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A Case Report of Papillary Renal Cell Carcinoma Seeding along a Percutaneous Biopsy Tract

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Abstract

We report a rare case of a papillary renal cell carcinoma seeding along a percutaneous biopsy tract detected at the time of partial nephrectomy in a 51-year-old man with a 3.5 cm renal mass discovered on computed tomography scan (CT scan). Although renal percutaneous biopsy is now considered as an accurate and safe technique to provide valuable diagnostic information for indeterminate renal lesions, some inherent risks have been reported to associate with this procedure. One of the risks is tumor needle tract seeding, which is a very rare complication of renal percutaneous biopsy. Our well-documented case report could provide some useful information to evaluate the prognosis of patients with tumor seeding along a percutaneous biopsy tract.

Keywords

Kidney Neoplasms, Biopsy, Seeding

1. Introduction

In the past few years, with the increased use of cross sectional imaging, many small renal masses are discovered in asymptomatic patients. Some of those small renal masses do not present radiological criteria allowing determining the nature of these tumors. 15% to 35% of these incidentally discovered small renal masses are benign after final histological diagnosis [1]. A more precise pretherapeutic diagnosis is now required in order to avoid unnecessary surgical removal. Therefore, percutaneous renal biopsy plays an important role in the management algorithm for those patients [2] [3] [4]. Recent assessments of the safety of renal mass biopsies state that the overall complication rates range from 1.4% to 4.7%, with major complications reported only in 0.46% of all patients undergoing renal mass biopsies [4] [5] [6] [7]. The major complications are tumor

tract seeding, bleeding, arteriovenous fistula, infection and pneumothorax. Needle tract seeding refers to implantation of tumor cells by contamination when instruments like biopsy needles are used to examine, excise or remove a tumor. It can later manifest as a tumor. Some authors believe that tumor seeding may lead to change the tumor stage, convert a resectable tumor into an inoperable one and then worsen the prognosis [8]. The tumor tract seeding has been estimated to be lower than 0.01% [9]. Since 1977 to date, only 15 cases of tumor tract seeding have been reported in the literature [5] [6] [10]-[20]. We describe here an another well documented case, which is the only one encountered in our institution in 205 cases of renal biopsies followed by surgery in 17 years, establishing a frequency of tumor tract seeding of 0.48%.

2. Clinical Case

I represent and warrant that investigations involving human subjects received the appropriate institutional approval.

A 51-year-old man with no prior medical history presented with a right flank pain. The CT-scan discovered a 3.5 cm solid renal mass, strictly limited to the kidney (**Figure 1**). The patient also had a 3.5 cm cystic lesion that was not explored but a marsupialization of the cyst was done. An ultrasound-guided biopsy of the solid mass was performed. The lesion was accessed using an 18-gauge needle with coaxial sheath. 2 passes were made to obtain 8 cores, measuring 0.3 and 0.4 cm in length. Pathological analysis of the biopsy specimens showed a papillary renal cell carcinoma, probably type 1. No adjuvant treatment was administered. The patient underwent partial nephrectomy a month after diagnosis. No problems occurred post-operatively and no other treatment was prescribed. The analysis of the surgical specimen showed a well circumscribed firm mass measuring 4.2 × 3.9 × 3.7 cm and showing a yellow colour, without necrosis. The renal capsule overlying the tumor mass was intact. Microscopically, this well

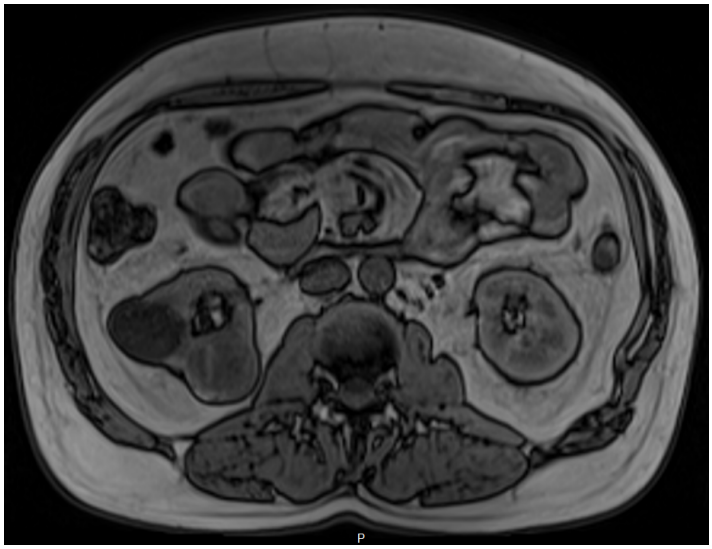


Figure 1. MRI shows a 3.5 cm solid right renal mass and a 3.5 cm cystic lesion.

