment of Abnormally Calcified Renal Masses (3 Case Reports)

Qingwen L*, Sheng X, Sheng W, Jianmin L, Jiajun Z, Zhijun C, Chengyong W, Jian L and Shuai Y

Department of Urology, the First Affiliated Hospital of Bengbu Medical College, Bengbu Anhui 233004, China

***Coressponding author:** Qingwen L, Department of Urology, The First Affiliated Hospital of Bengbu Medical College, Bengbu Anhui -233004, China, Tel: 86 552 317 5333; E-mail:bbrobber@163.com

Rec date: Jun 18, 2015; **Acc date:** Jul 22, 2015; **Pub date:** Jul 24, 2015

Abstract

Object

Improve the diagnosis and treatment of calcified renal masses.

Method

We respectively reviewed 3 cases of abnormally calcified renal masses admitted to our hospital. We evaluated the clinical manifestations in the patients we treated and reviewed the literature regarding the diagnosis and treatment of calcified renal masses. Case 1, a 21 year old male, was evaluated for a right renal space-occupying lesion found incidentally on physical examination. CT imaging revealed a space-occupying lesion in the middle lower pole of the right kidney with peripheral circular calcifications and irregular calcifications. The lesion was low density on CT. Case 2, a 44 year old male, presented with right flank swelling pain and discomfort for 10 days. KUB and CT imaging demonstrated an abnormal round calcification in the dorsal midpole of the left kidney. Case 3, a 53 year old female, presented with dull left flank pain for more than 2 years. KUB and CT showed a round calcified lesion in the upper pole of the left kidney.

Results

The diagnosis of renal cancer was made before surgery in patient 1 and radical nephrectomy was carried out. The pathological diagnosis was papillary renal cell carcinoma. The patient was followed for 27 months and was free of recurrence and metastases. The preoperative diagnosis of patient 2 was benign renal tumor. The patient underwent enucleation of the renal tumor. Pathologic examination revealed clear cell renal carcinoma. A radical nephrectomy was then performed. The patient was followed for 37 months and was free of recurrence and metastases. The preoperative diagnosis in patient 3 was left renal calyceal stones. The patient underwent wedge resection of left renal parenchyma. Pathologic examination revealed an abnormal left renal calcification with inflammatory cell infiltration. The patient was followed for 39 months and remained in good health.

Conclusion

Calcified renal masses are rare manifestations of renal cancer. It is difficult to make the diagnosis before surgery, but the prognosis is favorable. Nephron sparing surgery (NSS) is the choice of treatment.

Keywords: Renal mass; Renal tumor; Calcification

Introduction

Renal mass calcifications, especially non-peripheral calcifications (such as punctiform or cord-like calcifications) have been considered an indicator of malignancy [1]. Although peripheral curvilinear calcifications are more common in benign renal cysts, 20% are malignant. In 1905, Albrecht first reported a calcified fibrous capsule surrounding a renal cancer [2]. We reviewed 3 abnormally calcified renal masses recently diagnosed at our hospital. It was difficult to make the diagnosis because of the different pathologic findings.

Clinical data

We admitted 3 patients with abnormally calcified renal masses to our hospital since 2008. CT, IVU or ultrasonography confirmed a mass with calcifications. The patients did not have a history of urinary calculi or hypercalcemia. One patient was diagnosed incidentally during physical examination and the other 2 patients presented with flank discomfort.

Case 1: A 21 year old male was admitted to evaluate a right renal mass diagnosed by ultrasonography during a physical examination in May, 2009. Ultrasound demonstrated a 55 × 66 mm solid mass in the middle upper pole of the right kidney. Many hyperechoic ring enhancing elements were found inside of and around the mass. There were multiple (<13 × 17 mm) hypoechoic areas within the mass. CT

imaging demonstrated a calcified space-occupying mass located on the surface of the middle upper pole of right the kidney. Significant peripheral calcification was present. The calcification surrounded the entire renal mass and formed a border with the renal parenchyma. Irregular calcifications and soft tissue shadows were visible within the mass (Figure 1a). Lab tests showed no abnormalities except occult blood in the urine.

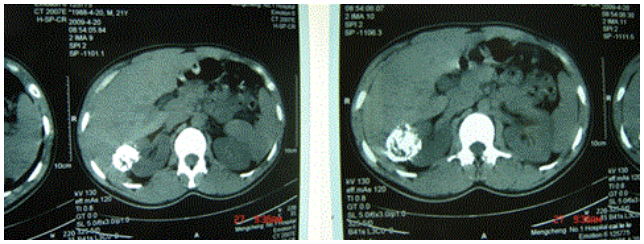

Figure 1a: CT scan of both kidneys.

