Radiology
Case-Based Discussion

2024/01/25

Presenter: Clerk 2 印維哲 Adrian L. Yin

Supervisor: 張寶源 醫師

Patient Profile

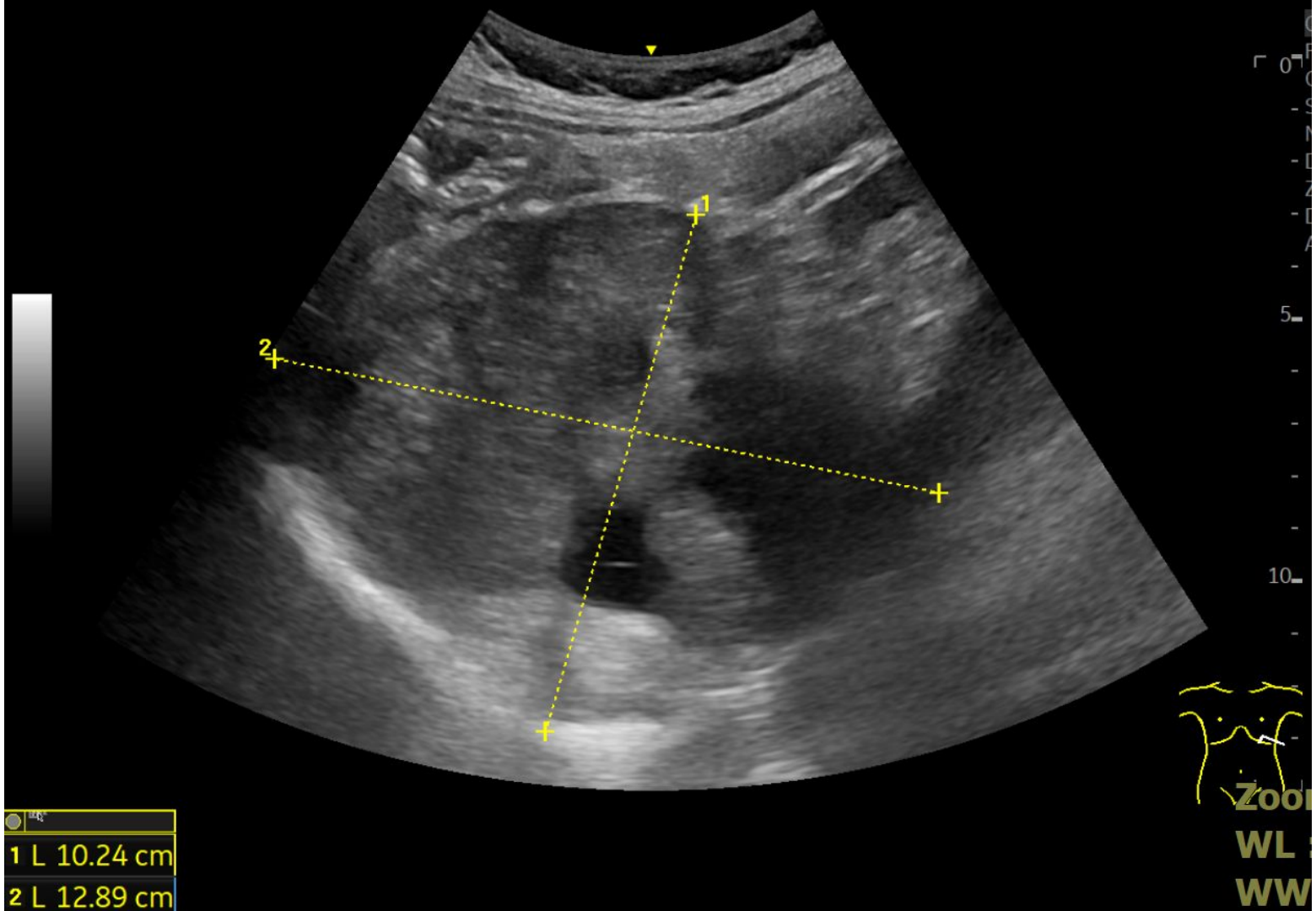
- 胡O婷, 56 y/o female
- Date of admission: 2024/01/09
- Chief complaint: **epigastric discomfort** since 1 month ago
- Past hx: suicide attempt, bilat. ovarian cysts removal over 10 yrs ago, prolapsed hemorrhoid s/p hemorrhoidectomy on 2020/10/29
- Family hx: grandfather (lung ca), mother (DM, HTN, heart disease)
- A (-), B (-), C (< 1 PPD)

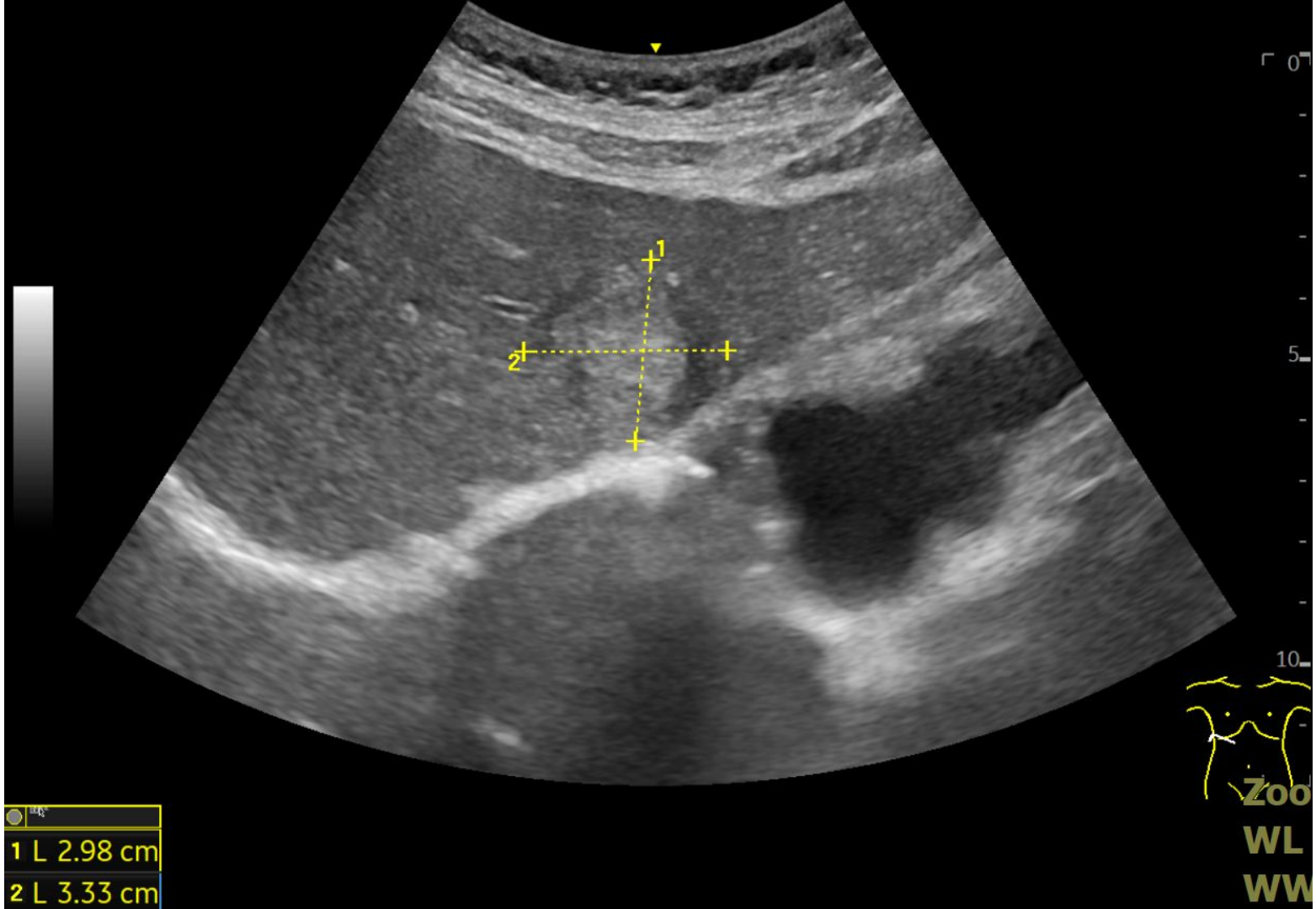
Initial Presentation

- Epigastric discomfort, unrelated to meal, w/ bloating & acid regurgitation
- No fever, no hematuria, no BW loss, no poor appetite
- Sought help at our GI OPD (Dr. Chen) on 2023/12/01
- Abdominal echo, UGI panendoscopy & colonoscopy was arranged

Initial Presentation

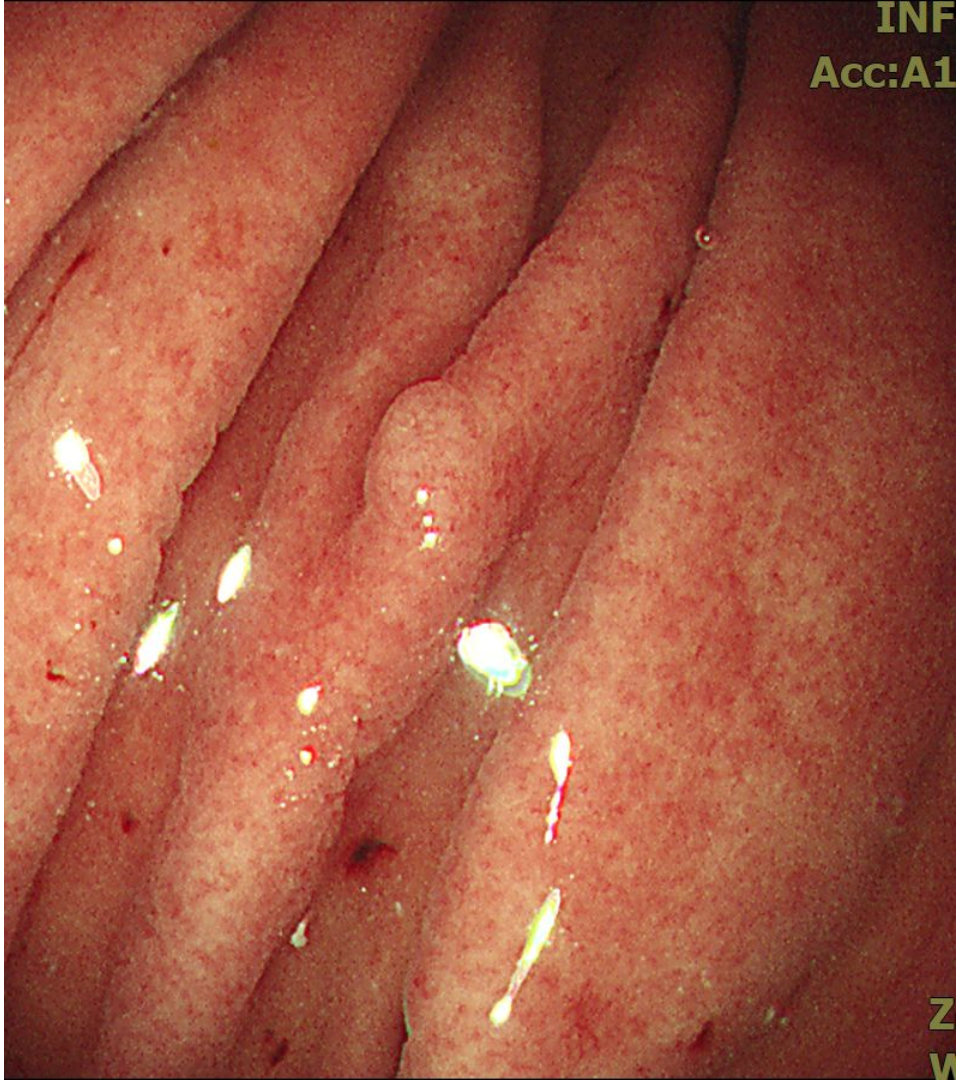
- Echo (2023/12/11):
  - Heterogeneous tumour, about **12 cm**, between **l't kidney** & pancreatic tail
  - **Liver** hyperechoic tumour w/ halo ring, about **3.3 cm** at S4
  - One hyperechoic spot at r't liver, c/w calcification