demarcated lesion was a type 1 papillary renal cell carcinoma with Fuhrman grade 3 (Figure 2), without capsular effraction. In the peri-renal fat overlying the tumor, we observed a focus of viable tumor infiltration associated with a liponecrosis and a granulomatous inflammatory reaction (Figure 3 and Figure 4). The histological finding corresponded to a tumor seeding along the biopsy tract. Immunohistochemically, the tumor seeding cells were positive for both P504s and CK7 (Figure 5). The TNM classification was established as pT3a.

The follow up included a CT-scan 2 days after surgery, 2 months later, 9 months later and finally 4 years after diagnosis. They were all unremarkable.

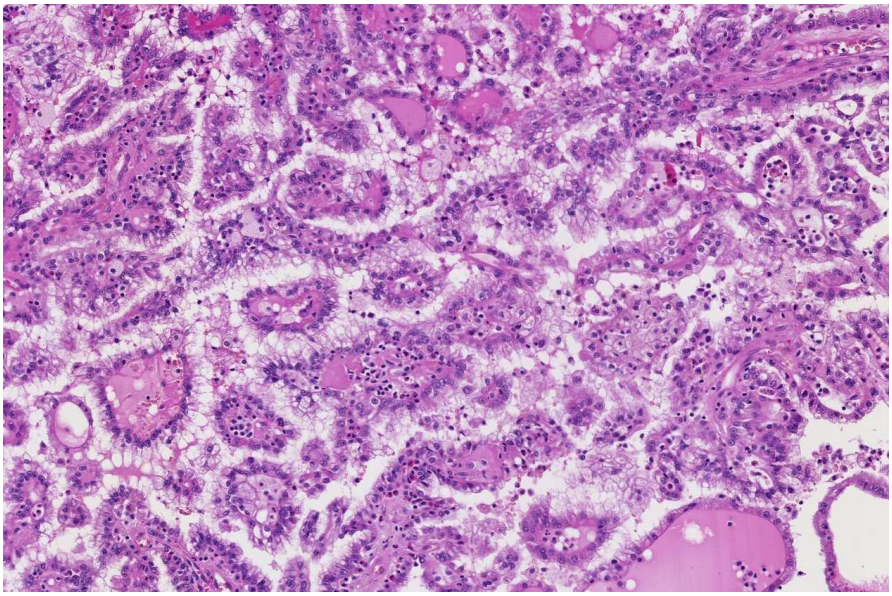


Figure 2. Papillary renal cell carcinoma type 1, characterised by tubulopapillary architecture with admixed foamy histiocytes in the papillary cores (HE staining, 10×).

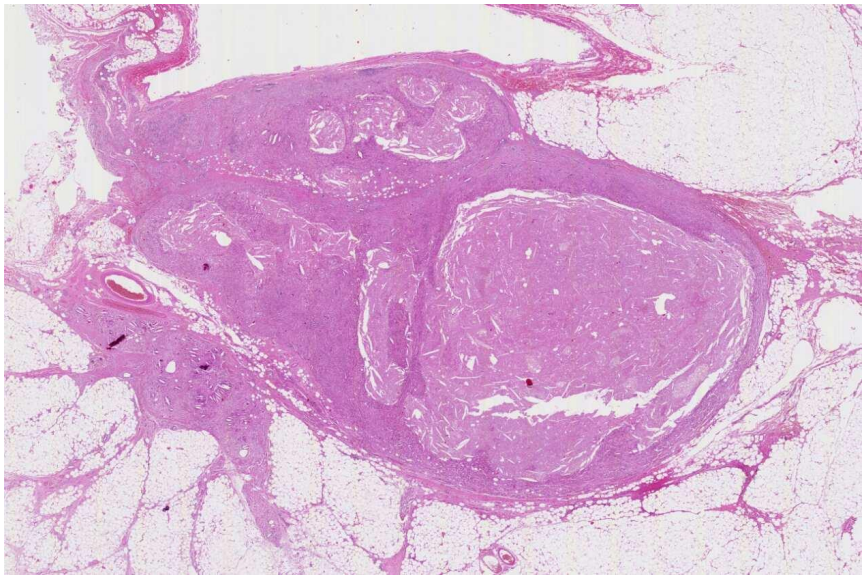


Figure 3. Peri-renal fat overlying the tumor showing the previous percutaneous biopsy tract with tumor seeding.

