Comprehensive Preoperative Evaluation, Risk Stratification & Postoperative Management in High-Morbidity Gynecologic Cancer Surgery

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DECLARATION OF INTERESTS

Nothing to declare

Principles of the Protocol

1. **Selective Testing**
   Not every patient needs the same workup — test selectively based on history, exam, and surgical risk
2. **Risk Stratification**
   Use validated scoring systems for objective risk assessment
3. **Early Optimization**
   Correct modifiable risk factors before surgery
4. **Multidisciplinary Collaboration**
   Involve specialists early for complex patients

And always — carry assessment through to intervention, not just a score

The question has changed

The changing paradigm

Maximal cytoreduction

Upper-abdominal surgery, bowel/diaphragm/spleen resection now routine in advanced ovarian cancer.

Radical pelvic surgery

Pelvic exenteration and LEER for recurrent disease — massive dissection, high resource use.

Vulnerable hosts

Aging, obesity and multimorbidity deplete physiologic reserve.

Old question

"Can this patient undergo anesthesia?"

New question

"What is the likelihood of severe complication, prolonged recovery, non-home discharge, or failure to receive adjuvant therapy?"

Quantify risk

Use validated tools, not impression.

Optimize

Fix reversible abnormalities.

Decide strategy

PDS vs NACT; extent & support.

The Case — Would You Operate on This Patient?

72-Year-Old Woman · Suspected Advanced Ovarian Cancer

Tumor	Massive ascites · CA-125 1,840 U/mL
Imaging	CT: extensive carcinomatosis, subdiaphragmatic lesions, omental cake
Comorbidities	Hypertension · Type 2 diabetes · CKD stage 3
Labs	Albumin 2.8 g/dL · Hb 9.4 g/dL
Weight	8 kg loss over 6 months
Medications	9 active medications
Function/Social	Lives alone; 2 falls in the past year

Questions on the table

- Primary debulking surgery (PDS)?
- Neoadjuvant chemo (NACT) then interval debulking?
- What evidence should drive that decision?

"Surgery is technically feasible."

The question isn't feasibility — it's whether this pa tient can survive the operation, recover, and go on to receive chemotherapy.

What makes surgery “high-morbidity”

Representative Operations

1. **Ovarian cancer cytoreductive surgery**
   Upper abdominal surgery, bowel resection, diaphragm stripping, splenectomy, multiple peritonectomies
2. **Pelvic exenteration / radical pelvic surgery**
   Extensive dissection, urinary/bowel diversion, prolonged length of stay
3. **Complex recurrent cancer surgery**
   Reoperative field, prior radiation, adhesions, fistula risk

What amplifies morbidity — risk factors

- **Long operative time · major blood loss**
- **Bowel · urologic · upper-abdominal resection**
- **Large tumor burden requiring wide debulking**
- **Frailty · low ECOG · sarcopenia · malnutrition**
- **Cardiopulmonary disease · high VTE risk**

The same procedure name can carry a completely different risk depending on how these factors combine

Why gynecologic cancer surgery is uniquely risky

Patient Factors

- Advanced age · frailty
- Sarcopenia
- Hypoalbuminemia
- Ascites-related GI dysfunction
- Anemia
- Obesity (endometrial cancer)

Surgical Factors

- Upper-abdominal manipulation (diaphragm, spleen)
- Bowel resection & anastomosis
- Prolonged operative time (6h+)
- Potential for massive blood loss
- Usually an open approach

Tumor Factors

- Widespread peritoneal spread
- R0 resection drives prognosis
- → strong incentive to accept risk

The feedback loop between "risk assessment" and "scope of surgery" is tighter here than in almost any other surgical field

The result of the risk assessment reshapes the operative plan itself — that is the defining feature of gynecologic cancer surgery

STEP 1

Screening

Every patient, in under 5 minutes. No special equipment, no extra tests.

