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Case Report

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Incidental Occurrence of Papillary Renal Carcinoma in Kidney Transplant Recipient: A Case Report

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Abstract

Renal transplantation is recognized as the optimal treatment for end-stage renal disease (ESRD), offering improved survival rates and quality of life compared to dialysis. However, renal transplant recipients face a significantly increased risk of developing renal cell carcinoma (RCC), with a risk approximately five to six times higher than that of the general population. This case report highlights both the incidence and histological subtypes of RCC in renal transplant patients, emphasizing the notable prevalence of papillary RCC. This subtype occurs in 40% of cases among transplant recipients, compared to only 10 - 15% in the general population. We discuss a case involving a 30-year-old male patient who had a significant family history of hereditary renal disease. He progressed to ESRD, received a living renal transplant, and developed papillary RCC 15 years post-transplant in the transplanted kidney. Additionally, we present findings from multiple studies worldwide, highlighting the extensive data collected and the implications of long-term follow-up for monitoring outcomes of RCC. Our findings emphasize the need for increased awareness and regular screening for RCC in this high-risk population.

Keywords

Chronic diseases, Cancer, Cancer prevention and therapy

Introduction and Case Report

A 30-year-old male patient with a known strong family history of hereditary renal disease progressed to ESRD in 2007. He underwent a living renal transplant in the right iliac fossa in 2008 and was on maintenance immunosuppression therapy, including Sirolimus 2 mg BID, MMF 500 mg BID, and prednisolone 5 mg OD. The patient underwent allograft ultrasound surveillance every 5 years with no abnormalities detected. The most recent ultrasound surveillance exam was in July of 2019.

In October 2023, he presented with subjective fever associated with fatigue, loss of appetite, nausea, vomiting, and loose stool. He denied any history of abdominal pain, bloody diarrhea, vomitus, or any urinary symptoms. A positive family history of similar symptoms was documented. The physical examination was unremarkable.

A rise in his renal profile and serum creatinine from 330 baseline to 627 umol/L was noted. In addition to marked leukocytosis, raised CRP, mildly raised pancreatic enzymes, severe metabolic acidemia, and hyponatremia.

PermaCath insertion was done, and a hemodialysis session was performed. Ultrasonography showed a new hypoechoic lesion arising from the lower pole of the transplanted kidney (Figure 1), with the primary diagnosis being abscess,

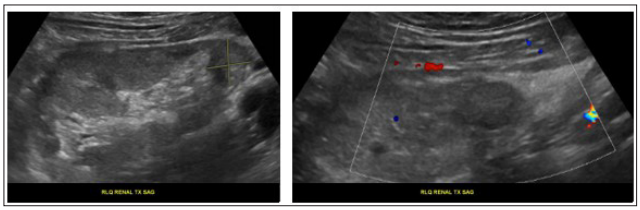


Figure 1: Renal transplant ultrasound showed a 2 × 1.7 cm homogenously hypo-echoic well-defined isolated lesion in the lower pole of the transplanted kidney, with no significant internal blood flow on doppler evaluation.

giving the clinical presentation. After stabilization of the patient and improvement of symptoms, a repeated ultrasound 5 days later showed unchanged findings, and the suspicion of malignancy was established.

Thereafter, pelvic magnetic resonance (Figure 2) was done and revealed a well-defined lower pole lesion with an element of restriction diffusion concerning malignancy.

Non-enhanced chest and abdomen computer tomography was negative for metastasis. The decision was in favor of total graft nephrectomy. Gross pathology showed a capsule with multiple hemorrhagic adhesions (Figure 3). Microscopic examination revealed type-1 papillary RCC (Figure 4) confined to the kidney parenchyma and did not extend into the perirenal fat. No lymphatic or vascular invasion was seen. The findings correspond to TNM stage 1 (T1aN0M0).