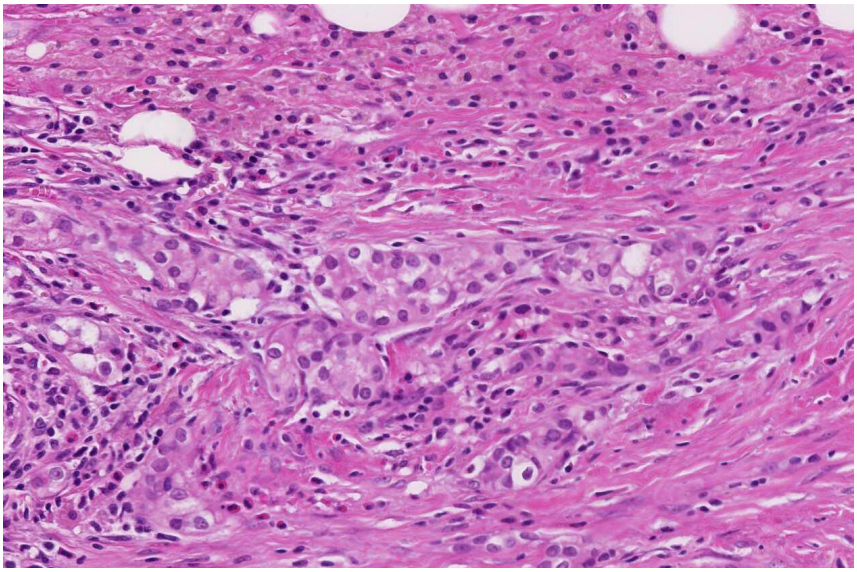
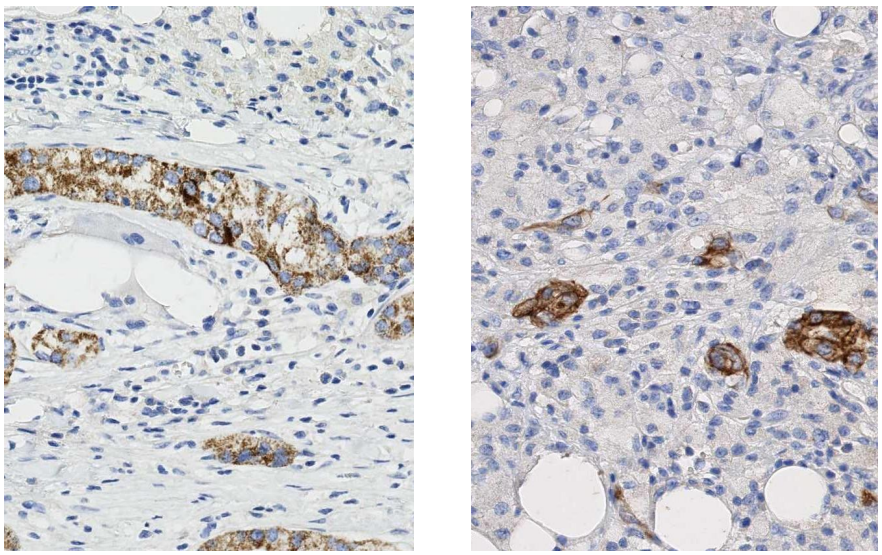


Figure 4. Peri-renal fat overlying the tumor showing papillary renal cell carcinoma seeding along the previous percutaneous biopsy tract (HE staining, 20×).



(a) (b)

Figure 5. Tumor seeing cells were positive for P504s (**Figure 5(a)**) and CK7 (**Figure 5(b)**), immunohistochemical staining, 20×.

3. Discussion

With the development of new biopsy techniques and wider experience of both radiologist and pathologist, the indications of needle core biopsy and fine needle aspiration (FNA) of renal masses are expanding in the diagnosis and management of renal tumors. The percutaneous biopsy of renal masses appears to be safe and accurate [4]. But some potential complications have been observed, including tumor seeding along the needle tract, bleeding, arteriovenous fistula, infection and pneumothorax. Tumor seeding along the needle tract is an extremely rare phenomenon. A review by Herts and Baker in 1995 found that the overall

estimated risk is less than 0.01% [9]. To our knowledge only 15 cases have been reported in the literature from 1977 up to nowadays (**Table 1**) [5] [6] [10]-[20]. As mentioned in **Table 1**, tumor seeding along the needle tract has been observed with the use of different needle calibre from 14 to 25 gauges, showing no correlation between the risk of seeding and needle size. Some authors believed that the risk may increase with the number of passes (from 1 to 8 passes), non-cutting needles and high tumor grade [4] [9]. Unfortunately, most of published data did not mention the number of passes. Several recent series showed no cases of tumor seeding, likely due to better techniques like using coaxial sheath, the widespread use of guiding cannulas and experienced radiologists [7] [8]. Apparently, the current modern techniques can reduce the risk of tumor seeding along the biopsy tract. However, this phenomenon cannot be completely avoided. For our patient, a 18-gauge needle with coaxial sheath was used and

Table 1. Published cases of RCC seeding along a renal percutaneous biopsy tract.