1

Functional Status & Performance

METs (metabolic equivalent)

1 MET	Self-care
	Eating, dressing, or using the toilet
	Walking indoors and around the house
	Walking one to two blocks on level ground at 2 to 3 mph
4 METs	Light housework (e.g., dusting, washing dishes)
	Climbing a flight of stairs or walking up a hill
	Walking on level ground at 5km/h
	Running a short distance
	Heavy housework (e.g., scrubbing floors, moving heavy furniture)
	Moderate recreational activities (e.g., golf, dancing, doubles tennis, throwing a baseball or football)
Greater than 10 METs	Strenuous sports (e.g., swimming, singles tennis, football, basketball, skiing)

< 4 METs
Poor: increased risk of postop cardiac complications

≥ 4 METs
Adequate: can tolerate the hemodynamic stress of moderate surgery

Function is necessary but not sufficient

Read it alongside frailty and nutrition. METs is a quick bedside marker — distinguish cardiac limitation from simple deconditioning.

Age is not the number that matters — frailty is

Two patients, both 78, with a 3-fold difference in surgical risk

Age 78 · Fit

Lives independently · exercises 3x/week · 1 medication

No comorbidities · CFS 2

→ Extensive debulking is feasible

Age 78 · Frail

Uses a walker · recent fall · 11 medications

Weight loss · cognitive decline · CFS 6

→ Sharply elevated risk of major complications and failure to recovery

Screening tools — Modified FRAIL & K-FRAIL Scales

No tool is perfect. The one you actually use is the good one.

Modified FRAIL scale

Yes = 1 score, No = 0 score

Maximum score = 5, minimum score =0

Fatigue - Are you fatigued ?

Resistance - Cannot walk up 1 flight of stairs?

Aerobic - Cannot walk 100m ?

Illness - Do you have more than 5 underlying diseases?

Loss of weight - Have you lost more than 5% of your body weight in the past 6 months?

K-FRAIL scale

		0점	1점
Fatigue (피로)	지난 한 달 동안 피곤하다고 느낀 적이 있나요?	종종, 가끔 또는 아니요	항상 또는 거의 대부분
Resistance (저항)	도움 없이 혼자서 쉬지 않고 10개 계단 오르는데 힘이 드나요?	아니요	예
Ambulation (이동)	도움 없이 혼자서 300 m 걷는데 힘이 드나요?	아니요	예
Illness (지병)	이런 병이 있다고 들은 적이 있나요? 고혈압, 당뇨병, 암, 만성폐질환, 심근경색증, 심부전, 협심증, 천식, 관절염, 뇌경색, 신장질환 중 5개 이상의 만성 복합 질환	0~4개	5개 이상
Loss of weight (체중감소)	1년 전 체중(kg)과 지금 체중은 얼마인가요?	5% 미만 감소	5% 이상 감소 또는 변화 없거나 증가

* 합계 점수 0점은 강건함(robust), 1~2점은 노쇠 전단계(prefrail), 3점 이상은 노쇠(frail)를 시사.

Screening tools — Clinical Frailty Scale

No tool is perfect. The one you actually use is the good one.

Clinical Frailty Scale

1	2	3	4	5	6	7	8	9
매우 건강	건강	건강관리 양호	아주 경미한 허약	경미한 허약	중등도 허약	중증 허약	초고도 허약	불치병 환자
강건하고, 활동적이며, 활력이 넘치고, 의욕이 넘치는 사람. 보통 규칙적으로 운동하며, 동년배에서 가장 건강한 편.	기저질환은 없지만 매우 건강한 상태는 아닌 사람. 가끔(특정 계절 한정 등) 격렬한 활동 혹은 운동을 함.	의학적 문제를 잘 관리하고 있으나 일상적인 활동(걷기 등) 이상의 다른 격렬한 활동을 하지 않는 사람.	일상생활에 타인에게 도움을 받을 정도는 아니나, 본인의 상태로 인해 활동이 제한되는 경우가 많음. 활동이 느려지거나, 일과중에 피곤함을 느끼는 증상이 대표적.	행동 둔화의 양상을 보이며, 다소 어려운 도구적 일상생활 수행에는 도움이 필요함. 대부분의 경미한 허약을 가진 사람들은 점차 쇼핑, 야외에서 혼자 걷는 것, 식사 준비, 집안일등을 수행하기 어려워지게 됨.	모든 외부활동과 집안일에 도움이 필요함. 실내에서는 계단 오르기, 목욕 등을 혼자 할 수 없는 경우가 많고 옷 입기에도 약간의 보조가 필요할 수 있음.	신체적 혹은 인지적인 이유로 타인에게 완전히 의존하고 있으나 상태가 안정적이고 사망 위험(6개월 이내)도 높지 않아 보임.	수명이 얼마 남지 않은 상태로 일상생활을 타인에게 완전히 의존함. 사소한 질병에서도 회복하기 어려움.	임종이 얼마 남지 않은 상태. 암 등 두드러지는 기저질환에 의해 6개월 이하의 기대수명 상태.

