A Case Report and Literature Review of Renal Calculi Accompanied by Primary Renal Pelvis Adenocarcinoma

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Introduction: In this study, we present a retrospective analysis of a complex clinical case involving a patient with concurrent renal calculi and primary renal pelvis adenocarcinoma. The case, treated at the First People's Hospital of Jiujiang, prompted an extensive literature review, aimed at enhancing the level of clinical diagnosis and treatment. The patient was a 59-year-old male who underwent urogenital ultrasound and related CT scans upon admission. The initial diagnosis was considered to be right renal calculi concomitant with a renal pelvis tumor. Subsequently, the patient underwent cystoscopy, laparoscopic right ureterectomy,Department of Urology, Jiujiang City Key Laboratory of Cell Therapy, JiuJiang NO.1 People's Hospital, Jiujiang, 332000, Jiangxi Province, China and local lymph node dissection.

Pathological assessments revealed primary adenocarcinoma originating from the renal pelvis urothelium. Consequently, a cisplatin-gemcitabine treatment regimen was administered. During treatment, the patient experienced renal failure, which was ineffective with ureteral catheter drainage. Unfortunately, the patient died of disease a mere three months after the discovery of renal pelvis adenocarcinoma. The coexistence of renal calculi and renal pelvis adenocarcinoma is a rare clinical disease with high malignancy and poor prognosis. In the diagnosis and treatment of urogenital calculi, the possibility of concomitant renal pelvis tumors should be considered. Moreover, early diagnosis and an aggressive treatment, including postoperative adjuvant chemotherapy and radiotherapy, may achieve better treatment effects in similar clinical contexts.

Keywords: Renal Calculi; Renal Pelvis Adenocarcinoma; Chemotherapy

INTRODUCTION

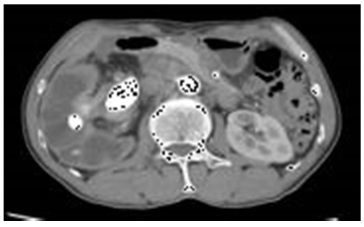
Urinary calculi are common in urological surgery, ranking first among inpatients. They can cause mechanical injury, obstruction, urinary tract infections, and even urologic malignancy malignant changes in the urinary system. The incidence of upper urinary tract epithelial tumors is not high, with transitional cell carcinoma as the main pathological type. Primary adenocarcinoma in the urinary tract is rare, and this kind of tumor most commonly occurs in the bladder, followed by the ureter and renal pelvis. Primary adenocarcinoma of the renal pelvis is exceedingly uncommon, as evidenced by the limited number of documented cases in extant literature.. Cases of urinary calculi coincide with renal pelvis adenocarcinoma are even rarer in clinical practice. This present study conducts a retrospective analysis of clinical data and treatment methods for a patient with renal calculi accompanied by primary renal pelvis papillary adenocarcinoma, treated at our hospital. Furthermore, we combine the relevant literature for analysis to discuss its clinical diagnosis and treatment methods.

Renal calculus-induced long-term inflammation or irritation has the potential to induce glandular metaplasia of the urinary epithelium, even leading to malignant tumors. Primary adenocarcinoma emerging within the renal pelvis and calyx system of these patients represents an uncommon malignancy. Patients may easily be overlooked in the early stages due to a lack of symptoms, and it is particularly difficult to obtain a definitive clinical diagnosis prior to surgery. The vast majority of patients are diagnosed based on postoperative pathological findings[1, 2]. To date, there are no other safe and effective treatments, other than surgery. Additionally, the prognosis for patients is generally poor. Reporting new cases and reviewing past literature provide more clinical experience for the treatment of this disease and still have significant practical value. Therefore, we report a distinctive case of renal calculi accompanied by primary renal pelvis papillary adenocarcinoma, to enhance the understanding and treatmentof this disease.