1
2
0
5
10
1 L 10.24 cm
2 L 12.89 cm


1
2
0
5
10
1 L 2.98 cm
2 L 3.33 cm
Zoo
WL
WW

Initial Presentation

- UGI panendoscopy & colonoscopy (2023/12/11):
  - GERD LA A
  - One 3 mm polyp removed
  - CLO (-) (2023/12/11)
  - One 5 mm polyp at d-colon removed


INF
Acc:A1
Z
W

Laboratory Data

HBs Ag	
HBs Ag	Nonreactive
S/CO	0.28
Anti HCV	
Anti HCV	Nonreactive
S/CO	0.11

AFP	3.5	ng/mL	0	9.0
CEA	3.4	ng/mL	0	3.0
CA 125	7.6	U/mL		35.0
CA 19-9	5.7	U/mL		35.0

ALP	90	IU/L	34	104
AST (GOT)	14	U/L	13	39
ALT (GPT)	8	U/L	7	52
BUN	15	mg/dL	7	25
CRE				
CRE	0.75	mg/dL	0.60	1.20
eGFR	85.27	mL/min	90	
GGT	15	U/L	9	64

2023/12/11 OPD

Clinical Course

2023/12/01

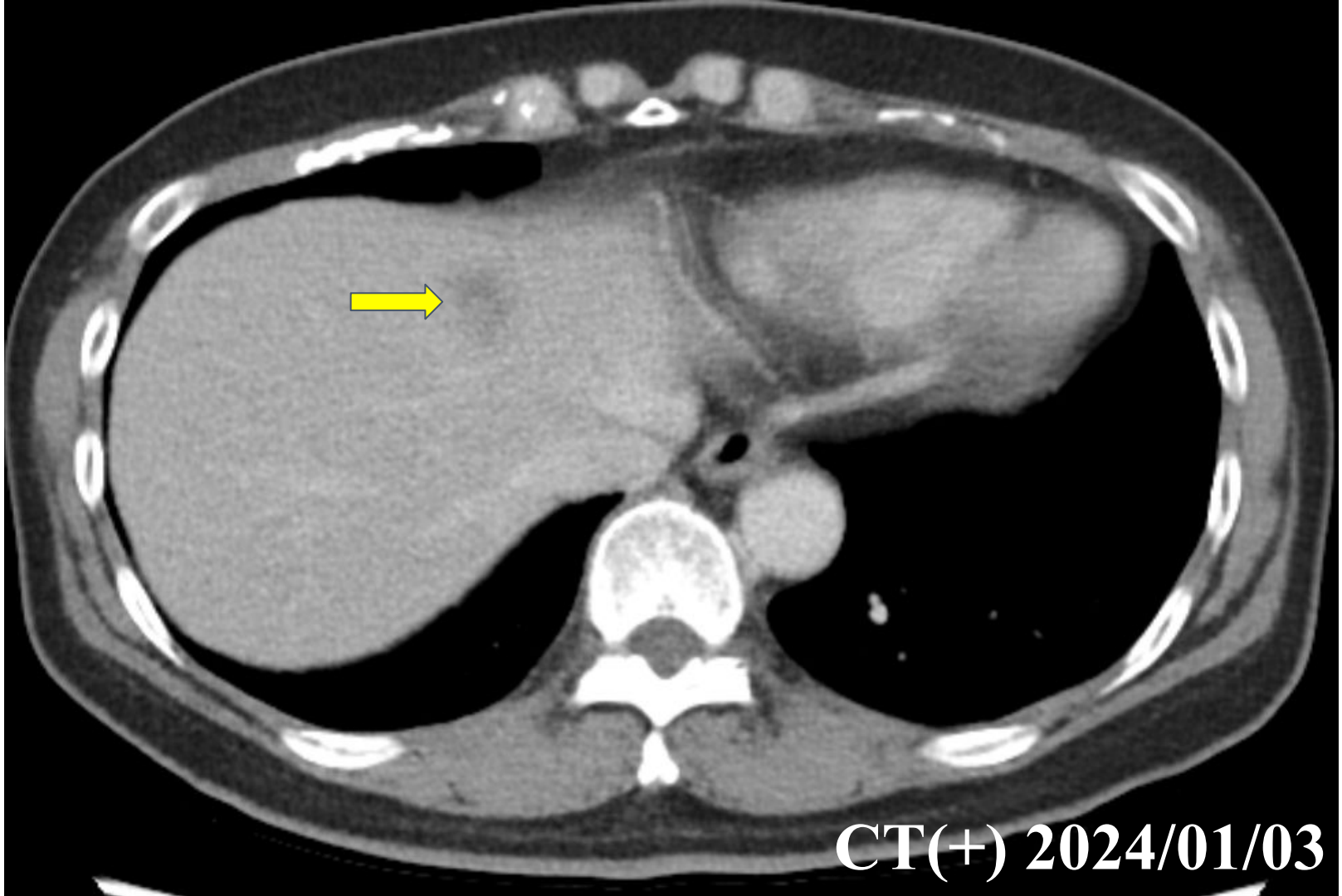
- 1st OPD

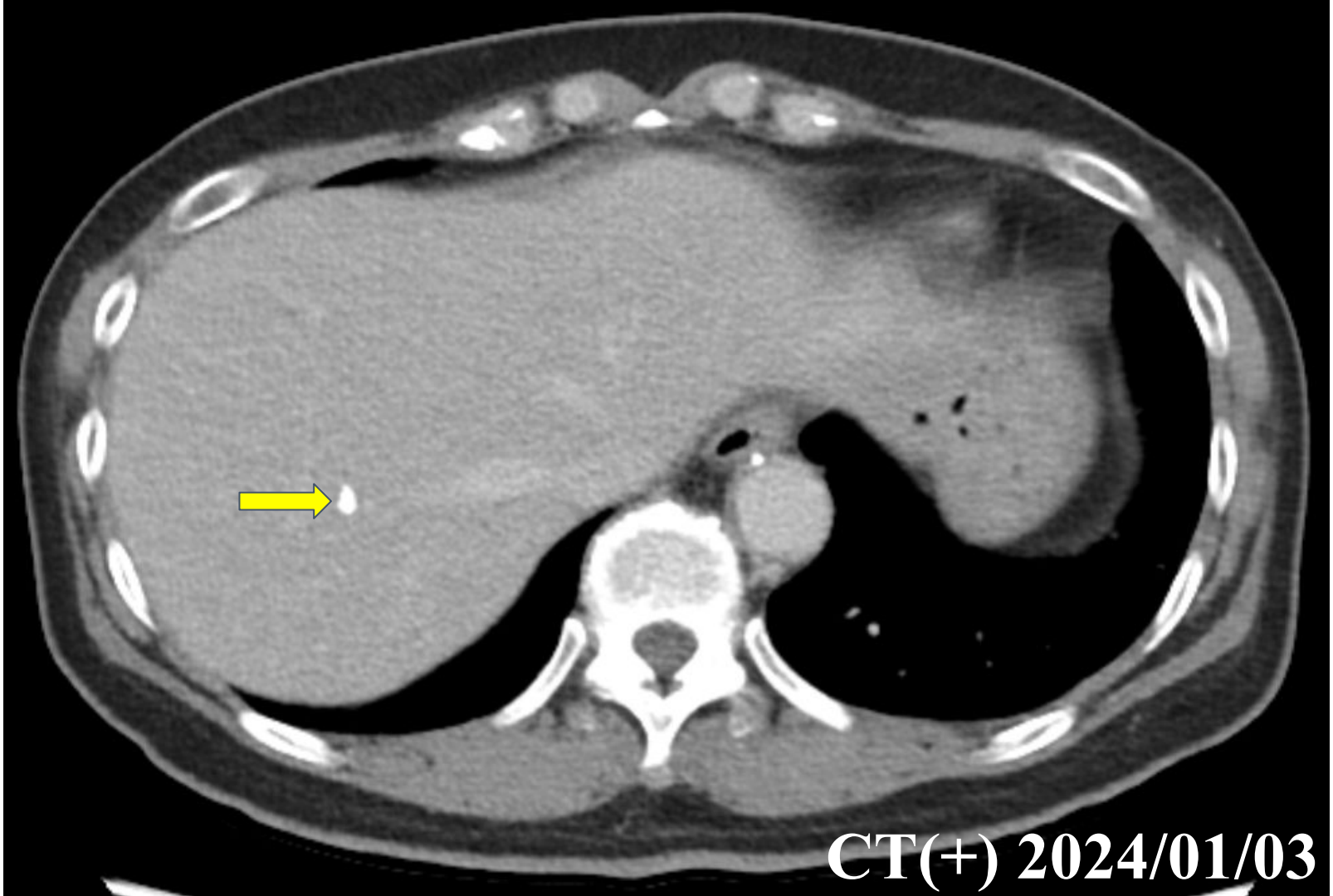
2023/12/11

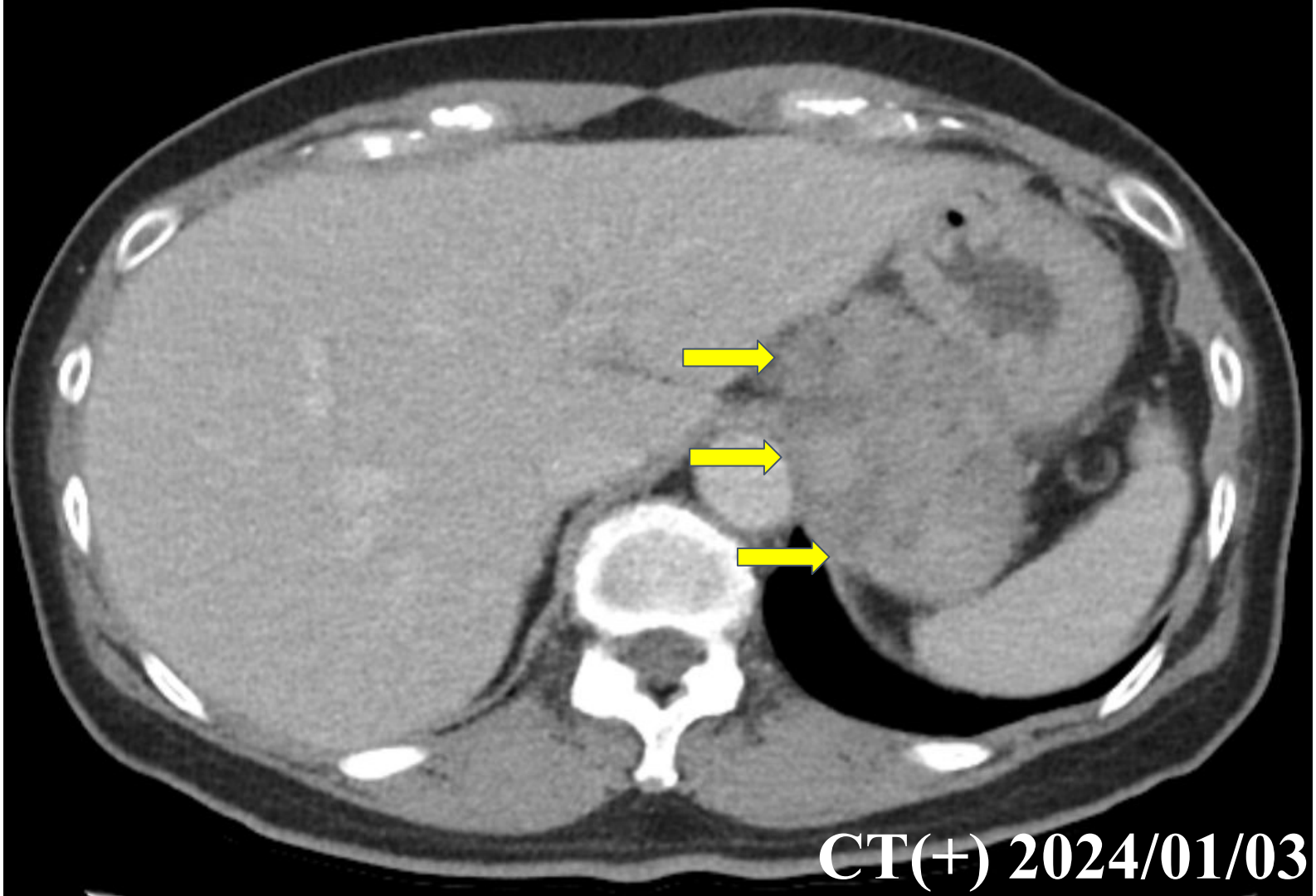
- Incidental finding of tumour

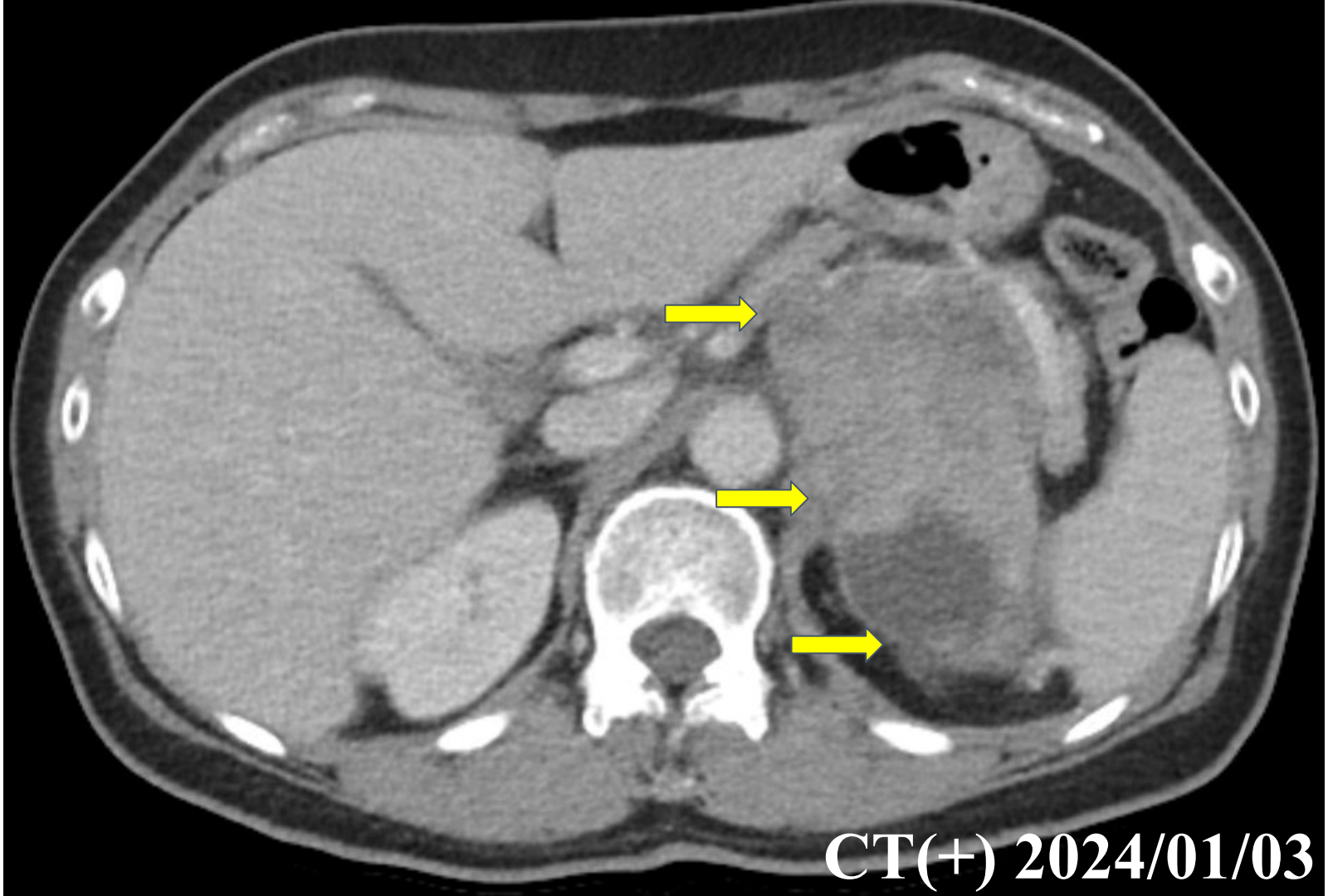
2024/01/03

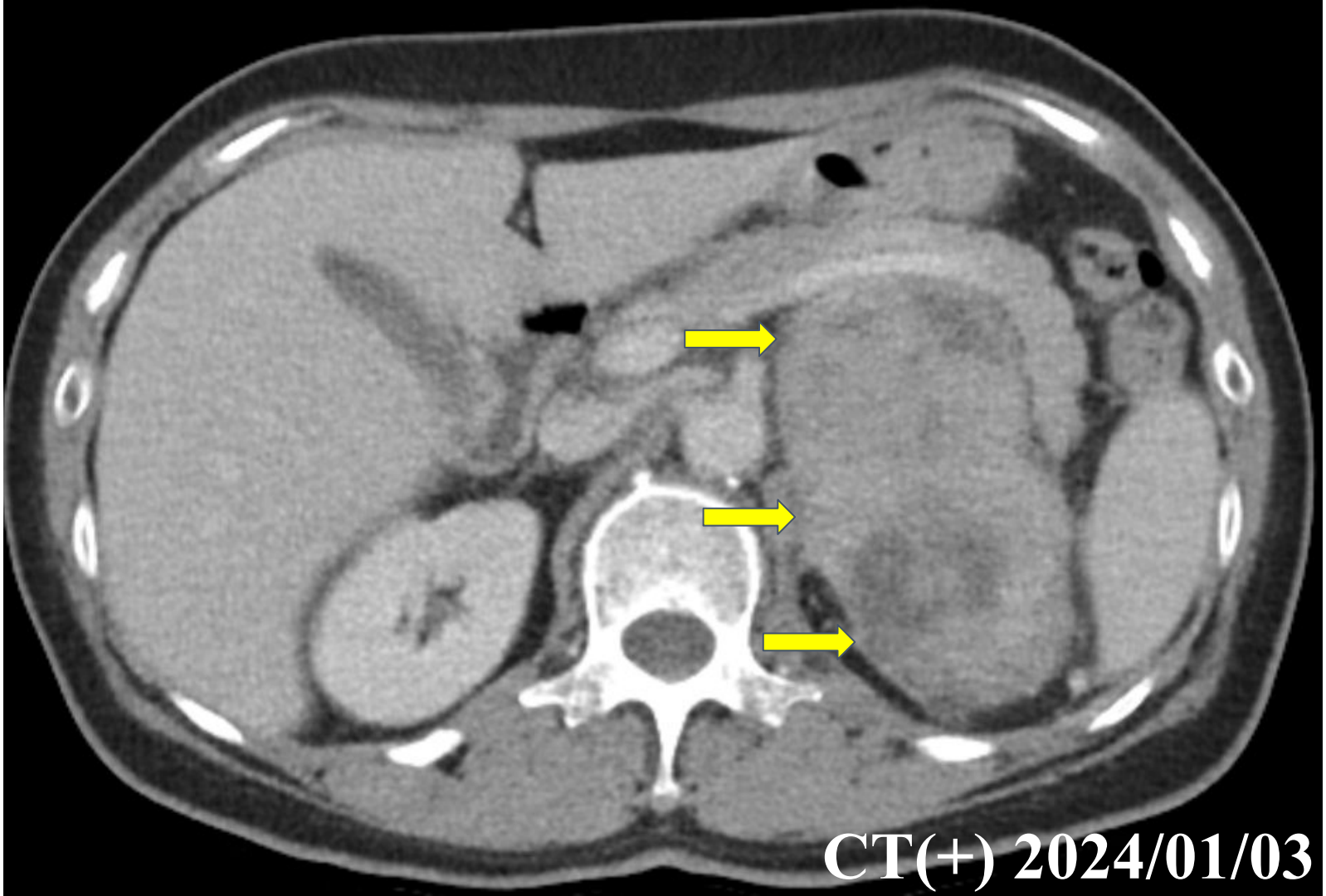
