PRIMARY MUCINOUS ADENOCARCINOMA OF RENAL PELVIS

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ABSTRACT

Primary mucinous adenocarcinoma of the renal pelvis is a very rare tumour which is usually associated with hydronephrotic changes; due to infection, chronic irritation, inflammation and urolithiasis, leading to glandular metaplasia of the urothelium.

We present a 52 year-old male, who presented with a palpable right loin mass and right flank pain and has a history of renal calculi 5 years before. He was diagnosed radiologically and clinically to have hydronephrosis with a non-functioning kidney. He underwent a right simple nephrectomy in Prince Hussein Urology Center in August 2021 and had a follow-up period of six weeks. Upon histopathological examination, the diagnosis was invasive well-differentiated mucinous adenocarcinoma of the ureter and renal pelvis stage PT2N0M0.

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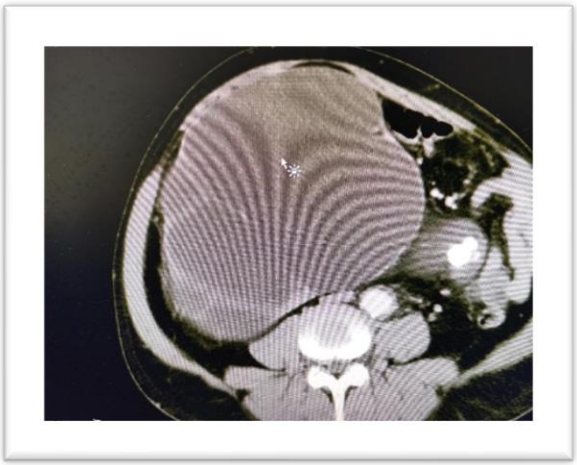
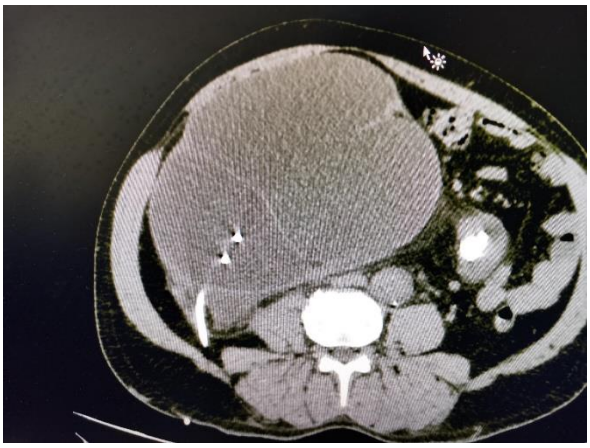
INTRODUCTION

Squamous cell carcinoma and transitional cell carcinoma are the commonest epithelial malignancies arising from the renal pelvis, accounting for 10–15% and 85–90% of cases, respectively (1). Adenocarcinomas of the renal pelvis account for <1% of cases with the subclassification of mucinous (21.5%), tubulovillous (71.5%) and papillary non-intestinal (7.0%) (1,2). The first report of primary mucinous adenocarcinoma of the renal pelvis was in 1960 by Hasebe *et al.* (3). It remains a rare disease with fewer than 100 cases reported (4). Without the characteristic symptoms or radiological features, it is difficult to diagnose preoperatively. Also, because of its' rarity, no standard treatment has been proposed (1). Herein, we present a case of mucinous adenocarcinoma arising from the renal pelvis following the CARE Guidelines and conduct a literature review including all of the cases reported since 2000.





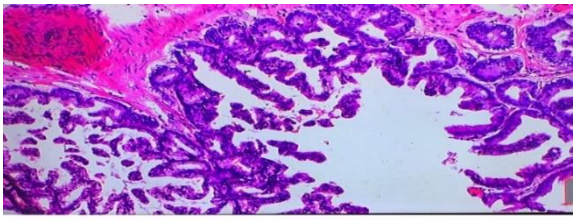
Case presentation

A 52 year-old man presented with a 6-month history of right flank swelling and pain in addition to episodes of fever. He has a history of right renal stones, for which the patient did not receive any treatment. He was admitted to Prince Hussein Urology Center. A computed tomography scan showed a 17 mm pelvi_uretric stone causing massive right hydronephrosis with the right kidney crossing the midline and the pelvic junction seen in the left side of the abdomen, along with a 17 mm lower group calyceal stone and cortical thinning. A non-functioning right kidney was found on the DMSA scan. He was diagnosed with a non-functioning right kidney and was given the plan of a right simple nephrectomy. He underwent right percutaneous nephrostomy insertion to relieve the hydronephrosis, with an output of 700 ccs 5 days before the surgery. Four days later, on follow-up computed tomography, the hydronephrosis was unchanged along with recurrent blockage of the nephrostomy tube. Laboratory tests showed normal liver and kidney function tests. We diagnosed the patient with calculous non-functioning kidney with the possibility of malignant disease to be excluded. We performed a midline simple nephrectomy.