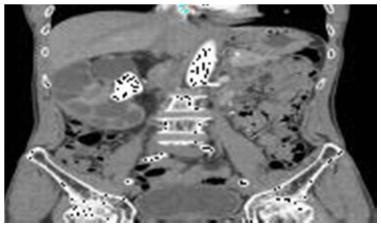
MATERIALS AND METHODS

1. General Information:

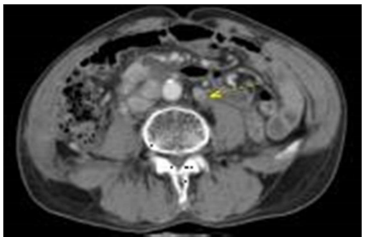
Chest CTThe patient, a 59-year-old male, was admitted to the hospital due to "right-sided back pain for more than 20 days. Physical examination did not reveal any positive signs. After admission, a urogenital ultrasound examination suggested a right kidney size of approximately 186mm×128mm×81mm; presenting with abnormal size and shape. Furthermore, no obvious normal renal parenchymal echo was seen, right kidney collection system separation measured around 75mm, heterogeneous echo area was probed in the right renal calyx, the range was about 70mm×57mm, with a rich blood flow inside. Urogenital CTU suggested (Fig.1): The shape of the left renal pelvis and calyx was good, no obvious hydronephrosis was seen, and no obvious widening of the left ureter was seen. Conversely, the right kidney was significantly enlarged, the renal pelvis and calyx were dilated, nodular density shadows were seen in the right kidney and renal pelvis area, the larger one was about 2.0cm×2.0cm×5.1cm, sheet-like density increase shadows could be seen around it, slight enhancement was seen, the right renal vein was compressed and the display was not clear, multiple lymph node shadows could be seen in the retroperitoneum, no obvious dilation of the right ureter was seen, and the bladder filling was good. and other laboratory examinations were not abnormal.



(a) The right kidney was significantly enlarged, the renal pelvis and calyces were dilated, and nodular density shadows were seen in the right kidney and renal pelvis area.



(b) Sheet-like density increase shadows were seen around the stone, and slight enhancement was seen.



(c) Two months after the operation, the wall of the middle and lower segments of the left ureter was seen to be thickened.

Figure 1 Preoperative urogenital CTU image and postoperative enhanced CT image

2. Treatment Process

1) Surgical Method

The patient underwent cystoscopy + laparoscopic right ureterectomy + local lymph node dissection under general anesthesia. During the operation, no bladder neoplasm was seen on cystoscopy, and no bleeding was seen from both ureteral orifices. The patient position was changed to a left lying position, followed by routine disinfection and towel laying; a 2cm incision was made under the right rib edge in the posterior axillary line, and the retroperitoneal space was cut layer by layer, a visual expansion balloon was placed to expand the retroperitoneal space, and a 10mm trocar was placed and fixed. Pneumoperitoneum was created, and maintained at a pressure of 14mmHg. laparoscopes were placed under direct vision at the mid-axillary line 2cm above the iliac crest and at the anterior axillary line under the right rib edge, and 12mm and 10mm trocars were placed. The ultrasonic knife was used to free and remove part of the extraperitoneal fat. The right kidney was found to be significantly enlarged, so the right ureter was found first, and after clamping with a Hamlock, gemcitabine bladder perfusion was performed and retained for 30 minutes. Subsequently, The right kidney walls were fully separated from the perinephric fat capsule, and during separation, it was found that the perinephric tissue was significantly adhered with bleeding, and it was slowly freed. From the posterior approach, the renal pedicle was found at the renal hilum, and the lymph nodes at the renal hilum were observed to be significantly enlarged, with multiple lymph nodes fused and growing, tightly adhering to the inferior vena cava. The right renal artery and vein were first exposed, and the Hamlock was used to double clamp and cut the artery and vein, the right kidney was removed, and the right ureter was freed down to the level of the iliac vessels. Then, a 12CM oblique incision was made under the right twelfth rib, the latissimus dorsi, external oblique, internal oblique, transversus abdominis, and lumbodorsal fascia were cut layer by layer, the intercostal internal and external muscles were cut, the pleura was protected, and the ultrasonic knife continued to free down along the freed ureter to the bladder, the entire length of the right ureter was removed, and the right kidney and ureter were taken out of the body as a whole. Then, lymph node dissection was performed at the renal hilum, and it was completely removed, with

attention paid to protecting the inferior vena cava during the process. A drainage tube was placed in the retroperitoneum for drainage. The surgical specimen is shown in Figure 2.