Discussion

Renal transplant stands as the optimal therapeutic choice for ESRD, as it offers superior outcomes in terms of survival rate and life quality compared to dialysis [1]. Compared to the general population, renal transplant recipients face a higher risk, approximately five to six times higher, of developing RCC, predominantly in the native kidney [2]. Clear cell RCC (ccRCC) is typically the predominant histological subtype. However, individuals who received renal transplants face a notably elevated risk of developing papillary RCC, with an

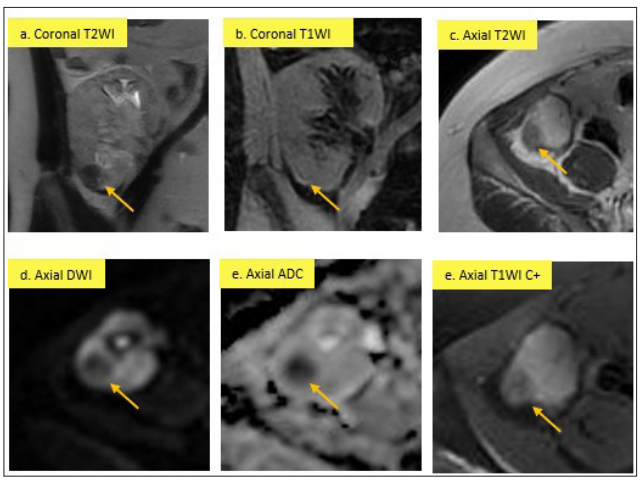


Figure 2: Pelvic MRI with and without contrast showed a partially exophytic, well-defined lower pole lesion with low T2 and iso T1 signal intensities, associated with an element of diffusion restriction and heterogeneous enhancement.

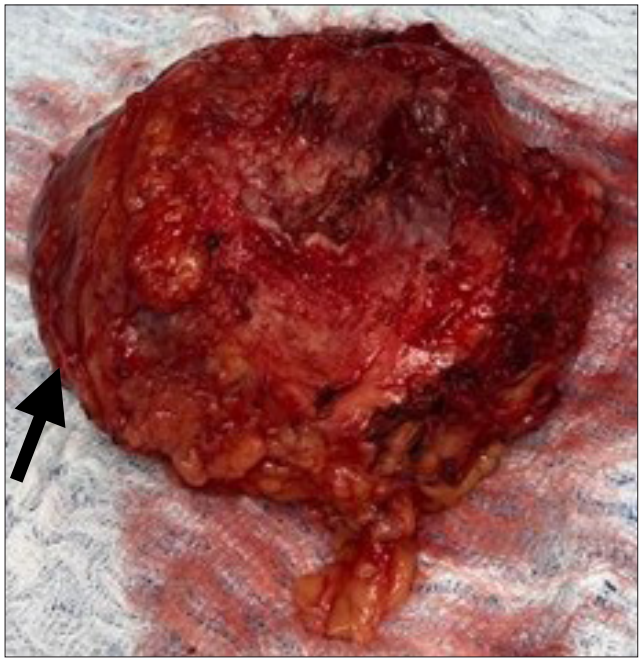


Figure 3: The gross pathology revealed the presence of a capsule (black arrow) with numerous hemorrhagic adhesions.

incidence of 40% compared to a prevalence of only 10 - 15% in the general population [2-4].

Clinical manifestations in transplant-related RCC are nonspecific. Patients may be asymptomatic or present with hematuria, proteinuria, abdominal discomfort, or fever [5]. Known risk factors for RCC include tobacco smoking, obesity, and hypertension [6, 7]. More sustained risk factors include prolonged use of immunosuppressants and oncogenic viruses, which enhance the formation of tumors [8]. On a population level, smoking cessation and decreased obesity may be the most effective prevention measures [9].