What Frailty Predicts — and Why It's Reversible

What happens as the score rises

- **Major complications : increases**
- **Length of stay : longer**
- **30-day readmission : Increases**
- **Discharge to a facility : not going home**

→ **Delayed adjuvant chemo**
Feeds into worse oncologic outcomes

What is frailty — a reduction in physiologic reserve across multiple organ systems, limiting response to stress

It outpredicts chronological age
Predicts complications, length of stay, 30-day readmission, discharge to a facility, and 1-year mortality

But it's not binary
“Frail” isn't “inoperable” — it's a signal that the plan needs to change

And some of it is reversible
Anemia, nutrition, strength, and polypharmacy can improve within weeks

STEP 2

Domain-Specific Workup

Cardiac · pulmonary · nutrition · anemia · cognition · meds · VTE — the items that get missed, made systematic.

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STEP 1 · Screening | **STEP 2 · Domain Workup** | STEP 3 · Risk Integration | POSTOP · Postop Care

Cardiovascular Assessment

Follow the sequence and you avoid unnecessary testing

1 Check urgency

Emergency surgery proceeds without workup

2 Active cardiac disease?

Unstable angina · decompensated HF · severe arrhythmia · severe valve disease
→ delay surgery, cardiology

3 Calculate risk

RCRI or NSQIP MICA

4 Functional capacity

METs ≥ 4 (2 flights of stairs, brisk walk) or DASI → if met, proceed without further testing

5 Consider biomarkers

NT-proBNP ≥ 300 pg/mL or BNP ≥ 92 → postoperative troponin surveillance (MINS)

Watch for — a gynecologic-oncology trap

"I can't climb stairs"

Is this patient's reduced exercise tolerance cardiac — or is it massive ascites and cancer-related fatigue?

Ascites, pain, and generalized weakness systematically distort METs assessment — always tease apart the cause of reduced function.

"How were you doing before the ascites?"

Order stress testing only when the result would actually change management.

Cardiovascular risk — Stepwise Approach (2024 AHA/ACC)

Stepwise evaluation (2024 AHA/ACC)

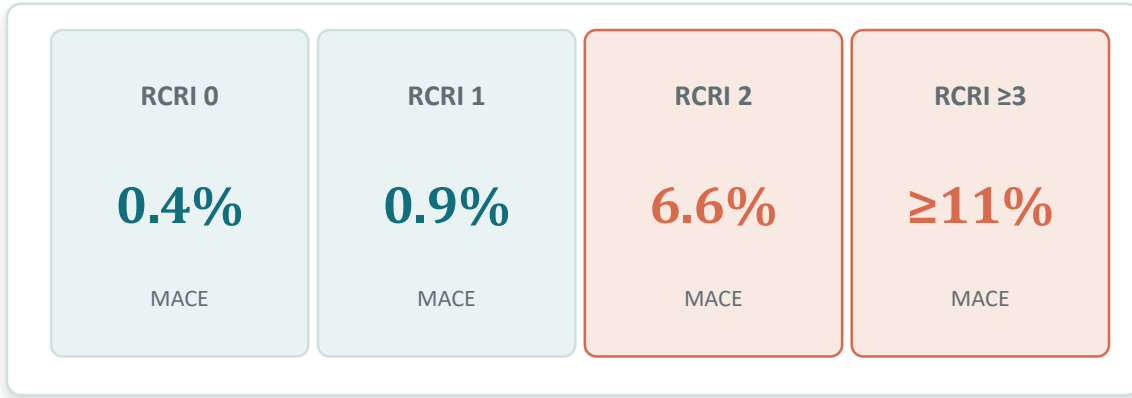
1. Surgical risk — major intra-abdominal gyn-onc surgery is high-risk (>5% 30-day cardiac death/MI).
2. Clinical risk factors — IHD, HF, cerebrovascular disease, CKD, insulin-treated DM.
3. Functional capacity — is low capacity cardiac, or deconditioning?
4. Targeted testing only if it will change management.