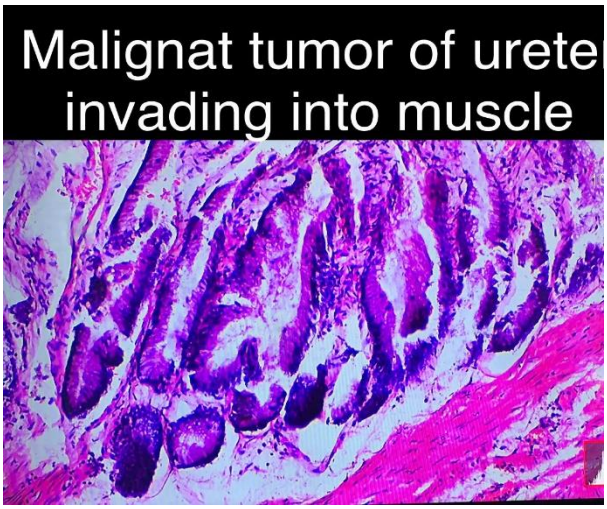
His kidney was markedly enlarged with a thin cortex.
There was an unintentional spillage of gelatinous material because of the PCN procedures. Therefore, we only performed a nephrectomy without a total ureterectomy. On sectioning the kidney, there was thick gelatinous material. The cut surface showed cystic dilation of the pelvicalyceal system with extensive atrophy and thinning of the renal cortex. The histological diagnosis of

primary mucinous adenocarcinoma of the renal pelvis along with intestinal metaplasia was made.

This patient was advised to undergo adjuvant chemotherapy because of the spillage of gelatinous material during surgery. He initially refused and was referred to the oncology team. Later on, the patient received 4 cycles of adjuvant chemotherapy of gemcitabine–cisplatin. On follow-up bone and CT scans, he was found to have bone metastasis in the coccyx and left proximal femur. He is now under the care of the oncology team.



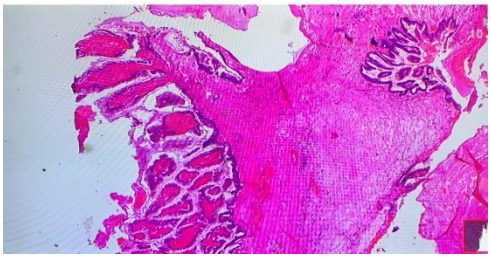
Invasive moderately differentiated adenocarcinoma

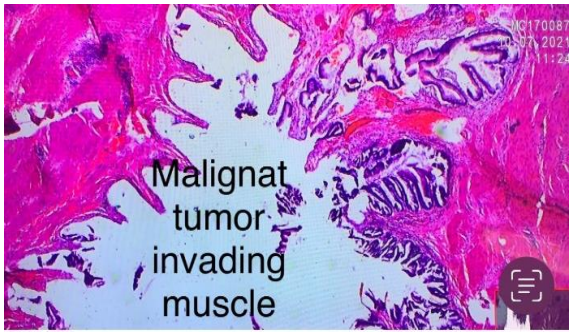


DISCUSSION

Mucinous adenocarcinoma, generally seen in organs other than the urinary system, is characterised by abundant mucous secretion comprising more than half of the tumour volume (5, 6). To date, fewer than 100 cases of the rare primary mucinous adenocarcinoma of the renal pelvis have been reported. It can be misdiagnosed as calculus pyonephrosis because it is poorly recognised. As in the present case, PCN can

Renal pelvis involved by malignant tumor

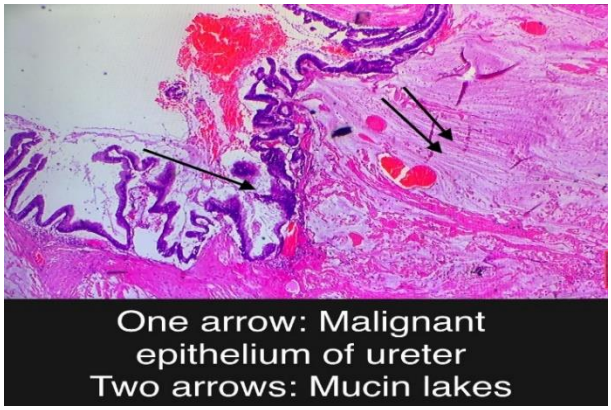




result in iatrogenic tumour-cell spillage and seeding; PCN can also increase the difficulty of any subsequent

treatment. These factors can contribute to its poor prognosis. Although we are not the first group to report
this disease, our case should remind surgeons about the possibility of malignancy before conducting PCN on patients with pyonephrosis, especially those with elevated serum tumour markers and longstanding obstructive calculus.