- Abdominal CT

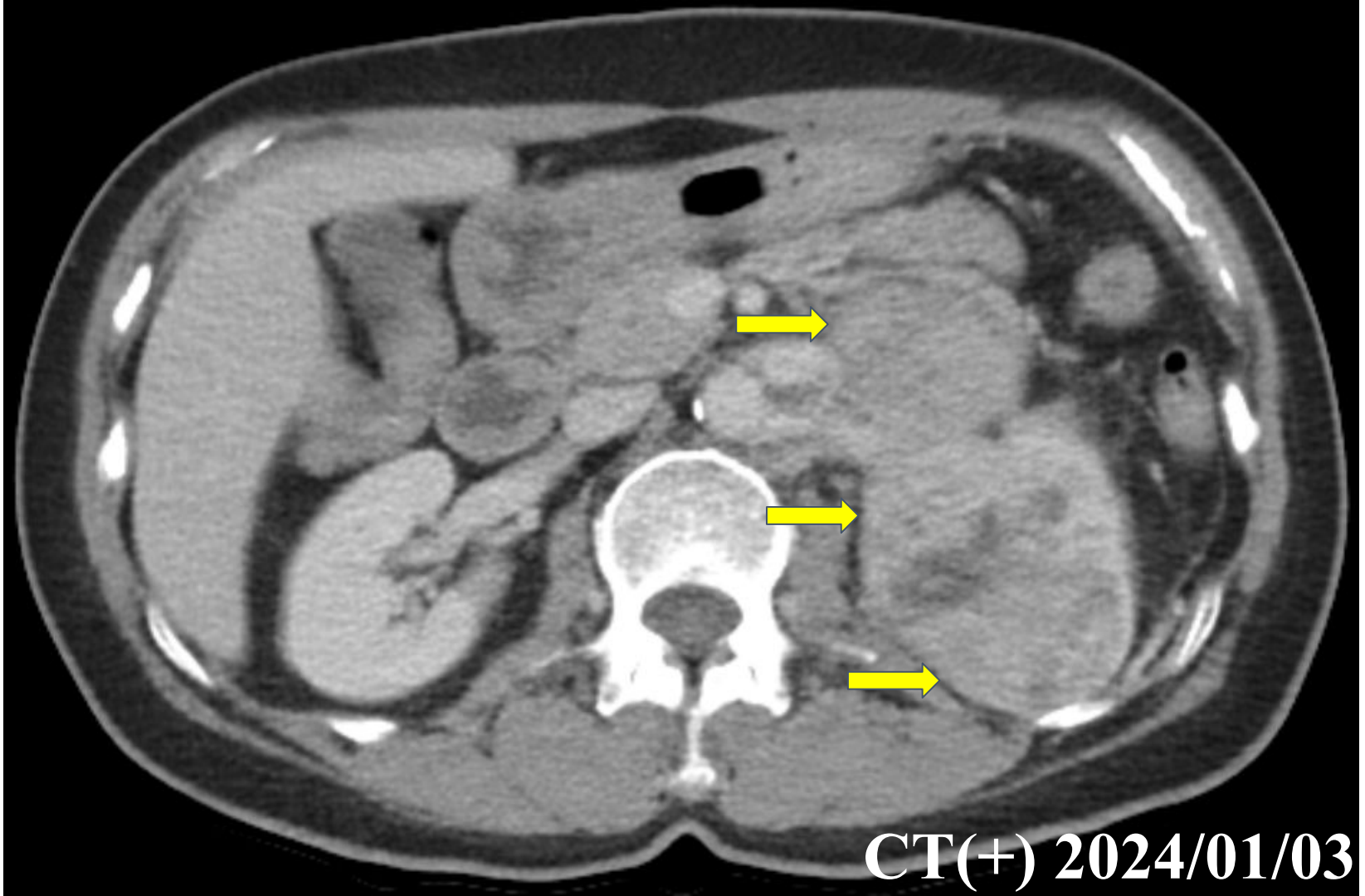

CT(+) 2024/01/03

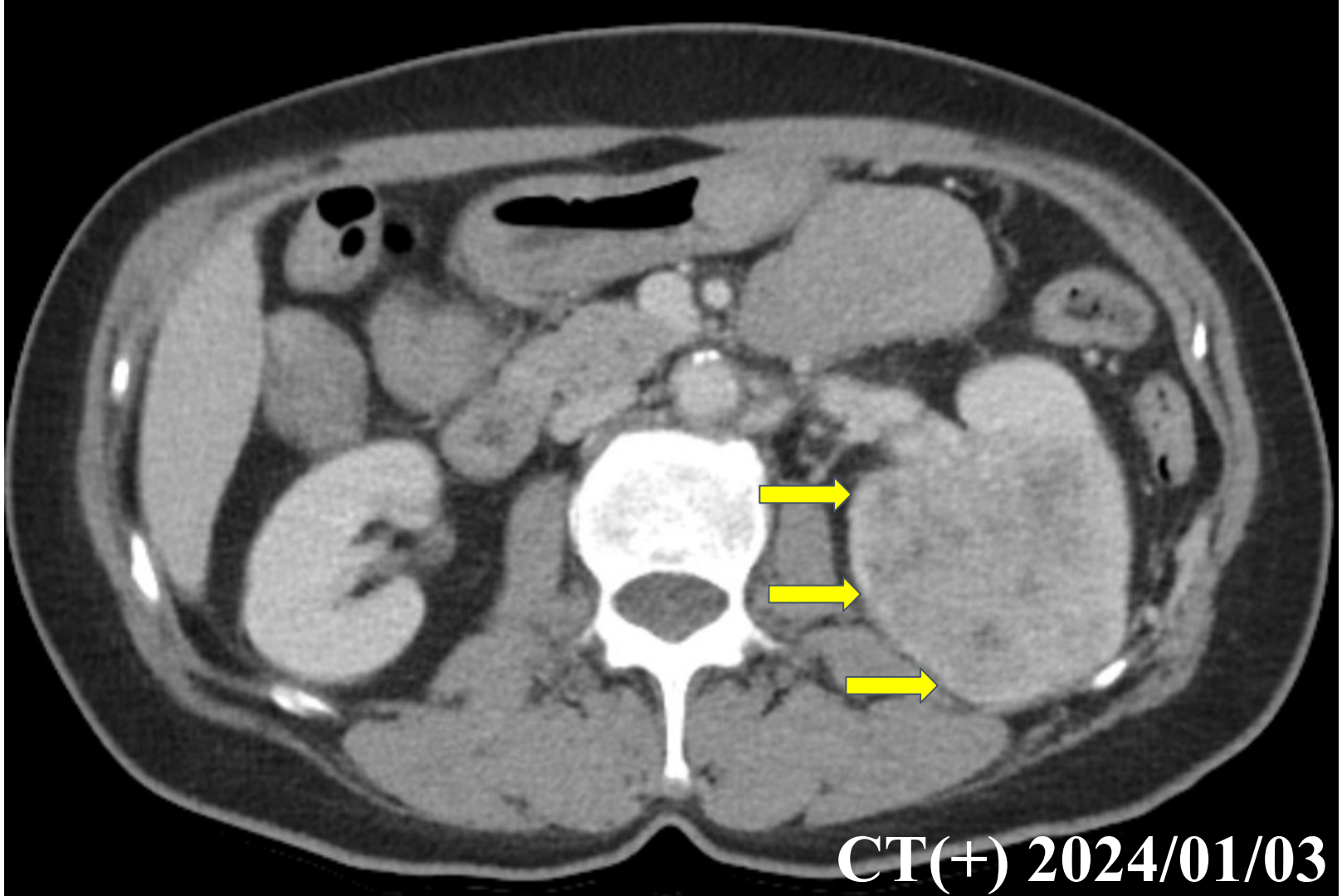

CT(+) 2024/01/03

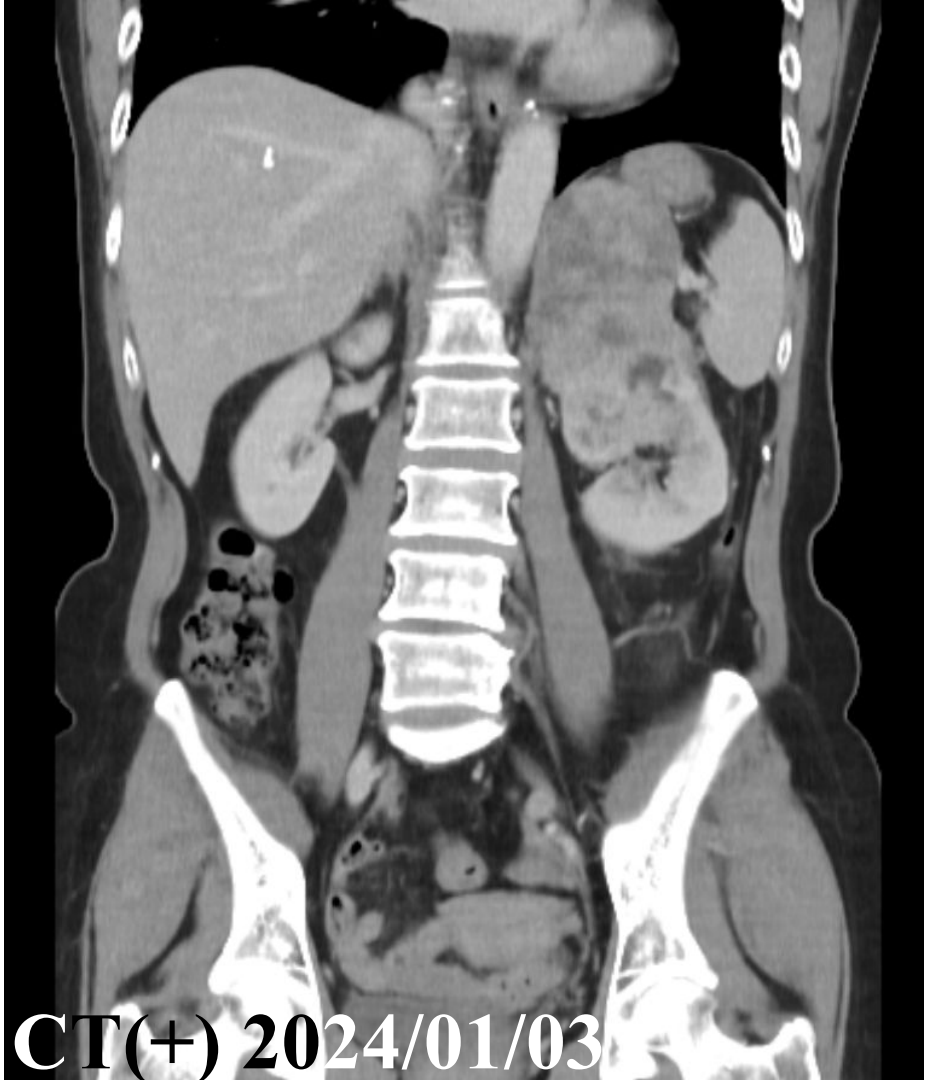

CT(+) 2024/01/03


CT(+) 2024/01/03


CT(+) 2024/01/03


CT(+) 2024/01/03


CT(+) 2024/01/03


CT(+) 2024/01/03

Primary tumor (T)	
T category	**T criteria**
TX	Primary tumor cannot be assessed
T0	No evidence of primary tumor
T1	Tumor ≤7 cm in greatest dimension, limited to the kidney
T1a	Tumor ≤4 cm in greatest dimension, limited to the kidney
T1b	Tumor >4 cm but ≤7 cm in greatest dimension, limited to the kidney
T2	Tumor >7 cm in greatest dimension, limited to the kidney
T2a	Tumor >7 cm but ≤10 cm in greatest dimension, limited to the kidney
T2b	Tumor >10 cm, limited to the kidney
T3	Tumor extends into major veins or perinephric tissues, but not into the ipsilateral adrenal gland and not beyond Gerota's fascia
