Primary mucinous adenocarcinoma of the renal pelvis

Hsiang-Ying Lee, Mei-Yu Jang, Wen-Jeng Wu, Jung-Tsung Shen, Hsun-Shuan Wang, Shu-Fang Chang, Ki-Jiun Tsai

1. Introduction

The most common subtype of renal pelvis cancer is transitional cell carcinoma, which accounts for about 90% of cases. The remaining subtypes include squamous cell carcinoma and adenocarcinoma. Primary mucinous adenocarcinoma of the renal pelvis is rare and is often discovered accidentally by nephrectomy. It is related to chronic irritation such as urolithiasis, infection, inflammation, and hydronephrosis, and is derived from the metaplastic endothelium.

In our hospital, this is the first case of primary mucinous adenocarcinoma of the renal pelvis and was diagnosed by a pathologist. We present our experience and review the literature.

2. Case report

A 72-year-old man complained about intermittent right flank dull pain for about 1 year. His kidney-ureter-bladder (KUB) X-ray revealed a right staghorn stone and several ureteral stones. Abdominal computed tomography (CT) revealed a right-upper and middle-third ureteral calcui with severe right hydronephrosis and hydroureter (Fig. 1). He then received an indwelling right percutaneous nephrostomy for relieving hydronephrosis and we discovered a mucinous-like discharge from the nephrostomy. We also investigated urine cytology, which had negative findings and degenerated epithelial cells, foamy cells, and crystalloid material. In case of pyonephrosis, surgery was suggested. His urinalysis had pyuria but renal function was within the normal range. During the operation, an enlarged kidney with a lot of mucinous fluid in the renal pelvis was noted. Several stones were found there as well (Fig. 2). At that time, we performed a right nephrectomy and resected a segment of the proximal ureter.

Grossly, there were many vesicles with clear fluid on the outer surface of the kidney. Upon opening the kidney, there was a polypoid, mucoid tumor measuring 4.3 cm in diameter in the dilated renal pelvis. Multiple foci of tumor-like lesions and some stones were also noted in the dilated renal calyx or renal pelvis. The renal cortex was thinned. Microscopically, the renal pelvis was lined by pseudostratified, mucin-secreting, columnar epithelial cells thrown into delicate papillary folds. There were sloughed epithelial cells floating in the pools of mucin. The stroma was infiltrated by lymphocytes (Fig. 3). Therefore, the histopathological diagnosis was mucinous adenocarcinoma. The pathological stage was pT1. We followed-up carcinoembryonic antigen (CEA) concentration about 3 months after the operation and the result was within the normal range (1.6 ng/mL). The disease course was still uneventful around 1 year after the operation and no obvious recurrence or metastasis was found.

3. Discussion

The highest incidence rate of renal pelvis cancer is urothelial carcinoma, which is epithelial in origin and accounts for ~90% of
cases; the rest includes squamous cell carcinoma and adenocarcinoma. The adenocarcinoma type comprises < 1%. One of the adenocarcinoma subtypes, primary mucinous adenocarcinoma, is usually found in the colon, rectum, stomach, gallbladder, bile ducts, small intestine, urinary bladder, lung, breast, fallopian tubes, and pancreas. Mucinous adenocarcinoma in the renal pelvis is rare, especially of primary origin, and has mainly been discovered in the Asian area. Therefore, metastasis from other primary origins must be first considered. The images of mucinous adenocarcinoma such as intravenous pyelography, ultrasonography, CT, and magnetic resonance imaging are not specific, therefore, its diagnosis is difficult. It is almost confirmed accidentally after operation by pathological examination. However, because it presents copious mucous material in the urine, we can keep in mind the possibility of mucinous adenocarcinoma of the renal pelvis when discovering mucous discharge from percutaneous nephrostomy, especially concomitant renal stone impaction. Urine cytology may be an assisting method for diagnosis.

In most patients, symptoms are nonspecific and similar to those of other renal pelvis tumors, and some cases can even be asymptomatic. The most common symptom is gross or microscopic hematuria. Flank pain and palpable mass show up in late stages. Our patient presented a long-standing intermittent right flank dull pain for about 1 year.

