

Table SI. Clinical data of simultaneous occurrences of ccRCC and bUC in literature cases (n=36).

First author, year	Age at first cancer onset, years	Sex	Smoking history/history of diabetes	Family history of cancer	First symptom	First cancer			Second cancer			Third or other cancer			SMPMN or MMPMN (0: time of first cancer diagnosis, time between first and second cancer, time between first and third cancer), months	Survival or follow-up time since the last cancer diagnosis, months/(survival status)	(Ref.)
						Cancer type	Treatment	Pathological stage	Cancer type	Treatment	Pathological stage	Cancer type	Treatment	Pathological stage			
Yokoyama <i>et al</i> , 1981	79	Male	Yes/NG	NG	NG	bTCC	TURBT	pT1-2NxMx	ccRCC (R)	NPC	pT1N0M0	-	-	-	MMPMN (0,84,98)	4/(dead)	(32)
Dieckmann and Nekarda, 1988	74	Male	NG/NG	NG	Health check-up	ccRCC (L)	N	pT1N0M0	bTCC	TURBT	pTaNxMx	PCa	TURP	NG	MMPMN (0,14,14)	7/(alive)	(40)
Nakano <i>et al</i> , 1990	50	Female	NG/NG	NG	NG	Uterine cancer	Hysterectomy	NG	ccRCC (L)	PN	pT2N0M0	bTCC + non-functioning right kidney	RC + right NC	pT3bNxMx	MMPMN (0,180,180)	12/(dead)	(52)
Kinbara <i>et al</i> , 1990	31	Female	No/ NG	No	Health check-up	bTCC	TURBT	pT1NxMx	ccRCC (R)	N	pT2bN0M0	von Hippel-Lindau disease	Surgery	NG	SMPMN (0,0, NG)	14/(alive)	(51)
Tsujimura <i>et al</i> , 1991	77	Male	NG/NG	NG	NG	bTCC	TURBT	NG	ccRCC (L)	NPC	pT1NxMx	Renal pelvic and ureteral	NPC	NG	MMPMN (0,36,36)	14/(alive)	(56)

												TCC					
Ando <i>et al</i> , 1996	59	Male	Yes/NG	Yes	Asymptomatic gross hematuria	Renal pelvic TCC (L)	NU + Chemo	pT3NxMx	bTCC	TURBT	pTaNxMx	ccRCC (R)	PN + fluorouracil	pT2NxMx	SMPMN (0,2,4)	18/(alive)	(54)
Morikawa <i>et al</i> , 1997	53	Male	Yes/NG	NG	NG	ccRCC (L)	N	NG	bTCC	TURBT	NG	Hepatic carcinoma	NG	pT4NxMx	MMPMN (0,120,144)	12/(dead)	(58)
Harima <i>et al</i> , 1998	74	Male	Yes/NG	No	Gross hematuria and dysuria	PCa	Prostate biopsy + leuprorelin + flutamide	pT2N0M0	ccRCC (R)	NU + interferon α	pT2N0M0	bTCC	TURBT + IC	pT1N0M0	MMPMN (0,1,11)	42/(alive)	(41)
Oka <i>et al</i> , 2001	62	Male	NG/NG	NG	NG	bTCC	TURBT	pT1aN0M0	ccRCC (R)	N	pT2N0M0	-	-	-	MMPMN (0,113)	24/(dead)	(33)
Takada <i>et al</i> , 2002	72	Male	No/NG	No	Gross hematuria	ccRCC (L)	NC + Renal hilar lymph node dissection + interferon γ	pT3bN0Mx	bTCC	TURBT	pT1aNxMx	PCa	Prostate biopsy + goserelin + bicalutamide	pT1cN0M0	SMPMN (0,0,0)	6/(alive)	(42)
Satoh <i>et al</i> , 2003	82	Male	No/NG	No	NG	ccRCC (L)	N + RP	pT3aN0Mx	bMUC	TURBT	pT2N0Mx	PCa	N + RP	pT2aN1M0	SMPMN (0,0,0)	8/(alive)	(43)
Kamota <i>et al</i> , 2003	73	Male	NG/Yes	NG	Gross hematuria	bTCC	TURBT	pT1aNxMx	ccRCC (L)	N	pT3bN0Mx	Metastatic clear cell carcinoma of the bladder and lung	TURBT	NG	SMPMN (0,0,5)	26/(dead)	(59)
Srinath <i>et al</i> , 2006	73	NG	NG/NG	NG	Painless paroxysmal hematuria	ccRCC (R)	LNPC	T1N0M0	bNMUC	TURBT	T1N0M0	-	-	-	SMPMN (0,0)	30/(alive)	(34)
Chuang <i>et al</i>	67	Female	No/NG	No	Painless	bNMUC	TUBRT	pTaN0M0	ccRCC (R)	NU	pT2bN0M	Bilateral	Bilateral	pTaNxM	SMPMN	NG/NG	(57)