T3a	Tumor extends into the renal vein or its segmental branches, or invades the pelvicalyceal system, or invades perirenal and/or renal sinus fat but not beyond Gerota's fascia
T3b	Tumor extends into the vena cava below the diaphragm
T3c	Tumor extends into the vena cava above the diaphragm or invades the wall of the vena cava
T4	Tumor invades beyond Gerota's fascia (including contiguous extension into the ipsilateral adrenal gland)

Regional lymph nodes (N)	
N category	**N criteria**
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Metastasis in regional lymph node(s)
Distant metastasis (M)	
M category	**M criteria**
M0	No distant metastasis
M1	Distant metastasis

Prognostic stage groups			
When T is...	**And N is...**	**And M is...**	**Then the stage group is...**
T1	N0	M0	I
T1	N1	M0	III
T2	N0	M0	II
T2	N1	M0	III
T3	NX, N0	M0	III
T3	N1	M0	III
T4	Any N	M0	IV
Any T	Any N	M1	IV

Clinical Course

2024/01/09

- Admission for CT-guided biopsy

2024/01/10

- Tc99m DTPA: **GFR: 58.85 ml/min** (l't: 23.41 ml/min, r't: 35.44 ml/min)
- Bone scan: r't knee, suspect OA

2024/01/11

- Chest CT: no significant findings

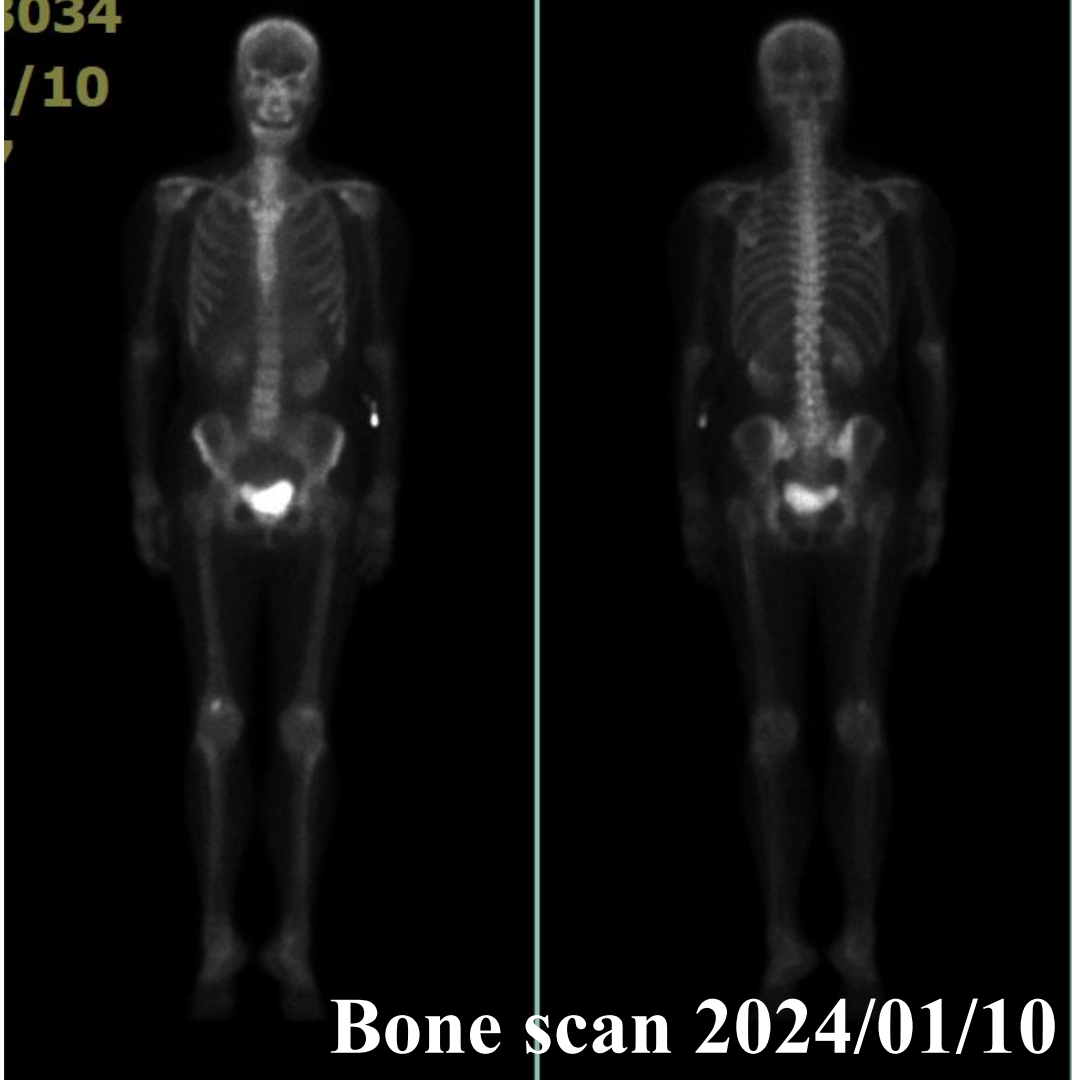
Laboratory Data

WBC	7.39	*10^3/uL	3.50	11.00
RBC	**3.85**	*10^6/uL	4.00	5.20
Hb	**11.8**	g/dL	12.0	16.0
Ht	**34.5**	%	36.0	46.0
MCV	89.6	fL	80.0	100.0
MCH	30.6	pg	26.0	34.0
MCHC	34.2	%	31.0	37.0
PLT	291	*10^3/uL	150	400
RDW-CV	12.5	%	11.5	14.5

PT	10.1	sec	8.0	12.0
Control	10.6	sec.		
INR	0.95		0.85	1.15
APTT		sec.	23.9	35.5
APTT	27.3	sec.	23.9	35.5
Control	27.4	sec.		

Na	141	mmol/L	136	145
K	3.9	mmol/L	3.5	5.1
Ca	2.32	mmol/L	2.20	2.65
BUN	12	mg/dL	7	25
CRE				
CRE	0.75	mg/dL	0.60	1.20
eGFR	**84.96**	mL/min	90	
TBI	0.3	mg/dL	0.3	1.0
DBI	0.1	mg/dL		≦0.2
AST (GOT)	13	U/L	13	39
ALT (GPT)	9	U/L	7	52
T P	7.4	g/dL	6.4	8.9
ALB-BCG	4.6	g/dL	3.5	5.7
GLO	2.8	g/dL		
A/G ratio	1.6			