Cardiovascular risk — RCRI Score & MACE Risk

RCRI (Revised Cardiac Risk Index) → major cardiac event (MACE)

High-risk surgery: intra-abdominal, intrathoracic, or suprainguinal vascular	1 pt
Ischemic heart disease: prior MI, angina, positive stress test, or nitrate use	1 pt
Heart failure: CHF, pulmonary edema, or paroxysmal nocturnal dyspnea	1 pt
Cerebrovascular disease: prior stroke or TIA	1 pt
Insulin-treated diabetes	1 pt
Renal impairment: creatinine >2.0 mg/dL	1 pt

RCRI Score	Clinical Meaning
0 pts	Low risk.
1 pt	Low–intermediate risk.
2 pts	Intermediate risk.
≥ 3 pts	High risk



Pulmonary risk & correctable habits

ARISCAT — predicts postoperative pulmonary complications

Score inputs

Age	≤ 50 years (0 points)
	51 - 80 years (+3 points)
	> 80 years (+16 points)
Preoperative SpO_2	≥96% (0 points)
	91-95% (+8 points)
	≤ 90% (+ 24 points)
Respiratory infection in the past month	No (0 points)
	Yes (+17 points)
Incision site — upper abdominal / intrathoracic	Peripheral (0 points)
	Upper abdominal (+15 points)
	Intrathoracic (+24 points)
Preoperative anemia (Hb ≤ 10 g/dL)	No (0 points)
	Yes (+11 points)
Duration — over 2h / over 3h	< 2 (0 points)
	2-3 (+16 points)
	> 3 (+23 points)
Emergency surgery	No (0 points)
	Yes (+8 points)

Score ≥ 45 = high risk · PPC rate above 30%
→ pulmonary rehab is essential

Anemia & Patient Blood Management (PBM)

Not solved by transfusion — corrected before surgery

30–40%

of gyn-cancer patients are anemic bef ore surgery. Preoperative anemia is an independent risk factor for postoperat ive mortality and raises transfusion ex posure.

1 Detect

Preoperative anemia is common (bleeding in cervical/endometrial cancer, anemia of chronic disease in ovarian cancer)
Independently raises complications and mortality

2 Determine cause

Ferritin · TSAT · CRP
Iron deficiency, or anemia of chronic disease?
Don't give iron without knowing the cause

3 Correct

Iron deficiency → IV iron (oral is inferior in abs orption and adherence)
At least 2–4 weeks before surgery · consider ESA if needed

4 Transfuse restrictively

Intra- & post-op threshold Hb < 7–8 g/dL; balance against symptoms and hemodynamics.

Preoperative Medication Review — By Category

Polypharmacy raises delirium, bleeding, and metabolic risk all at once

Potentially inappropriate meds	Apply Beers criteria and STOPP/START. Re-review benzodiazepines, anticholinergics, sedative-hypnotics. Consider pharmacy consult for 5+ medications.
Anticoagulants / antiplatelets	Confirm stent history and timing (antiplatelets); bridging decisions are individualized. Cancer patients carry elevated clot and bleeding risk simultaneously — engage cardiology/hematology early.
Chronic steroids	Stress-dose coverage is needed for surgical stress — consider adrenal insufficiency risk.
Cancer treatment history	Bevacizumab — delayed wound healing, ensure adequate interval from surgery. Immunotherapy — screen for endocrinopathy (thyroiditis, hypophysitis).