<i>al, 2008</i>					paroxysmal hematuria						0	renal pelvic and ureteral UC	NU + x regular hemodialysis	(0,0,0,5,0,5)			
Soda <i>et al</i> , 2009	63	Male	NG/NG	No	Gross hematuria	ccRCC(R)	N	pT2N0M0	bNMUC	RC + NC + hemodialysis	pT1N0M0	Left renal UC	RC + NC + hemodialysis + chemo	pT3N1M2	SMPMN (0,0,0)	3/(alive)	(53)
Gönül <i>et al</i> , 2009	57	Male	NG/NG	NG	Prostatitis symptoms	bMUC	RC	T2bN2M0	ccRCC (R)	PN	T1N0M0	Tubular cystic renal cell carcinoma (R)	PN + GP	T1N0M0	SMPMN (0,0,0)	24/(alive)	(60)
Arikan-Sengul <i>et al</i> , 2009	70	Male	Yes/NG	NG	Hematuria	PCa	GnRH analog + bicalutamide	NG	bTCC	TURBT	pT1NxMx	ccRCC (R and L)	PN + IL-2 + interferon	pT2bN0M0	MMPMN (0,0,9)	NG/NG	(44)
Nishikawa <i>et al</i> , 2009	54	Male	Yes/NG	No	Microscopic hematuria	ccRCC (R)	N	pT1aN0M0	PCa	RP + radiation therapy	pT3aN0M0	bUC	Complete pelvic exenteration + left ureterostomy + colostomy	pTisN0M0	SMPMN (0,5,36)	4/(alive)	(45)
Zhang <i>et al</i> , 2009	42	Male	NG/NG	NG	NG	ccRCC	Surgery	T1N0M0	bNMUC	TURBT + IC	T1N0M0	-	-	-	SMPMN (0,0)	37/(alive)	(35)
Rotellini <i>et al</i> , 2010	76	Male	NG/NG	NG	NG	ccRCC	LN	T1NxMx	bTCC	RC	NG	-	-	-	MMPMN (0,72)	12/(alive)	(36)
Pérez <i>et al</i> ,	63	Male	NG/NG	No	Hematuria	Bladder	LRC	pT1G3N0M0	ccRCC (L)	LNC	pT1aG2N	PCa	LRC	pT2apN0	SMPMN (0,0,0)	34/(alive)	(46)

