Renal granuloma misdiagnosed as renal papillary carcinoma: a case report

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Abstract

The imaging appearance of renal granuloma is very similar to that of a renal tumor. Granulomatous lesions usually do not require surgical treatment, while kidney tumors typically necessitate surgical removal. The diagnosis of renal granuloma typically relies on the history of bacillus Calmette-Guérin perfusion and the position of the renal pelvis in the image (malignant tumors usually destroy or compress the surrounding renal pelvis). However, in this case, the patient has no history of bacillus Calmette-Guérin perfusion, making the diagnosis more challenging. The ultrasound and enhanced CT findings were consistent with renal papillary carcinoma. Laparoscopic partial nephrectomy was performed, revealing degeneration and necrosis of the renal cortex and formation of granulomas. The imaging diagnosis of renal granuloma is difficult. Ultrasound-guided biopsy may be a preferable method to avoid unnecessary surgery.

Keywords: ultrasonography; computed tomography; renal granuloma; renal tumor
**Background**

Granuloma is a well-defined nodular lesion formed by the limited infiltration and proliferation of macrophages and their evolving cells. It can be categorized into infectious granuloma, foreign body granuloma, and sarcoidosis granuloma.

Renal granuloma is extremely rare. It is usually reported in the literature as a result of bacillus Calmette-Guérin (BCG) infusion. Renal complications following intravesical BCG therapy, including granulomatous lesions, abscesses, pyelonephritis, and interstitial nephritis, are very uncommon [1-3]. Renal granulomas sometimes manifest as expansive and mass-like lesions, resembling renal neoplasms [4]. Typically, granulomatous lesions do not necessitate surgical treatment, while kidney tumors often require surgical removal. Therefore, distinguishing between renal tumors and BCG-induced renal granulomas based on imaging findings is clinically significant in order to prevent unnecessary surgical resection. The diagnosis of renal granuloma usually relies on a history of BCG perfusion and the presence of compressed or destroyed calyces (malignant tumors typically destroy or compress the surrounding calyces) [5]. However, in this particular case, the patient does not have a history of BCG perfusion, which further complicates the diagnosis.

**Case**

A 58-year-old male patient with a five-year history of diabetes mellitus presented without any complaints related to the urinary or gastrointestinal tract. Laboratory tests revealed elevated levels of blood glucose (14.64 mmol/L, normal range: 3.61–6.11 mmol/L), carcinoembryonic antigen (8.56 ng/mL, normal range: 0–5 ng/mL), carbohydrate antigen 125 (30.0 U/mL, normal range: 0–24 U/mL), and carbohydrate antigen 19-9 (34.1 U/mL, normal range: 0–30 U/mL). The patient denied any history of trauma or surgery. Ultrasound images displayed a slightly hypoechoic, round protrusion with an unclear boundary originating from the left kidney. Color Doppler flow imaging did not reveal any apparent blood flow signal (Figure 1). Renal cell carcinoma was considered based on the ultrasound findings. CT scan demonstrated a round, low-density lesion (approximately 2.8 cm in maximum diameter) located in the middle and lower part of the left kidney, protruding outward with an indistinct boundary. Contrast-enhanced CT showed slight edge enhancement but no central enhancement. Enhanced CT findings suggested renal papillary carcinoma (Figure 2). After a comprehensive analysis by urologists, renal cell carcinoma was considered, and the patient was informed about their condition. Informed consent was obtained prior to performing laparoscopic partial nephrectomy. Pathological examination revealed degeneration and necrosis of the renal cortex and the presence of granulomas.

**Figure 1 Ultrasound images.** It showed a slightly hypoechoic, round like, protruding out of the left kidney with unclear boundary. Color Doppler flow imaging showed no obvious blood flow signal.

**Figure 2 CT images.** (A, B, D) Contrast enhanced CT showed slight edge enhancement but no central enhancement (A, B: arterial phase; D: venous phase). (C) CT scan showed that a round type low density lesion (the maximum diameter is about 2.8 cm) was found in the middle and lower part of the left kidney, and it was protruded outward and the boundary was unclear. (E, F) No obvious compression of calyx (excretory-phase imaging).


**Discussion**

Papillary carcinoma is the second most common type of renal cell carcinoma, accounting for 15–20% of cases, with clear cell carcinoma being the most prevalent [6]. For the treatment of papillary carcinoma, partial nephrectomy is recommended as the treatment of choice instead of radical nephrectomy, as it improves postoperative quality of life without compromising survival rates [7].

In previous cases of renal granuloma, most were treated with anti-tuberculous drugs [4, 8]. Green DB et al. reported that corticosteroids and antimycobacterial agents are the preferred treatments for renal granuloma [9]. Additionally, it has been documented that asymptomatic renal granulomas can spontaneously resolve without the need for anti-tuberculous drugs [10]. Therefore, obtaining a clear diagnosis is crucial for formulating an appropriate clinical treatment plan and avoiding unnecessary surgical resection. If papillary carcinoma is detected early and treated with surgical local excision, it can result in a cure while preserving kidney function. Conversely, renal granuloma does not necessitate surgical removal and can be managed conservatively. Misdiagnosing renal granuloma as papillary carcinoma may lead to unnecessary surgery for the patient. On the other hand, if papillary carcinoma is misdiagnosed as renal granuloma, it will delay the patient’s condition and will even lead to nephrectomy, etc. Given the differing treatment approaches for these two conditions, accurate identification before surgery is of utmost importance. In terms of imaging, renal granuloma and papillary carcinoma typically exhibit small, homogeneous, hypovascular lesions without calcification [7]. Consequently, relying solely on imaging findings to differentiate between renal granulomas and papillary carcinomas can pose challenges. Diagnosis often depends on the patient’s history of BCG perfusion [5]. Senes et al. reported the presence of a “central unaffected calyx sign”, which could be useful in distinguishing renal granuloma from malignant tumors [5]. In renal granuloma, a normal calyx remains centrally located and is visible on post-contrast CT, whereas a malignant tumor tends to displace or destroy adjacent calyces [5]. However, in this particular case, there was no history of BCG perfusion, and the lesion was located in the renal cortex without significant compression of the calyx, making the diagnosis more difficult. The CT scan revealed a round, low-density lesion protruding outward with an unclear boundary. Contrast-enhanced CT exhibited slight edge enhancement but no central enhancement. Ultrasound and enhanced CT findings were consistent with renal papillary carcinoma, leading to the decision to perform laparoscopic partial nephrectomy. Pathological examination revealed degeneration and necrosis of the renal cortex, along with the formation of granulomas. Considering the negative staining for acid resistance, the patient had no history of tuberculosis or clinical symptoms related to it. In this case, we speculate that the granuloma resulted from ischemic necrosis of the kidney due to diabetes.

**Conclusion**

The imaging diagnosis of renal granuloma can be challenging. To avoid unnecessary surgery and improve diagnostic accuracy, an ultrasound-guided biopsy may be a preferable method.

**References**