VTE — the near-inevitable risk

Peak hypercoagulability: malignancy + pelvic surgery + long operative time + pelvic lymphadenectomy + immobility.

Assess & prevent : Caprini score - most high-risk gyn-onc patients fall at ≥ 5–8 (highest-risk category).

1 Point	• 41 to 60 years of age • Minor surgery • BMI more than 25 kg/meter square • Swollen legs • Varicose veins • History of unexplained or recurrent abortions (>3) • Pregnancy or postpartum state • Oral contraceptive use or hormone replacement	• Serious lung disease, including pneumonia (less than a month). • Sepsis (less than a month). • Abnormal pulmonary function. • Patient on bed rest. • History of inflammatory bowel disease. • Acute myocardial infarction. • Congestive heart failure.
2 Points	• 61 to 74 years of age • Major open surgery (more than 45 minutes) • Laparoscopic surgery (more than 45 minutes) • Confined to bed (more than 72 hours) • Immobilizing cast • Central venous access • Malignancy	
3 Points	• Age more than 74 years • History of VTE • Family history of VTE (venous thromboembolism) • Heparin-induced thrombocytopenia • Congenital or acquired thrombophilia	
5 Points	• Stroke (less than a month) • Elective arthroplasty • Hip, pelvis, or leg fracture • Acute spinal cord injury (less than a month)	

Risk Level	Caprini Score	Prophylaxis Strategy	Duration
Low	0-2	Mechanical (SCD)	Until ambulatory
Moderate	3-4	Mechanical + consider pharmacologic	Duration of admission
High	≥5	Dual prophylaxis (mechanical + pharmacologic)	Admission + consider extended
Cancer surgery	Usually ≥5	Dual prophylaxis	28 days total (extended)

28 days

Extended prophylaxis

After laparotomy for abdominal/pelvic malignancy, guidelines (ACOG/ASCO/SGO/ESGO) recommend 28-day LMWH — cutting delayed post-discharge VTE by >50% without excess bleeding.

Renal function, fluids & AKI prevention

Baseline reserve is over-estimated

- Ascites, obstruction, vomiting, fasting, bowel prep and nephrotoxins mask true kidney reserve.
- Check eGFR & creatinine trend, urine output history, Na/K/HCO_3.

Gyn-specific: obstruction

- Bulky tumor can cause hydronephrosis — screen for it.
- Consider preoperative Double-J ureteral stent when indicated.

Prevent intra-op AKI

- Goal-directed fluid therapy to preserve renal perfusion pressure.
- Strictly limit nephrotoxic drugs; aim for euvolemia, not overload.

Read volume status as effective arterial blood volume, not just “is there edema”

Ascites, obstruction, vomiting, fasting, bowel prep, and nephrotoxic drugs all mask true renal reserve — a patient can be intravascularly dry despite ascites or peripheral edema. Postoperative oliguria is common but not always benign.

Perioperative DM Management

Preoperative targets:

- HbA1c <8% ideal; if >10%, consider delaying if oncologically safe
- Morning-of-surgery glucose target: 100–180 mg/dL

Day-of-surgery medication management:

- Metformin: hold day of surgery (48h if contrast given)
- SGLT2 inhibitors: hold 3–4 days before surgery
- Sulfonylureas: hold morning of surgery
- DPP-4 inhibitors: may be continued
- Long-acting insulin: give 50–80% of usual dose the night before
- Short-acting insulin: hold morning of surgery

STEP 3

Risk Integration

Turning scattered scores into a single tier. And the tier becomes the strategy.

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STEP 1 · Screening | STEP 2 · Domain Workup | **STEP 3 · Risk Integration** | POSTOP · Postop Care

Surgical Complexity Score (SCS)

Low
≤ 3 pts

- Total hysterectomy
- Bilateral salpingo-oophorectomy
- Omentectomy
- Pelvic lymphadenectomy

Intermediate
4–7 pts

- Para-aortic lymphadenectomy
- Peritonectomy
- Small bowel resection
- Appendectomy

High
≥ 8 pts

- Rectosigmoid resection + anastomosis
- Diaphragm stripping / resection
- Splenectomy
- Partial hepatectomy
- Extensive peritonectomy