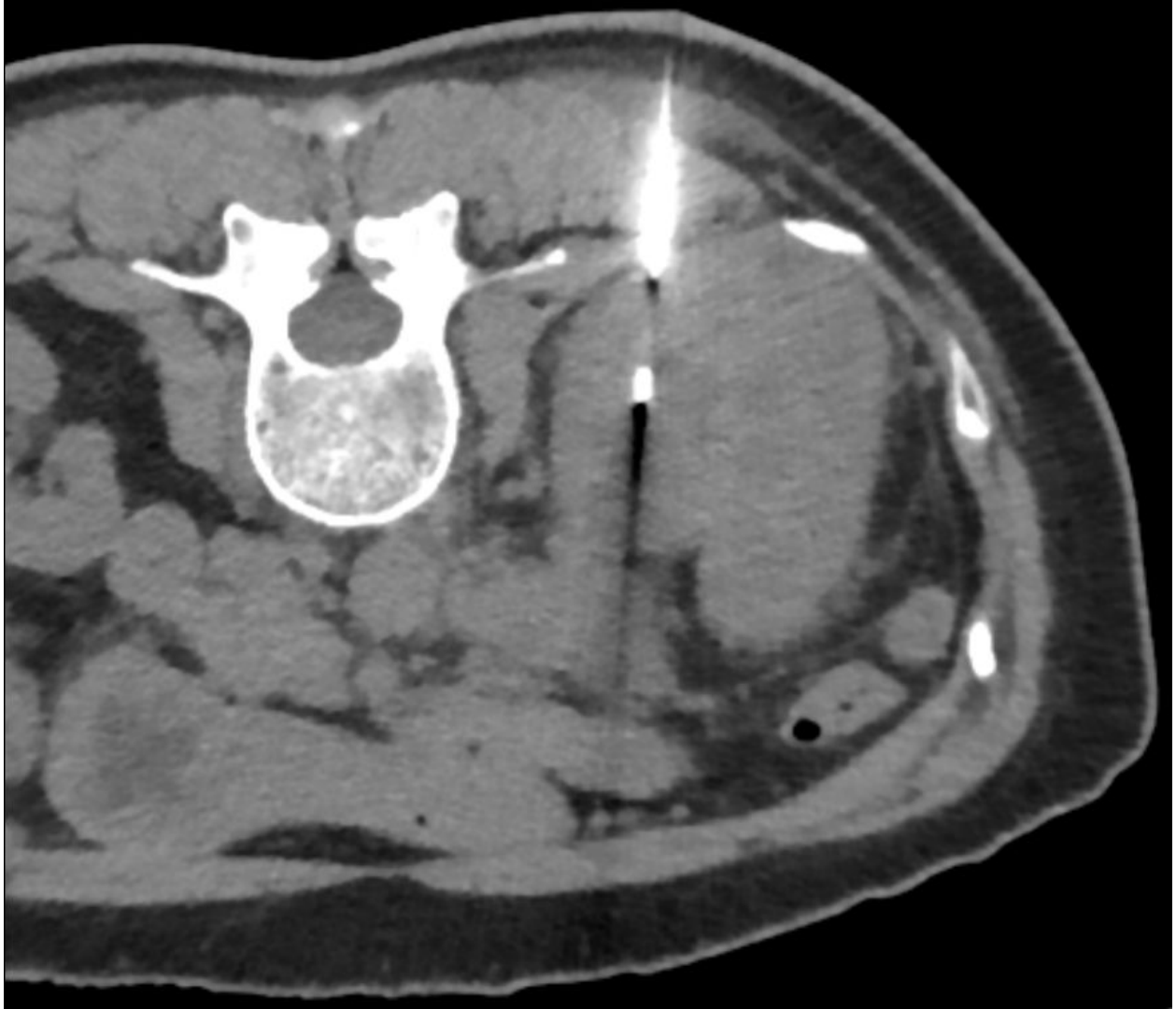
2024/01/09 Inpatient


3034
/10
Bone scan 2024/01/10

Clinical Course

2024/01/11

- CT-guided biopsy (5 specimen) by Dr. Chang



Clinical Course

2024/01/11

- CT-guided biopsy by Dr. Chang

2024/01/12

- Discharge

2024/01/17

- Pathology report

Diagnosis

- Main tumour c/w **renal cell carcinoma** (papillary or translocation-associated RCC might be considered)
- CK7 (-), PAX8 (+), weak CD10 (+), HepPar1 (-), focal TFE3 (+)
- r/o **liver mets**, **stage IV**

Discussion

- Types of RCC:
  - **Clear cell** (70~80%)
  - **Papillary** (13~20%)
  - Clear cell papillary
  - Chromophobe (5%)
  - Collecting duct (< 1%)
  - Medullary
  - Sarcomatoid

Discussion

- RCC on CT:
  - Soft tissue attenuation, 20~70 HU
  - w/ necrosis or calcification (30%)
  - Variable enhancement (clear cell RCC maybe w/ stronger enhancement)
  - IVC involvement (worse prognosis)

Discussion

Review > Medicina (Kaunas). 2021 Jan 8;57(1):51. doi: 10.3390/medicina57010051.

Imaging Characterization of Renal Masses

Carlos Nicolau [1], Natalie Antunes [2], Blanca Paño [1], Carmen Sebastia [1]

Affiliations + expand

PMID: 33435540 PMCID: PMC7827903 DOI: 10.3390/medicina57010051

2022 JOURNAL IMPACT FACTOR

2.6

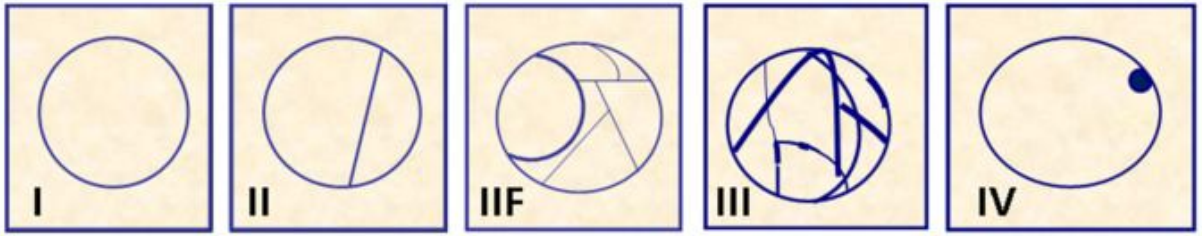
CATEGORY

MEDICINE, GENERAL & INTERNAL

89/169

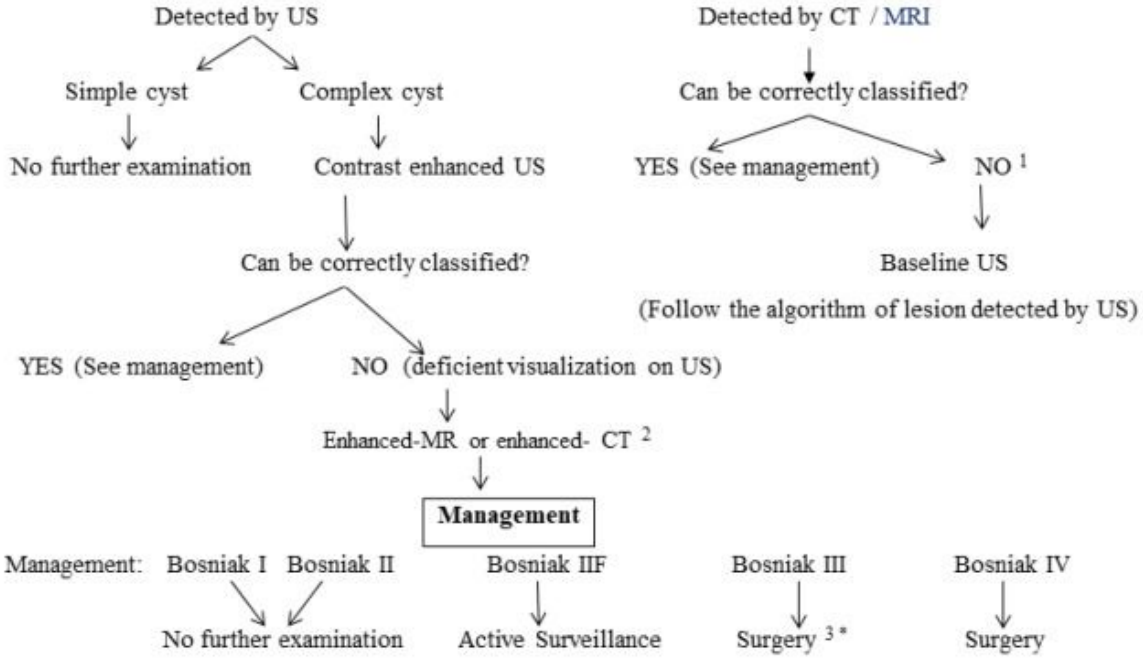
Discussion

- Ddx by imaging:
  - CT or MRI
  - Phases: unenhanced → corticomedullary (25~70 s) → portal/nephrographic (~100 s) → excretory (3 min)
  - Cystic, nodular or infiltrative



Bosniak stage	Risk of malignancy (%)	Features
I	0	Thin wall without septa or solid components. No internal enhancement.
II	0	Few (≤3) thin septa. It may show minimal enhancement of the septa. Hyperintense on T1 without enhancement.
IIF	5	Multiple (>3) thin septa. Smooth mild thickening (3 mm) of the wall or septa. It may contain minimal enhancement of the septa.
III	50	Thickened (>3 mm) wall or septa with enhancement. Irregular wall or septa with enhancement.
IV	90	Soft tissue enhancing mass independent from the wall.

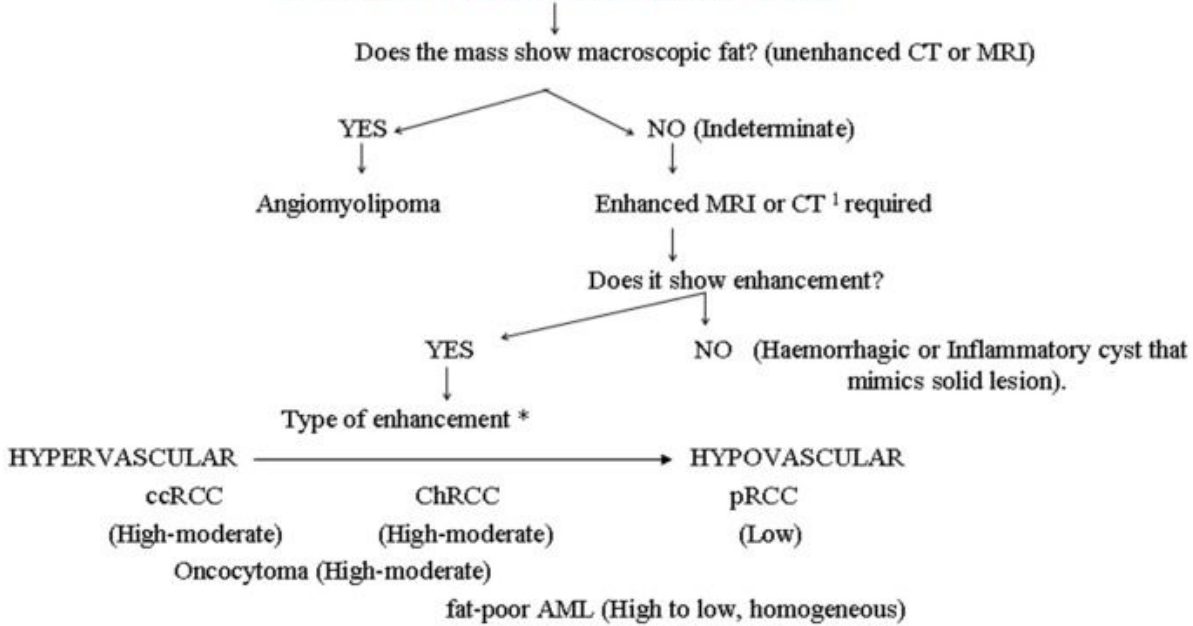
Management of renal cystic lesions



- [1] The study can be non-conclusive because of incomplete protocol (lack of enhanced phases or only a venous phase) or difficulty to classify the lesions (mainly in hyperattenuating renal lesions, Bosniak IIF and III cysts).
- [2] MRI or CT depending on the experience of the center and features of the patient such as the renal function.
- MRI is preferred because of its lack of radiation, additional information from Diffusion sequence, and higher sensitivity to detect microvascularization.
- [3] Some authors suggest biopsy instead of surgery. Active surveillance is also a possibility.