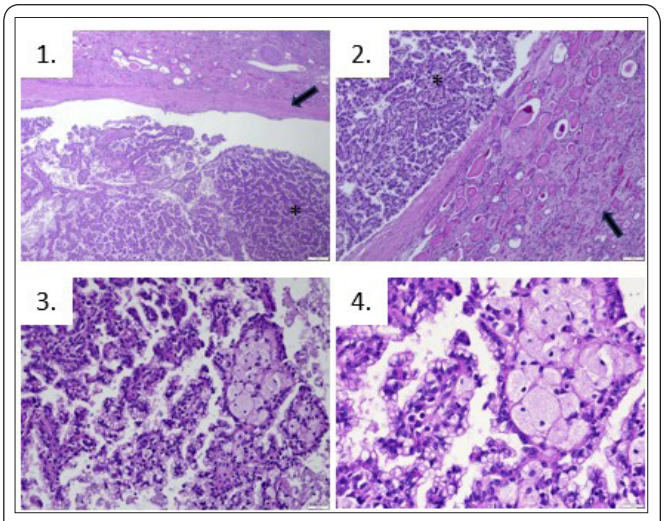


Figure 4: Image 1 and Image 2: H & E stained slides (magnification × 20 and × 40, respectively) reveal papillary renal cell carcinoma (asterisk) and background renal tissue with chronic changes (arrow). Image 3 and Image 4: H & E stained slides (magnification × 100 and × 200, respectively) reveal higher magnification of papillary neoplastic growth lined by small basophilic cuboidal cells with some clearing of the cytoplasm and foamy histiocytic. The nuclei are bland with rare inconspicuous nucleoli.

A study involving 3,568 renal transplant patients revealed that 39 cases (1.1%) were diagnosed with RCC in the native kidneys and 8 patients (0.3%) in the transplanted kidney. Among these cases, papillary RCC emerged as the predominant histological type in transplanted kidneys, with 5 diagnoses, while 3 were ccRCC. Among the native kidneys, 21 were classified as ccRCC, followed by papillary RCC in 20 cases. Synchronous bifocal RCC was identified in two patients with different histologies, revealing a larger ccRCC and a smaller papillary RCC [10].

A multicenter study with a sample of 41,806 renal recipients found that only 79 (0.19%) developed RCC in the transplanted kidney. 44 were papillary RCC, 32 were ccRCC, and 3 were mixed [11]. Native kidney RCC was not included in the study.

Another study at Memorial Hermann Hospital Texas Medical Center of 1,998 renal transplant patients showed that 20 individuals (0.8%) developed RCC. Among these cases, RCC was diagnosed with 12(60%) native kidneys and in 8(40%) allograft kidneys. Out of the native cases, ccRCC was identified in 9 cases, papillary RCC in 2 cases and chromophobe RCC in 1 case. Among the allograft cases, 6 were diagnosed with ccRCC and 2 with papillary RCC [12].

A French study included 1,250 patients who developed RCC in native kidneys; 303 suffered from ESRD, and 947 without ESRD. The study showed that ccRCC was less frequent in patients with ESRD (59% vs 89%), whereas papillary RCC was more common in patients with ESRD (37%) compared to (7%) in patients without ESRD. A small fraction of tumors showed nodal invasion (3% vs 12%) or distant metastatic disease (2% vs 15%) in patients with ESRD [13].

Several studies have shown that patients with ESRD, especially those with kidney transplants, are more likely to undergo abdominal imaging examinations. This leads to an earlier stage of diagnosis, with less nodal and distant metastasis [12-14] Based on similar reports in the literature, we anticipate that patients with long-term follow-up will have earlier detection and favorable outcomes.

Conclusion

Renal transplant recipients have a significantly elevated risk of RCC, especially in their native kidneys. While ccRCC remains the most common subtype, transplant recipients show a notably increased incidence of papillary RCC. Prolonged use of immunosuppressants and traditional risk factors, such as smoking and obesity, contribute to this increased risk. Effective routine screening protocols are essential for early detection, and despite the heightened risk, the prognosis for transplant recipients with RCC is generally favorable.

Acknowledgments

None.

Conflicts of Interest

None.

Ethical Statement

Ethical approval was obtained from the Office of Research Affairs in King Faisal Specialist Hospital and Research Centre (Reference number: RAC2024-CR-53).

Data Availability Statement

Data can be available upon a reasonable request from the corresponding author.

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