Reference (year)	Coaxial needle	Needles size (gauge)	Number of passes	Time to seeding	Pathological findings	Follow up
Gibbons *et al.* (1977)	No	18	N/A	20 months	RCC	15 months after seeding, no recurrence
Auvert *et al.* (1982)	No	N/A	N/A	7 years	Oncocytoma	N/A
Wehle *et al.* (1986)	No	20	N/A	4 years	Papillary RCC	Died 10 month after seeding
Kiser *et al.* (1986)	No	14 and 20	N/A	24 days	Papillary RCC	18 months after nephrectomy, no recurrence
Shenoy *et al.* (1991)	No	23	7 to 8	12 months	RCC	N/A
Abe and Saitho (1992)	No	N/A	N/A	30 months	Angiomyoliposarcoma	N/A
Mullins and Rodriguez (2013)	No	20 and 22	6	2 months	Papillary RCC	3 months after nephrectomy, no recurrence
Sainani *et al.* (2013)	Yes	20 and 25	N/A	4 years	Papillary RCC	7 years after nephrectomy and cryoablation
Giordadze *et al.* (2013)	No	20 and 22	N/A	4 years	Papillary RCC	N/A
Chang *et al.* (2015)	No	16 and 22	2	66 days	Clear cell RCC	6 months after nephrectomy, no recurrence
Soares *et al.* (2015)	Yes	17 and 18	4	56 days	Papillary RCC	1 month after partial nephrectomy, no recurrence
Viswanathan *et al.* (patient A, 2015)	Yes	19 and 20	N/A	10 months	Clear cell RCC	Died 2 years after initial presentation
Viswanathan *et al.* (patient B, 2015)	Yes	19 and 20	N/A	2 months	Papillary RCC type 1	5 years after biopsy, no recurrence
Andersen and Norus (patient A, 2016)	Yes	N/A	N/A	4 years and 7 years	RCC	N/A
Andersen and Norus (patient B, 2016)	N/A	N/A	N/A	at the time of nephrectomy	RCC	4 times of local recurrence between 2 years and 4 years and 5 months after initial surgery

only 2 passes were performed. Tumor seeding along the biopsy tract was observed at the time of nephrectomy. This is the only case in our series of 205 patients of renal biopsies followed by surgery in 17 years. The frequency of tumor needle tract seeding in our series is 0.48% (1/205). The 15 tumor seeding cases after renal biopsy reported in the literature included 6 papillary renal cell carcinoma, 2 clear cell renal cell carcinoma, 1 angiomyoliposarcoma, 1 oncocytoma and 5 without precise histological subtype of RCC [5] [6] [10]-[20]. There is no increase in risk according to the histological type of the renal carcinoma, except for upper tract urothelial carcinoma [4] [7]. The seeding-related recurrences, including our case, were detected from one month to 7 years after the initial biopsy. Among the 15 reported cases, 5 of them did not provide follow up information. The rest of patients have been followed from 1 month to 7 years after the discovery of tumor seeding. The majority of them had a follow-up less than two years without local recurrence. One of the patients had 4 local recurrences which happened between 24 months and 53 months after the initial surgery [20]. Two patients died. One of them died 10 months after the diagnosis of seeding which occurred 4 years after total nephrectomy for a papillary carcinoma. Another patient died 14 months after the discovery of tumor seeding and 10 months after cryoablation for a clear cell renal cell carcinoma with Fuhrman grade 2. The prognosis of patients with tumor seeding along a percutaneous biopsy tract needs to be further explored.

4. Conclusion

The use of needle core biopsy in renal masses is expanding to rule out nonrenal cell primary tumors or benign conditions. The risk of tumor seeding along the needle tract appears to be minimal with modern biopsy techniques, but it cannot be completely avoided. We reported a case with tumor seeding along a percutaneous biopsy tract by using an 18-gauge needle with coaxial sheath and only 2 passes. Our case report may contribute to evaluate the prognosis of patients with tumor seeding along a percutaneous biopsy tract.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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