Nodular Renal Masses	
Renal cell carcinoma	Clear cell RCC [1] Papillary RCC Chromophobe RCC
Oncocytoma	
Angiomyolipoma	
Other malignant masses	Lymphoma Metastases Transitional cell carcinoma
Benign masses	Leiomyoma Adenoma
Pseudotumors	Prominent columns of Bertin, bulging of the renal contour focal renal hypertrophy

Management of renal solid nodular lesions



* Type of enhancement: Does the mass show features that suggest oncocytoma or fat-poor AML or, if RCC, would percutaneous ablation or active surveillance be treatment possibilities?

YES → Biopsy [2]

NO → Surgery

[1] Requires specific protocol of characterization of solid lesions with several phases with enhanced MRI or CT depending on the experience of the center and features of the patient (renal function). MRI is preferred because of its lack of radiation and additional value of Diffusion technique.

[2] Biopsy is recommended due to the high possibility of benign lesion or to decide treatment.

Renal Lesion	Morphologic Findings	MRI Signal Intensity	Enhancement	Diffusion
Typical AML	Macroscopic fat detection	Signal loss on Fat-saturation sequence.	Variable depending on the amount of adipose tissue, smooth muscle and blood vessels	No obvious restriction. Low signal on the ADC map due to the presence of fat.
Fat-poor AML	Hyperdense on unenhanced CT (basal CT)	Hypointense signal on T2	Variable. Usually homogeneous and prolonged	No obvious restriction.
Oncocytoma	Central scar (<50% cases)	Variable, but mainly hyper- or iso-intense.	Hyperenhancement on corticomedullary phase. Segmental enhancement inversion [1]	No obvious restriction.
Clear cell RCC	Occasional calcifications. Occasional central scar.	May show loss of signal intensity on opposed-phased sequence (due to the presence of microscopic fat)	Hyperenhancement on corticomedullary phase Heterogeneous if haemorrhagic, cystic, or necrotic areas.	Variable restriction depending on the differentiation.
Papillary and chromophobe RCC	Occasional calcifications.	Papillary RCC may show hypointensity on T2.	Iso-hyperenhancement on nephrographic phase Homogeneous. Occasionally very scarce enhancement (papillary RCC).	Papillary RCC: Greater restriction than clear cell RCC.

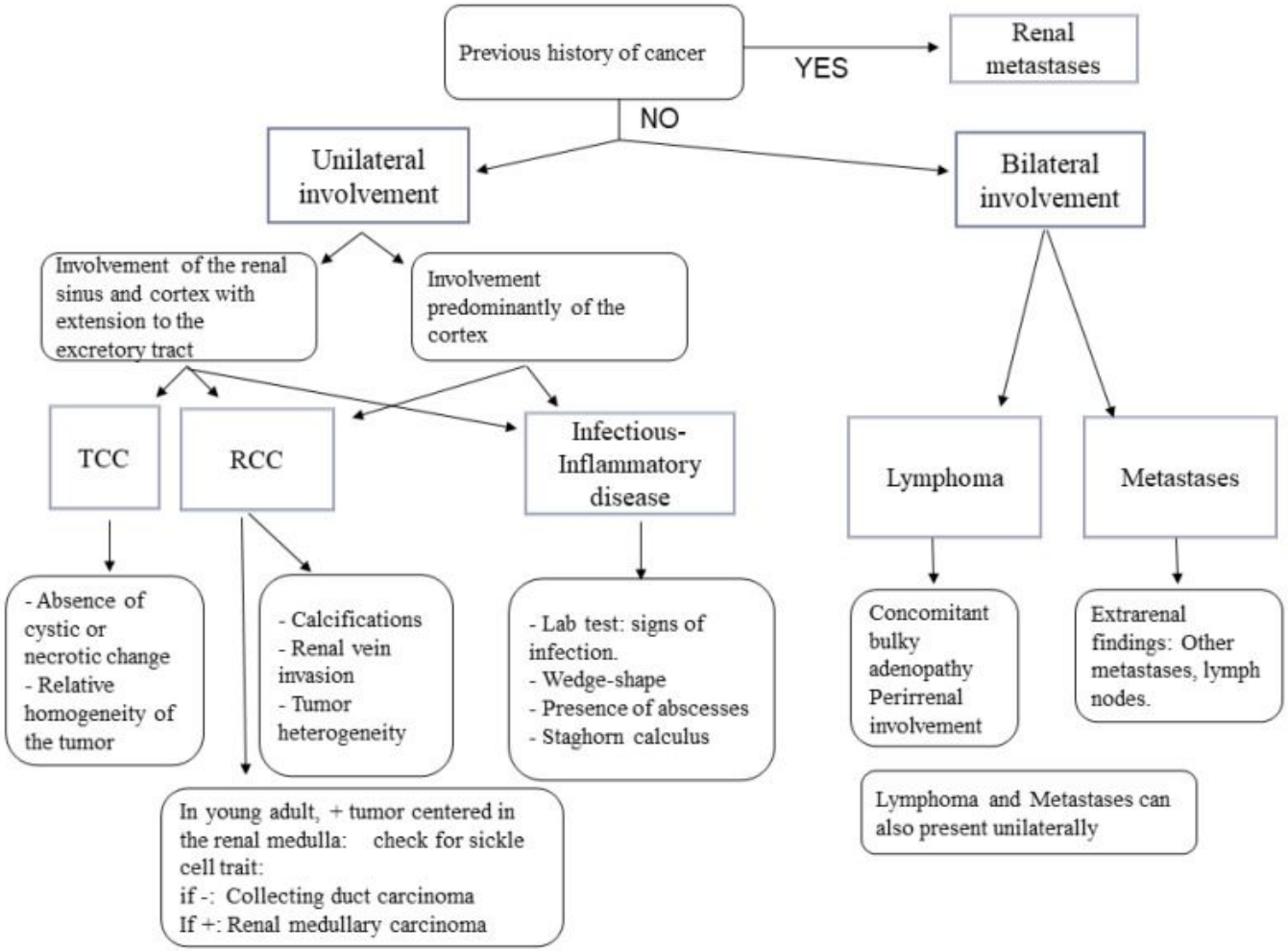
Discussion

- Nodular lesion:
  - w/ macroscopic fat → AML
  - w/o macroscopic fat → suspect RCC
  - ccRCCs: hypervascular, corticomedullary hyperenhancement
  - Papillary & chromophobe RCCs: less vascular, nephrographic/excretory phase enhancement

Renal solid masses associated with an infiltrative growth pattern.

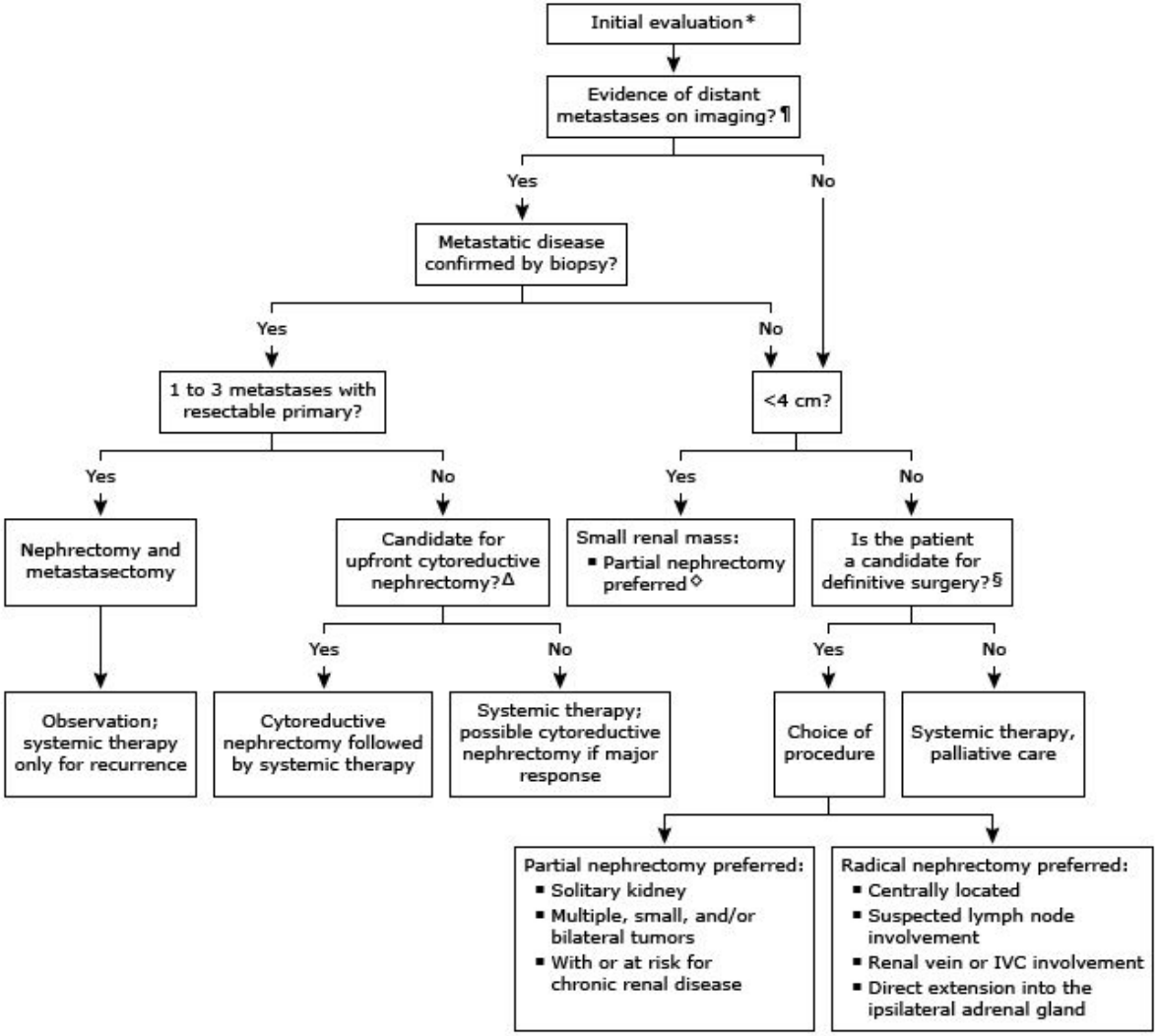
Renal cell carcinoma	Clear cell, papillary, or chromophobe
	Renal medullary carcinoma
	Collecting duct carcinoma
	Sarcomatoid differentiation
Urothelial carcinoma	Transitional cell carcinoma
	Squamous cell carcinoma
Lymphoproliferative disease	Renal lymphoma
	Renal leukemia
	Extramedullary plasmacytoma
Metastases	
Inflammatory conditions and pseudotumors	Developmental renal pseudotumors
	Pyelonephritis/abscess
	Xanthogranulomatous pyelonephritis