A preoperative diagnosis of malignant tumor was considered. The patient underwent right radical nephrectomy. During surgery, a rock-hard, calcified mass (diameter 5 cm) was observed in the upper pole of the right kidney (Figure 1b).

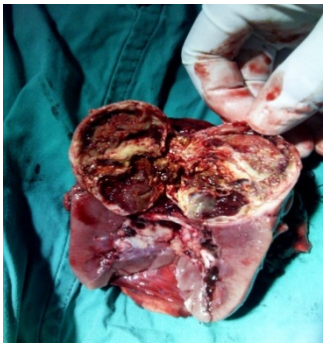

Figure 1b: Gross examination of right kidney.

Pathological examination revealed a 5 × 4.5 × 4.5 cm papillary renal cell carcinoma. The surgical margin of the ureters, adrenal gland, and paracaval lymph nodes (0/5) contained no tumor. Immunohistochemical evaluation was (IHC-09759) that RCC(-), CK10(+), EMA(++), CK(++), Vim(+), CK007(-), P504S(+), CK7(+). The patient recovered from surgery uneventfully.

Case 2: A 44 year old man was admitted with left flank swelling and pain of 10 days duration in August, 2008. He had been diagnosed with left renal calculi and underwent extracorporeal shock wave lithotripsy (ESWL) at some time in the past at another hospital. His symptoms did not improve after ESWL, and he was referred to our hospital. His routine lab tests were within normal limits. KUB and IVU demonstrated a 3.5 × 4.5 cm left renal calculus in the upper inner part of the left renal pelvis. The lesion had a smooth margin and was shaped similar to an egg shell. The left kidney and collecting system were normal in appearance (Figure 2a). Ultrasonography demonstrated a hyperechoic mass.

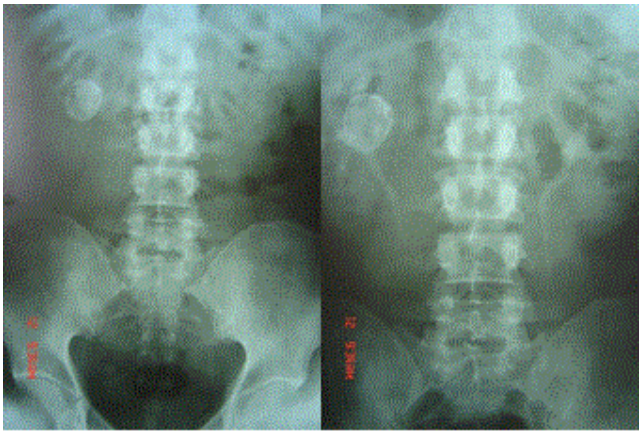

Figure 2a: KUB and IVU images.

CT imaging revealed a 3.0 × 4.0 cm well-defined solid calcified mass in the middle upper pole of the left kidney.

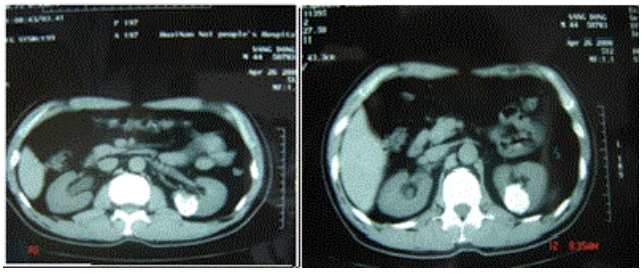

Figure 2b: CT scan of both kidneys.

Preoperative diagnosis was a benign space-occupying lesion of the left kidney. The patient was treated with enucleation. During surgery, a rock-hard, well defined and obstructed renal parenchymal mass was seen. Pathologic examination revealed clear cell renal carcinoma with calcifications. The patient was then treated with left renal radical nephrectomy. The patient recovered well.

Case 3: A 53 year old woman was admitted in April, 2008 with dull left flank pain of more than 2 years duration. CT imaging demonstrated a solid, circular, well defined calcification (diameter 2 cm) in the middle pole of the left kidney (Figure 3a).

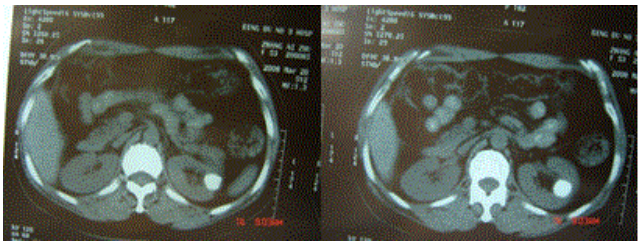

Figure 3a: CT scan of both kidneys.