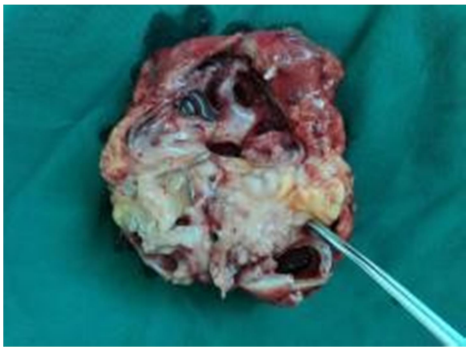


Figure 2 Right kidney specimen: kidney and perinephric fat 13*9*7cm, cut along the renal hilum, the whole kidney was solid, a 5.5*3cm tumor was seen at the renal hilum, the cut surface was grayish white and solid, papillary

2) Chemotherapy specific plan

According to the patient's height, weight, and PS score, the drug dose was calculated. The chosen chemotherapy drugs were gemcitabine + cisplatin. The first chemotherapy regimen: gemcitabine 1.2g Day1, 8 + cisplatin 30mg Day8-10; the second chemotherapy regimen: gemcitabine 1.2g Day1, 8 + cisplatin 30mg Day1-3. At the same time, symptomatic treatments such as antiemetic and gastric protection were given.

RESULTS

Postoperative pathology suggested: tumor cell proliferation was papillary and striped, infiltrative growth was seen, as shown in Figure 3. Immunohistochemical marker results considered primary adenocarcinoma of the renal pelvis urothelium; renal hilar lymph nodes (5/5) showed cancerous characteristics.

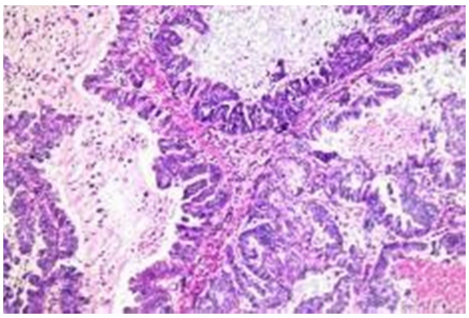


Figure 3 Renal pelvis adenocarcinoma pathology diagram: tumor cell proliferation is papillary, striped distribution, infiltrative growth (HE staining 200×)

The Immunohistochemical marker results were as follows: β-catenin(+),E-Cadherin(-),ER(-),MUC6(+),MUC2(-),MUC1(+),SATB2(-),CDX-2(-),P53(+),CA-125(+),GATA3(-),PAX8(-),CK20(-),CK7(+),Villin(+),CD10 spot(+). After the operation, the patient was treated with adjuvant chemotherapy in the oncology department, utilizing a regimen of gemcitabine combined with cisplatin. After two courses of chemotherapy, the patient experienced a decrease in urine volume, accompanied by a significant increase in creatinine. Enhanced CT suggested: thickening of the middle and lower segments of the left ureter, considering the possibility of tumor lesions, and hydronephrosis of the left kidney and upper segment of the ureter. Therefore, left ureteroscopy + ureteral stent implantation was performed. During the operation, the mucosa of the middle and lower segments of the left ureter was pale, considering the possibility of extrinsic compression, and tumor invasion was not ruled out. An F6 ureteral stent was left for drainage. However, the effect was not good, the patient's creatinine still progressively increased, and dialysis treatment was initiated. The patient died three months after the discovery of renal pelvis adenocarcinoma.

DISCUSSION

Renal pelvis adenocarcinoma is a special pathological type of upper urinary tract epithelial tumors, with an incidence rate accounting for less than 1% of upper urinary tract epithelial tumors[1]. The mechanism of its occurrence is not yet clear, but it is believed to be related to the glandularization of the urothelium caused by long-term

mechanical stimulation of stones and chronic inflammation caused by hydronephrosis[2]. Studies have shown that patients diagnosed with kidney stones before the age of 40 have an increased risk of kidney cancer and upper urinary tract epithelial cancer[3]. In this case, the patient had a large renal pelvis stone with severe renal hydronephrosis and essentially atrophic renal cortex, indicating a long duration of the stone disease without timely intervention, which eventually led to the occurrence of adenocarcinoma.