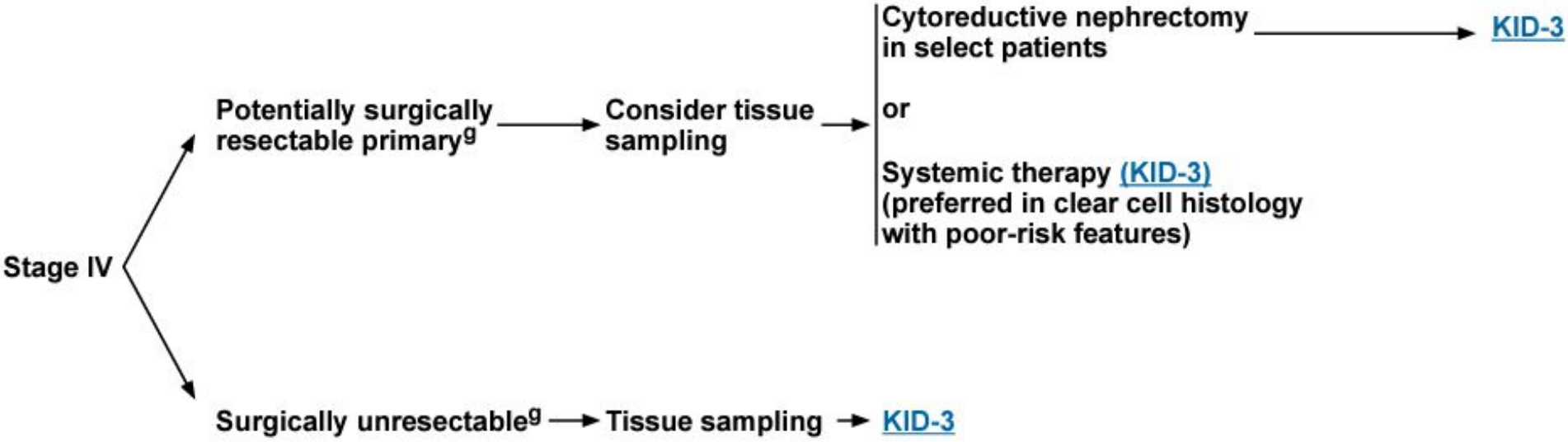
Management of renal infiltrative lesions

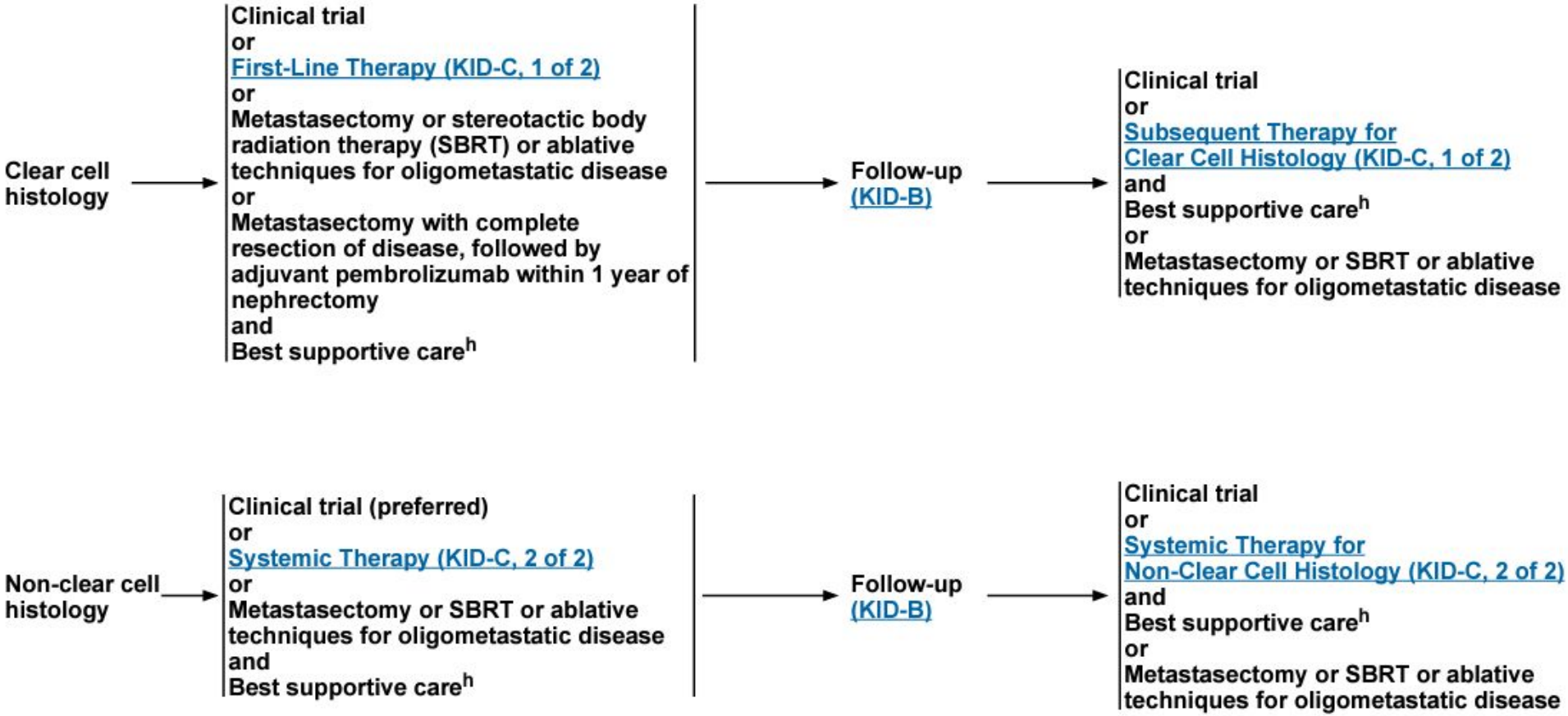


Back to the Patient

- Ms. Hu, 56F, initially presented w/ epigastric discomfort
- Dx: RCC r/o liver mets, stage IV


Initial evaluation*
Evidence of distant metastases on imaging? ¶
Yes
No
Metastatic disease confirmed by biopsy?
Yes
No
1 to 3 metastases with resectable primary?
<4 cm?
Yes
No
Yes
No
Nephrectomy and metastasectomy
Candidate for upfront cytoreductive nephrectomy? Δ
Small renal mass:
▪ Partial nephrectomy preferred ◇
Is the patient a candidate for definitive surgery? §
Yes
No
Yes
No
Observation; systemic therapy only for recurrence
Cytoreductive nephrectomy followed by systemic therapy
Systemic therapy; possible cytoreductive nephrectomy if major response
Choice of procedure
Systemic therapy, palliative care
Partial nephrectomy preferred:
▪ Solitary kidney
▪ Multiple, small, and/or bilateral tumors
▪ With or at risk for chronic renal disease
Radical nephrectomy preferred:
▪ Centrally located
▪ Suspected lymph node involvement
▪ Renal vein or IVC involvement
▪ Direct extension into the ipsilateral adrenal gland


Stage IV
Potentially surgically resectable primary[g]
Consider tissue sampling
Cytoreductive nephrectomy in select patients
KID-3
or
Systemic therapy (KID-3) (preferred in clear cell histology with poor-risk features)
Surgically unresectable[g]
Tissue sampling
KID-3


Clear cell histology
Clinical trial
or
First-Line Therapy (KID-C, 1 of 2)
or
Metastasectomy or stereotactic body radiation therapy (SBRT) or ablative techniques for oligometastatic disease
or
Metastasectomy with complete resection of disease, followed by adjuvant pembrolizumab within 1 year of nephrectomy
and
Best supportive care[h]
Follow-up (KID-B)
Clinical trial
or
Subsequent Therapy for Clear Cell Histology (KID-C, 1 of 2)
and
Best supportive care[h]
or
Metastasectomy or SBRT or ablative techniques for oligometastatic disease
Non-clear cell histology
Clinical trial (preferred)
or
Systemic Therapy (KID-C, 2 of 2)
or
Metastasectomy or SBRT or ablative techniques for oligometastatic disease
and
Best supportive care[h]
Follow-up (KID-B)
Clinical trial
or
Systemic Therapy for Non-Clear Cell Histology (KID-C, 2 of 2)
and
Best supportive care[h]
or
Metastasectomy or SBRT or ablative techniques for oligometastatic disease

SYSTEMIC THERAPY FOR NON-CLEAR CELL HISTOLOGY[i]		
Preferred Regimens	**Other Recommended Regimens**	**Useful in Certain Circumstances**
• Clinical trial • Cabozantinib	• Lenvatinib + everolimus • Nivolumab[b] • Nivolumab[b] + cabozantinib • Pembrolizumab[b] • Sunitinib	• Axitinib • Bevacizumab[h] • Bevacizumab[h] + erlotinib for selected patients with advanced papillary RCC including hereditary leiomyomatosis and renal cell cancer (HLRCC)-associated RCC (HERED-RCC-D) • Bevacizumab[h] + everolimus • Erlotinib • Everolimus • Nivolumab[b] + ipilimumab[b] (category 2B) • Pazopanib • Temsirolimus[e] (category 1 for poor-prognosis risk group; category 2A for other risk groups)

References

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- https://jcr.clarivate.com/jcr-jp/journal-profile?journal=MEDICINA-LITHUANIA&year=2022&fromPage=%2Fjcr%2Fsearch-results
- NCCN Guidelines® Kidney Cancer Version 2.2024 — January 3, 2024

Thank You for Your Attention!