KUB and IVU demonstrated a circular calcification in the left renal parenchyma and a normal renal collecting system (Figure 3b). Urinalysis revealed epithelial cells and occult blood.

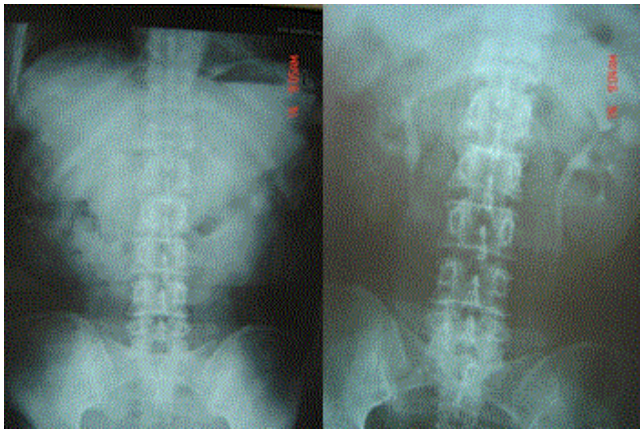

Figure 3b: KUB and IVU image.

The primary diagnosis was left calyceal calculus and possible left calyceal diverticula. Wedge resection of left renal parenchyma was carried out. The lesion was seen to be a gray-white stone-like, soft mass with tight local adhesion. Pathologic evaluation revealed collagen deposition, inflammatory cell infiltration, and necrosis. The patient recovered well.

Discussion

Renal cancer is one of the common tumors of the urinary system and accounts for 2% ~ 3% [3] of malignant tumors in the human body. The incidence of renal tumors has significantly increased with the introduction of imaging technologies, such as ultrasonography and CT. Surgery is the standard treatment of renal cancer. Radical nephrectomy is commonly considered the "Golden standard" for the treatment of renal cell carcinoma.

Early and accurate diagnosis of renal masses is important. This can help avoid overtreatment and unnecessary use of medical resources. Although needle biopsy can provide accurate diagnostic information, it can implant tumor cells in the needle tract. Because of the limited contribution to treatment, preoperative needle biopsy is usually not performed in patients undergoing radical nephrectomy The preoperative diagnosis of renal masses depends on imaging studies (ultrasonography, CT and IVU) that provide diagnostic evidence. Common benign renal tumors (renal cysts and renal angiomyolipoma) can be accurately diagnosed by their typical imaging features. The diagnosis of most renal cancers can be made before surgery by the typical imaging features seen on contrast enhanced renal CT imaging studies.

Calcification in renal masses is considered a marker of malignancy. Atypical calcifications found on imaging studies can be found in benign, malignant, cystic, or inflammatory lesions. Renal hamartoma, also called renal angiomyolipoma (AML) contains abundant non-calcified fat, allowing a diagnosis to be made from CT imaging studies before surgery. Ming Shi, et al. [4] reported a renal AML with significant calcification that had been misdiagnosed as renal calculi. Merran [5] reported a case of renal angiomyolipoma containing significant calcifications, possibly resulting from osseous metaplasia within the tumor. Elliot [6] reported a malignant renal tumor containing non-calcified fatty tissue. When fat is the major component within a renal mass, it is usually classified as an angiomyolipoma. A renal mass containing small amounts of fat and large amounts of calcification is more likely a renal cell carcinoma.