We conducted a literature search of PubMed and Embase using the MeSH terms 'mucinous, adenocarcinoma' and 'kidney pelvis'. We included all of the cases reported since 2000 (Table 1), with most being from Asia (83.3%), especially India (33.3%). More men were reported than women (63.33% vs. 33.33%). The only clinical risk factor in mucinous ovarian adenocarcinoma is smoking (6). The higher prevalence of smoking in men may cause a higher rate of adenocarcinoma. In previous cases, no typical symptoms were reported. As in this case, the patient
presented with right waist pain and intermittent fever. Our literature review found that 7/30 patients presented with abdominal mass, 19/30 presented with flank pain or discomfort and 5/30 presented with gross haematuria. These were consistent with the classical renal cancer triad, indicating late-stage or advanced disease. It is reported



that chronic obstruction, long-standing irritation and infection can contribute to the metaplastic changes of the urothelium, dysplasia and adenocarcinoma (8). However, some researchers thought that a suspicion or diagnosis of this tumour by history taking and physical examination was impossible (1). Through a literature review and the current case, we believe that careful physical examination and history taking could indicate long-term disease and contribute to the preoperative diagnosis.

Table 1Literature review of the 30 cases of primary mucinous adenocarcinoma of the renal pelvis reported in the literature since 2000

No. (ref.)	Sex/age	Region		Symptom	Tumour biomarker	Radiological findings	Surgery	Adjuvant therapy	Follow-up
1 (7)	M/NA	Japan		Haematuria; flank pain	NC	Hydronephrosis; calculi	NU	NC	Alive at 2 Y
2 (8)	F/45	India		Flank pain	NC	Hydronephrosis; pyonephrosis; mass	RN	NC	Alive at 6 M
3 (9)	M/73	Iran		Flank pain	NC	Hydronephrosis	Nephrectomy	NC	Alive at 6 M
4 (2)	M/40	China		Flank pain	CEA, CA19-9	Kidney cyst	RN	IL-2	Alive at 14 M
5 (10)	M/51	India		Abdominal pain and mass; haematuria	NC	PUJO; hydronephrosis	Heminephrectomy	NC	NC
6 (1)	M/50	Korea		Flank discomfort	NC	Hydronephrosis; PUJO; calculi	RN	NC	Alive at 20 M
7 (11)	F/45	India		Flank pain; fever	NC	Pyonephrosis; hydronephrosis	RN	NC	Alive at 3 M
8 (12)	M/72	Taiwan		Flank pain	Normal	Hydronephrosis; pyonephrosis	Nephrectomy	NC	Alive at 1 Y
9 (13)	F/71	Turkey		Haematuria	NC	Mass	RN	NC	Alive at 16 M

No. (ref.)	Sex/age	Region		Symptom	Tumour biomarker	Radiological findings	Surgery	Adjuvant therapy	Follow-up
10 (14)	F/51	Germany		Abdominal swelling	NC	Mass; calculi; hydronephrosis	Nephrectomy and partial ureterectomy	NC	metastasis within 1 Y
11 (15)	M/45	India		Abdominal pain	NC	Dermoid cyst; calculi; pyonephrosis	Nephrectomy	NC	Alive at 18 M
12 (16)	F/56	Taiwan		Fever	NC	Pyelonephritis	NU	NC	Alive at 6 M
13 (17)	M/54	Mexico		Abdominal mass	CEA	Cystic mass	Nephrectomy	NC	Alive at 2 Y
14 (17)	M/45	Mexico		Pyelonephritis	NC	Hydronephrosis	Nephrectomy	NC	Alive at 64 M
15 (18)	M/45	India		Flank pain	NC	Pyonephrosis; calculi; PUJO	Nephrectomy	NC	Alive at 1 M
16 (19)	M/56	Japan		Haematuria; flank pain	CEA	Kidney cyst	Tumorectomy	NC	NC
17 (20)	NA	India		NC	NC	Pyonephrosis	RN with partial ureterectomy	NC	Alive at 1 Y