From previous clinical experience, mucinous adenocarcinoma is often associated with chronic inflammation and infection including impaction of urolithiasis, pyelonephritis, and hydronephrosis. Long-term irritation may cause glandular metaplastic changes in the urothelium, although the theory is not proven. Some investigators postulate that metaplastic change from transitional epithelium is from successive stages. Mucinous adenocarcinoma in the renal pelvis combined with urothelial carcinoma has also been reported. The mechanism of carcinogenesis is still unclear. For mucinous adenocarcinoma in the renal pelvis, metastases may first be considered, so we must search for the possibility of primary carcinoma of other sites.

In addition to mucinous adenocarcinoma, renal stones are associated with inflammation and neoplasm, including xanthogranulomatous pyelonephritis and squamous cell carcinoma. These diseases are difficult to diagnose differentially preoperatively and are easily misdiagnosed. However, abdominal CT has considerably improved the ability to diagnose preoperatively. Xanthogranulomatous pyelonephritis, typically in middle-aged and diabetic female patients, may represent dilated renal calyces and pus-filled cavities with low attenuation. There may be a solid mass with heterogeneous areas in squamous cell carcinoma. Survival of all these diseases is related to early radical surgery.

The standard therapy is radical nephroureterectomy and bladder cuff excision. However, preoperative diagnosis is difficult, therefore, ureterectomy is often not performed. For preventing a spillage of tumor cells during the operation, careful manipulation is important. Adjuvant treatment such as chemotherapy and radiotherapy is controversial. Previous reports have shown various results for urinary tract primary mucinous adenocarcinoma. Some have even revealed no obvious benefits. Although there is no standard chemotherapy regimen, some physicians have prescribed...
different clinical combinations. Tatli and colleagues\textsuperscript{11} studied the chemotherapy for primary mucinous adenocarcinoma of the bladder. They considered if the immunohistochemistry was similar to that of colon cancer, and whether it had a positive response to the FOLFOX-4 regimen. It may be another choice for primary mucinous adenocarcinoma of the renal pelvis.\textsuperscript{11} Immunohistochemical analysis of colorectal adenocarcinoma is CDX-2- and cytokeratin (CK)20-positive and CK7-negative. However, urothelial carcinoma expresses CK7 alone or together with CK20 and with no expression of CDX-2. Therefore, the expression of CK7 is observed in 82% of cases and CK20 in 73%. The percentage of both CK20-positive and CK7-negative in primary mucinous adenocarcinoma of bladder was 29%.\textsuperscript{12}

It has been reported that primary mucinous adenocarcinoma can be related to the elevation of CEA. Ho et al\textsuperscript{13} have discovered that CEA level can predict the progression of primary mucinous adenocarcinoma of the renal pelvis as for other adenocarcinomas. However, due to the difficult diagnosis, a preoperative survey may not be performed. According to the author, the CEA concentration can still be followed-up for evaluating the prognosis. In our case, the patient's CEA level was within the normal range 3 months postoperatively.\textsuperscript{13}

Mucinous adenocarcinoma is more aggressive and has a poor prognosis compared with urothelial carcinoma, and early diagnosis is an important strategy. The prognostic factors include tumor size, stage, and grade. If we can approach these as early as possible, the tumor can be resected with negative margins.

In conclusion, mucinous adenocarcinoma of the renal pelvis is rare in cancer. The pathogenesis is considered to be associated with urolithiasis, long-standing infection and inflammation. Preoperative diagnosis is difficult, thus, physicians should still keep in mind this possibility when the patient has prolonged stone compaction with mucin discharge. Adjuvant therapy has not been established; therefore, an early operation is the main effective treatment. Although there is no identified chemotherapy regimen, we can also consider the regimen for colon cancer as an alternative choice when the renal tumor shows a histological similarity to colon cancer.

Conflicts of interest statement
The authors declare that they have no financial or non-financial conflicts of interest related to the subject matter or materials discussed in the manuscript.

Source of Funding
None.

References