There are two main classes of calcified renal cystic masses, simple or complex renal cysts (occurring after hemorrhage, infection or ischemia) and cystic renal cancer. Calcification is more common in renal cystic lesions and is often nodular or peripheral and cord like on imaging studies. Bosniak classified renal cystic lesions into 5 categories. A cyst that contains a few thin hairlike septa, with the wall or septa less than 1 mm in thickness, is category I. Fine calcifications present in the wall or septa occur in category II cysts. Category II is considered to be benign lesion. Category IIF cysts contain a larger number of thin hairline septa. There can be minimal thickening of the septa. The cyst may contain nodular or thick calcifications without any sign of enhanced soft-tissue components. Uniformly hyperdense lesions greater than 3 cm in diameter are placed in this category. Regular imaging follow up is recommended. Israel [7] followed 81 renal cystic masses with calcification. Enhanced soft tissue components correlated more with the diagnosis of neoplasm than did calcification. Calcifications in renal cancer are usually irregularly distributed throughout the mass, and rarely form a calcified marginal ring. William [8] reported 111 of 2709 renal masses had calcification diagnosed by imaging studies. 95% of renal masses with non-peripheral calcifications were malignant or needed further imaging studies. Additional studies were usually not helpful, and surgery was required. Eggshell-like peripheral calcifications were more common in benign tumors, and occurred in 20% of malignant tumors. Renal cancer most commonly occurs after 40 years of age, with a peak in the 50-70 year age range. In Rahaman [9] reported an unusual case of a 15 year old male with a renal mass in the upper pole of the right kidney. There was a peripheral circular calcification extending into the renal parenchyma. The postoperative pathologic report confirmed renal cell carcinoma. In our report, 2 renal masses contained significant solid calcifications that were suggestive of renal cell carcinoma, but were misdiagnosed as renal calculi or benign renal tumor. These two cases with solid calcification were classified as different subtypes of renal cancers, suggesting there are various mechanisms of calcification.

Many mechanisms are involved in the calcification of a renal tumor. There has not been a thorough study on these mechanisms. We reviewed the literature of calcification in renal tumors and propose several hypotheses, including vascular calcification, heterotopic ossification, inflammatory mediators, focal necrosis, and hypercalcemia. Ossification in a renal tumor can present as a calcification on imaging studies, but this is rare. Osseous renal masses are usually a variation of tumor cells or metaplasia of epithelial cells. Four childhood renal masses with ossification were reported as an "Ossifying renal tumor of infancy". Two cases of adult renal cell carcinoma presented with peripheral focal osseous metaplasia. One case was clear cell renal carcinoma and one was chromophobe renal carcinoma [10]. Calcification in renal masses may occur with nephrocalcinosis. It can be difficult to distinguish atypical calcification associated with renal tuberculosis from calyceal calculi. The misdiagnosis of the 3 cases in our study may be related to these reasons. Calcified renal masses are associated with diverse clinical manifestations. Typical imaging features are helpful in making the correct preoperative diagnosis. However, atypically calcified renal

masses must be surgically removed and undergo pathologic examination.

Since Albrecht first reported a renal cancer surrounded by a calcified fibrous capsule in 1905, a great number of imaging studies and pathologic data have confirmed that calcification occurs in renal tumors, including renal cell carcinoma, renal oncocytoma, and simple renal cysts. Calcified renal tumors have been classified into peripheral, non-peripheral and both. In our opinion, the location of calcification in a tumor is more significant in the differential diagnosis than the shape of the calcification. Other characteristics, such as hypovascularity, high degree of differentiation and favorable prognosis, suggest calcified renal cancer should be classified as an independent biological type. The prognostic implications have not been fully elucidated. The current classification of renal cancer does not separate calcified renal cancers as a subtype. The mechanism and clinical significance of calcified renal tumors needs more investigation.

References

1. Barbaian RJ, Lucey DT, Fried FA (1978) Significance and evaluation of calcifications associated with renal masses. Urology 12: 108-111.
2. Albrecht P (1905) Contributions to the clinic and pathological : Anatomy of malignant hypernephrome. Arch F Klin Chir 77: 1072-1074.
3. Jemal A, Siegel R, Xu JQ (2010) Cancer Statistics. CA Cancer J Clin 60: 277-281.
4. Shi M, Zeng D, Wei Q (2002) One case of renal angiomyolipoma with predominating calcification misdiagnosed as renal calculi. Journal of Clinical Urology[J] 17: 480.
5. Merran S, Vieillefond A, Peyromaure M (2003) Renal angi omyolipoma with calcification: CT-pathology correlation. Br J Radiol 77: 782–783.
6. Elliot J, Paul B, Marcela (2013) Renal cell carcinoma containing abundant non-calcified fat. Abdominal Imaging[J].
7. Israel GM, Bosniak MA (2005) How I Do It: Evaluating Renal Masses. Radiology[J] 236: 441-50.
8. William W, Glen W, David M (1972) Calcified Renal Masses: A Review of Ten Years' Experience at the Mayo Clinic. Radiology[J] 103: 503-8.
9. Rahaman QM, Bardhan J, Chatterjee M (2004) A case of renal cell carcinoma in juvenile age group with unusual rim calcification causing diagnostic dilemma. J Indian Med Assoc[J] 102: 582-584.
10. Wu SL, Fishman IJ, Shannon RL (2002) Chromophobe renal cell carcinoma with extensive calcification and ossification. Ann Diagn Pathol[J] 6: 244-277.