No. (ref.)	Sex/age	Region		Symptom	Tumour biomarker	Radiological findings	Surgery	Adjuvant therapy	Follow-up
18 (21)	F/56	China		Fever; flank pain	CEA, CA19-9	Hydronephrosis; pyonephrosis; soft tissues	Nephrectomy	None	Died at 5 M
19 (22)	M/68	Nepal		Flank pain; abdominal swelling	NC	Calculi; pyonephrosis	NU	NC	NC
20 (23)	M/56	India		Abdominal mass; flank pain	NC	Calculi; hydronephrosis	Nephrectomy	radiotherapy	Metastasis at 1 Y
21 (24)	M/54	India		Flank pain	NC	Hydronephrosis; hydroureter	Biopsy	NC	NC
22 (25)	M/52	American		Haematuria; mucusuria; flank pain	NC	Cystic mass	Nephrectomy	NC	Died at 1 Y
23 (26)	F/58	Guatemala		Flank mass and pain	NC	Hydronephrosis	Nephrectomy	NC	Died at 3 days
24 (4)	F/35	India		Flank pain	NC	Cystic mass	Nephrectomy	NC	NC
25 (27)	F/48	Taiwan		None	CEA	Cystic tumour	RN	NC	Alive at 9 M
		Japan		Haematuria	NC	Pelvic tumour	NU	NC	NC	

No. (ref.)	Sex/age	Region		Symptom	Tumour biomarker	Radiological findings	Surgery	Adjuvant therapy	Follow-up
27 (29)	M/40	India		Calculi; urinary infections	NC	Pyonephrosis; hydronephrosis	Nephrectomy	NC	NC
28 (30)	M/61	Malaysia		Flank mass	CEA	Hydronephrosis; calculi	Nephrectomy	NC	NC
29 (31)	M/79	American		Fever; flank pain; nausea	NC	Hydronephrosis, calculi	Nephrectomy; hemicolectomy	NC	NC
30 (32)	F/81	Japan		Haematuria	NC	Kidney tumour	Nephrectomy	NC	Died at 3 M

PUJO, pelvis ureteric junction obstruction; RN, radical nephrectomy; NU, nephroureterectomy; NC, data not clear; Y, years; M, months; CEA, carcinoembryonic antigen; NA, not available; CA19-9, carbohydrate antigen 19-9.

There were no typical radiological features of primary renal pelvis mucinous adenocarcinoma (18). Our patient presented with severe hydronephrosis and large renal pelvic calculi with cortical thinning, which led to the simple diagnosis of calculus pyonephrosis. In our literature review, there were 9/30 patients presenting with stones, 16/30 presenting with hydronephrosis, 10/30 presenting with pyonephrosis, 9/30 presenting with a tumour or mass and a few patients with stenosis or obstruction of the pelvic-ureteric junction. None of these features indicate malignancy, except for a mass. According to most of the reported cases, the diagnosis of non-functional kidney and hydronephrosis

caused by renal calculi was made by imaging. The diagnosis of primary mucinous adenocarcinomas of the renal pelvis could only be made after pathological assessment (12). However, a few cases reported that the diagnosis of primary mucinous adenocarcinomas of the renal pelvis could be associated with elevated serum tumour markers such as CEA or CA19-9 (2). Our literature review found that one-fifth of the patients had elevated serum tumour markers. We hypothesise that those serum tumour markers, accompanied by imaging (CT scan), can increase the rates of accurate diagnosis.

No standard surgical procedures have been proposed for this adenocarcinoma (2). As indicated in this literature review, because there were no preoperative measures to detect this tumour, most patients underwent a nephrectomy without total ureterectomy (14). However, radical nephroureterectomy with bladder cuff excision is the treatment of choice or the standard treatment for pelvis tumours (28). Moreover, adjuvant therapy was received by a few patients. Only Raphael *et al.* (23) and Lai *et al.* (2) reported that adjuvant radiation and interleukin-2 were administered after surgery, respectively. The primary adenocarcinoma of the renal pelvis has a poor prognosis generally and most patients die during the first few years of follow-up (21). It is reported that chemoradiation, chemotherapy and radiotherapy should be recommended for mucinous carcinoma of colorectal and ovarian origins (5, 6). To improve the prognosis, we recommend nephroureterectomy with a bladder cuff followed by adjuvant therapy such as chemotherapy.

CONCLUSION

In conclusion, renal pelvis primary mucinous adenocarcinoma is especially rare without characteristic or typical radiological features and standard treatment. Based on our literature review, careful history taking and radiological studies combined with serum markers may improve accurate diagnosis rates. For better survival outcomes, nephroureterectomy is recommended to be followed by adjuvant therapy.

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