The disease has no significant specificity in clinical manifestations, and there may be no symptoms in the early stage, which is also the reason for the poor prognosis of the disease. Only when the ureter is obstructed to cause severe hydronephrosis, there may be discomfort in the waist, with or without hematuria. This patient was admitted to the hospital due to discomfort in the waist. Because the tumor was large, an outpatient ultrasound found abnormal tissue and rich blood supply around the stone. This is an important condition for an accurate clinical diagnosis, and a comprehensive urinary CTU directly clarifies the renal pelvis lesion. However, most of these cases are easily missed, because their main clinical symptoms are similar to those of simple urinary calculi, and most of them are only found to have renal pelvis occupation in the lithotripsy or postoperatively, resulting in a delay in the timing of treatment. The reasons for the difficulty in diagnosing early lesions may be as follows: 1. This disease often accompanies long-term embedded stones, severe hydronephrosis, and changes in kidney structure, thus complicating imaging diagnosis; 2. The lesions often appear in a sheet shape around the stone, and the hydronephrosis environment is not conducive to exogenous growth of the tumor, and the lesions are generally small; 3. Urinary tract obstruction leads to poor drainage of urine from the affected kidney, and the diagnostic value of urinary exfoliated cell examination is not high, with a low positive rate[4]. For cases with obvious long course of stone disease and significant obstruction or infection symptoms, one should be vigilant for the possibility of kidney stones combined with renal pelvis tumors. At the same time, attention should be paid to observing the renal pelvis mucosa during stone surgery, especially the condition of the stone embedding position. For suspicious lesions, active biopsy should be carried out to avoid missed diagnosis. It is worth noting that studies have shown that for invasive urothelial

carcinoma of the muscular layer, when the biopsy tissue is less than 1mm, the missed diagnosis rate of the biopsy increases, and as much tissue as possible should be obtained during the biopsy to improve the accuracy of the biopsy[5].

The treatment of renal pelvis adenocarcinoma is similar to that of urothelial carcinoma, with surgical treatment as the first choice, followed by comprehensive treatment plans such as adjuvant chemotherapy, radiotherapy, immunotherapy, and traditional Chinese medicine treatment. The recommended surgical method is the standard radical nephroureterectomy. If the patient cannot tolerate radical surgery, for low-risk cases, palliative approaches such as percutaneous nephroscopic electrocoagulation of renal pelvis tumors or renal arterial embolization may also be selected. However, the treatment effect is not as good as radical surgery[6, 7], and local perfusion chemotherapy is still required after surgery. In this case, the patient was considered to have non-functional kidney before surgery, with a large renal calculus and a concurrent renal pelvis tumor, so direct cystoscopy + right hemi-urological resection + renal hilum lymph node dissection was performed, avoiding the physical, mental, and financial burden of a second surgery on the patient.

As for the timing of chemotherapy, it is currently believed that postoperative adjuvant chemotherapy brings better prognosis than preoperative neoadjuvant chemotherapy[8]. Chemotherapy based on cisplatin can improve the overall survival rate and disease-free survival rate of patients, with generally manageable tolerability levels [9]. However, due to the loss of some renal units in surgery, some patients have a creatinine clearance of less than 50ml/mi after surgery and cannot tolerate the cisplatin regimen, thus carboplatin needs to be used instead[10]. Research has also found that PD-1 inhibitors also show good efficacy in patients who are not suitable for cisplatin chemotherapy, and the drug toxicity is smaller, which may become a new alternative to platinum drugs[11]. Postoperative radiotherapy has obvious effects on local symptoms caused by tumors such as hematuria and controlling distant metastasis, but it does not significantly prolong survival[12, 13]. The effect of chemotherapy and radiotherapy alone on renal pelvis tumors is not yet reflected in current data.

The patient in this case underwent gemcitabine combined with cisplatin chemotherapy after surgery. During the chemotherapy, acute renal failure occurred. After cystoscopy, it was considered to be related to retroperitoneal lymph node metastasis and compression of the contralateral ureter. Despite active catheter drainage, the patient still died three months after surgery. Foreign studies believe that papillary adenocarcinoma has the best prognosis among renal pelvis adenocarcinomas, and the 5-year survival rate after early diagnosis and treatment can reach 100%[14]. The short postoperative survival time of this case is due to the late timing of consultation and the presence of lymph node metastasis at the time of diagnosis. The median postoperative survival time of patients with metastatic urothelial tumors rarely exceeds 3-6 months, and the prognosis is poor[12]. Although we performed lymph node dissection at the renal hilum and inferior vena cava during the operation, the lymph nodes in the abdominal aorta area were not treated, which may be the reason for the early appearance of compression symptoms in the left ureter after surgery. Therefore, It is recommended to perform standard lymph node dissection routinely while performing radical nephroureterectomy, which is beneficial for prognosis[15].

In conclusion, renal calculi accompanied by renal pelvis adenocarcinoma is a rare clinical disease that progresses rapidly with a poor prognosis. Therefore, the possibility of concomitant renal pelvis tumors should be considered in the diagnosis and treatment process of urinary calculi. Early diagnosis and aggressive treatment, along with postoperative adjuvant chemotherapy, radiation therapy, and other comprehensive treatment plans, may achieve better treatment effects.

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