2012						urothelial CIS					xM0			M0			
Tiwari <i>et al</i> , 2012	55	Male	Yes/NG	NG	Painless paroxysmal hematuria	MUC	TURBT	pT2N0M0	ccRCC (L)	NPC	pT1N0M0	PCa	RC +RP + pelvic lymph node dissection	pT1N0M0	SMPMN (0,0,0)	24/(alive)	(47)
Smith <i>et al</i> , 2012	54	Male	Yes/Yes	NG	Painless gross hematuria, dysuria and frequent urination	ccRCC (L)	LN	pT1bNxMx	bMUC	TURBT + chemo + RC + pelvic lymph node dissection	pT2aNxMx	-	-	-	SMPMN (0,1)	NG/NG	(37)
Zhu <i>et al</i> , 2012	60	Male	Yes/NG	No	NG	bMUC	Surgery + IC	T2NxMx	ccRCC (L)	Surgery	T1NxMx	-	-	-	SMPMN (0,2)	11/(alive)	(38)
Zhu <i>et al</i> , 2012	81	Male	No/NG	No	NG	ccRCC (R)	Surgery	T1NxMx	bNMUC	Surgery + IC	T1NxMx	-	-	-	MMPMN (0,24)	92/(alive)	(38)
Okumura <i>et al</i> , 2013	58	Male	No/NG	Yes	NG	PCa	RP	T1cNoM0	bUC	TURBT	pTaNxMx	ccRCC (R)	PN	pT1aNxM0	MMPMN (0,48,120)	48/(alive)	(48)
Wang <i>et al</i> , 2016	64	Male	Yes/NG	NG	Painless paroxysmal hematuria	ccRCC (R)	LNPC	NG	UIPC	LNPC	NG	bNMUC	TURBT + IC (pirarubicin)	NG	MMPMN (0,0,36)	48/(alive)	(61)
Xu <i>et al</i> , 2019	73	Male	NG/NG	Yes	Painless paroxysmal hematuria	bUC	TURBT + IC	NG	ccRCC (R)	LPN	T1NxMx	Esophagea l cancer	Radiotherap y	NG	MMPMN (0,81,108)	NG/NG	(62)
Lian <i>et al</i> , 2020	75	Female	NG/NG	NG	NG	ccRCC	Surgery	T2NxMx	bMUC	Surgery + chemo + Chinese medicine	T4NxMx	UUC	Surgery + Chinese medicine	T3NxMx	MMPMN (0,12,12)	32/(dead)	(55)

Kurose <i>et al</i> , 2020	78	Male	Yes/NG	NG	Health check-up	ccRCC (R)	Robot-assisted PN + nivolumab and ipilimumab	pT1aN0M1	bNMUC	TURBT	pTaN0M0	PCa	Prostate biopsy + hormonal therapy (degarelix)	cT1cN0 M0	SMPMN (0,3,3)	12/(alive)	(49)
Akan and Ediz, 2021	55	Male	Yes/NG	NG	Health check-up	NMUC	NG	TaNxMx	Left ureteral fibroepithelial polyps	Holmium:yttrium-aluminum-garnet laser	NG	RCC (L)	PN	NG	MMPMN (0,48,48)	12/(alive)	(63)
Djafari <i>et al</i> , 2021	59	Male	Yes/NG	NG	Intermittent gross hematuria and dysuria, frequent urination, urgency	UC	TURBT + BCG	T1NxMx	ccRCC (R)	LN	T2NxMx	-	-	-	SMPMN (0,0)	15/(alive)	(39)
Zhang <i>et al</i> , 2023	56	Male	NG/NG	No	Left hip pain	ccRCC (R)	Kidney biopsy	NG	bUC	TURBT + IC	NG	PCa	Prostate biopsy + chemo	T2N1M1 c	SMPMN (0,0,0)	16/(dead)	(50)
Mitchell <i>et al</i> , 2023	67	Female	Yes/NG	Yes	Left-sided back pain and hematuria	ccRCC (L)	LNC	pT2bN0Mx	bNMUC	TURBT + RC	pTaN0Mx	Renal NET(R)	LNC + somatostatin	pT2aN1 Mx	SMPMN (0,0,0)	NG/(alive)	(64)
Huang <i>et al</i> , 2023	63	Male	Yes/Yes	No	Health check-up	bMUC	PC + GC	T2NxMx	Rectal adenocarcinoma	Laparoscopic radical treatment of rectal cancer	T2N1M1	ccRCC (L) and bladder sarcomatoid	LPN + RC	T2NxMx and T4NxMx	MMPMN (0,69,72)	16/(alive)	(65)

												carcinoma					
Present case	65	Male	Yes/Yes	No	Intermittent hematuria	bMUC	TURBT + RC	T2N0M0	ccRCC (R)	LPN	T1N0M0	Metastatic UC	Right lymph node biopsy + tislelizumab (200 mg/3 weeks) + sunitinib (50 mg/day; taken for 4 weeks with an interval of 2 weeks)	T4N0M1	SMPMN (0,0,15)	19/(dead)	-

SMPMN or MMPMN (0, X, Y) months: (0, X) means only two primary cancers; (0, X, Y) means three primary cancers. R, right; L, left; SMPMN, synchronous multiple primary malignant neoplasms; MMPMN, metachronous multiple primary malignant neoplasms; RCC, renal cell carcinoma; UC, urothelial carcinoma; ccRCC, clear cell RCC; bUC, bladder UC; bMUC, bladder muscle invasive UC; bNMUC, bladder non-muscle-invasive UC; bTCC, bladder transitional cell carcinoma; UUC, ureteral UC; NET, neuroendocrine tumor; UIPC, ureteral inverted papilloma cancer; PCa, prostate cancer; NG, not given; N, nephrectomy; PN, partial nephrectomy; LN, laparoscopic nephrectomy; LPN, laparoscopic PN; TURBT, transurethral resection of bladder tumors; RC, radical cystectomy; PC, partial cystectomy; LRC, laparoscopic RC; LPC, laparoscopic PC; NU, nephroureterectomy; NC, nephroureter and cystectomy; NPC, nephroureter and partial cystectomy; LNC, laparoscopic NC; LNPC, laparoscopic NPC; RP, radical prostatectomy; IC, intravesical chemotherapy; BCG, Bacille Calmette-Guérin; GC, gemcitabine + cisplatin; GP, gemcitabine + carboplatin; chemo, chemotherapy; GnRH, gonadotropin releasing hormone; TURP, transurethral resection of the prostate; -, no information provided.

Table SII. Clinical characteristics, operation type and follow-up outcomes of patients with concurrent ccRCC and bUC.

Clinical characteristic	Value
Median age at onset (range), years	56.5 (31-82)
Sex, n (%)	
Male	30 (83.3)
Female	5 (13.9)
Not given	1 (2.8)
Smoking history, n (%)	
Yes	16 (44.4)
No	6 (16.7)
Not given	14 (38.9)
Family history of cancer, n (%)	
Yes	4 (11.1)
No	13 (36.1)
Not given	19 (52.8)
History of diabetes, n (%)	
Yes	4 (11.1)
No	0 (0.0)
Not given	32 (88.9)
First symptoms, n (%)	
Hematuria	17 (47.2)
Dysuria, frequent urination, urgency	4 (11.1)
Health check-up	5 (13.9)
Hip or back pain	2 (5.6)
Not given	8 (22.2)
ccRCC stage, n (%)	
T1	17 (47.2)
T2	12 (33.3)

T3	3 (8.3)
Not given	4 (11.1)
bUC stage, n (%)	
T1/a/Tis	21 (58.3)
T2	7 (19.4)
T3	1 (2.8)
T4	1 (2.8)
Not given	6 (16.7)
Operation types for bUC, n (%)	
Only TURBT	23 (63.9)
Only RC/LRC	6 (16.7)
RC/LRC after TURBT	5 (13.9)
Not given	2 (5.6)
Operation types for ccRCC, n (%)	
N/LN	10 (27.8)
PN/LPN/robot-assisted PN	10 (27.8)
NPC/LNPC	5 (13.9)
NU	3 (8.3)
NC/LNC	2 (5.6)
Renal biopsy	1 (2.8)
Not given	5 (13.9)
Subclassification of MPMN, n (%)	
ccRCC + bUC (include TCC, UC, MUC, NMUC)	9 (25.0)
ccRCC + bUC (include TCC, UC, MUC, NMUC) + PCa	11 (30.6)
ccRCC + bUC (include TCC, UC, MUC, NMUC) + others	16 (44.4)
Cases classified as SMPMN or MMPMN, n (%)	
SMPMN	20 (55.6)
MMPMN	16 (44.4)

Median survival or follow-up time since last cancer diagnosis (range), months	
MPMN	47.5 (3-92)
SMPMN	20.0 (3-37)
MMPMN	48.0 (4-92)

MPMN, multiple primary malignant neoplasms; SMPMN, synchronous MPMN; MMPMN, metachronous MPMN; UC, urothelial carcinoma; ccRCC, clear cell renal cell carcinoma; bUC, bladder UC; MUC, muscle invasive UC; NMUC, non-muscle-invasive UC; TCC, transitional cell carcinoma; PCa, prostate cancer; N, nephrectomy; PN, partial nephrectomy; LN, laparoscopic nephrectomy; LPN, laparoscopic PN; TURBT, transurethral resection of bladder tumors; RC, radical cystectomy; LRC, laparoscopic RC; NU, nephroureterectomy; NC, nephroureter and cystectomy; NPC, nephroureter and partial cystectomy; LNC, laparoscopic NC; LNPC, laparoscopic NPC.