Lower the complexity, and the risk comes down — even for the same patient

Patient reserve is hard to change quickly. Surgical complexity is something we decide. (Aletti score, multicenter validation in IJGC: severe morbidity rises significantly at SCS ≥ 8)

Diagnostic Laparoscopy: Fagotti Score (PIV) — Estimating R0 Odds Up Front

A laparoscopy-based predictive tool that supports the PDS-vs-NACT decision

7 anatomic sites scored — 2 points per site if disease present

Peritoneal carcinomatosis (excluding diaphragm)	0 / 2 pts
Diaphragmatic disease	0 / 2 pts
Omental cake	0 / 2 pts
Bowel infiltration	0 / 2 pts
Stomach / spleen / lesser omentum involvement	0 / 2 pts
Mesenteric root involvement	0 / 2 pts
Liver surface metastasis	0 / 2 pts

Maximum 14 points · PIV ≥ 8 → low likelihood of optimal (R1 or less) resection

Why it matters

CT/PET alone often underestimates the true extent of peritoneal disease. A brief diagnostic laparoscopy lets you see it directly, avoiding an “open-and-close” exploratory laparotomy that finds unresectable disease only after the abdomen is open.

PIV < 8

Primary debulking (PDS) is reasonable to attempt

PIV ≥ 8

Favor NACT → interval debulking (IDS)

ESMO-ESGO does not mandate a single specific score, but the Fagotti score is the most widely used tool in Europe.

The Integrated 3-Tier Risk Classification

Low Risk

Definition

Imaging: no extensive unresectable disease
Frailty: low
Laparoscopy: favorable resectability
R0 expected to be achievable

Strategy

Proceed as planned : primary debulking s urgery
Standard ERAS pathway

Intermediate Risk

Definition

Imaging: mixed or borderline findings
Frailty: intermediate
Laparoscopy: uncertain resectability

Strategy

further evaluation, PDS vs NACT

High Risk

Definition

Imaging: diffuse peritoneal disease
Frailty: high / low reserve
Laparoscopy: poor resectability

Strategy

NACT → interval debulking
or best supportive care

This is the biggest opportunity

High risk does not mean inoperable. High risk means a different operation, a different time, a different goal.

POSTOP

Assessment Doesn't End at Discharge from the OR

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What the assessment found must show up directly in the postoperative care plan.

STEP 1 · Screening | STEP 2 · Domain Workup | STEP 3 · Risk Integration | **POSTOP · Postop Care**

ERAS — a bundled risk-reduction system

ERAS is not a low-risk protocol. In high-risk patients it matters MORE — it reduces variation and the old-fashioned harms of prolonged fasting, fluid overload, immobilization, a nd excess opioids.

Before

- Education & expectation-setting
- Avoid prolonged fasting
- Carb loading — 800 mL night before, 400 mL 2 h pre-op
- Optimize anemia & nutrition

During

- Maintain normothermia
- Euvolemia — avoid crystalloid overload
- No routine mechanical bowel prep
- PONV prophylaxis

After

- Multimodal opioid-sparing analgesia
- Early oral feeding
- Early mobilization
- Remove catheters & drains early

Delivered as a bundle, ERAS shortens length of stay and reduces pain, complications and readmission — without increasing mortality or reoperation.

The first 72 hours — syndrome-based watch

0–24 h — Hemodynamic instability · bleeding · respiratory failure

24–72 h — AKI · ileus · delirium · evolving infection · anastomotic problems

Circulation

HR trend, BP, pulse-pressure, urine output — read the pattern, not one number.

Respiration

Rising O_2 demand, shallow breathing, ineffective cough, tachypnea.

Bleeding / drains

Bloody drain increase, distension, falling Hb with tachycardia.

Infection

Persistent tachycardia often precedes fever; escalating O_2, oliguria, confusion.

GI recovery

Ileus vs leak: distension, worsening pain, drain character change.

Neuro / delirium

Catch hypoactive (quiet) delirium; reorient, remove triggers.

Comprehensive Preoperative Checklist

A pocket summary for clinic and tumor board

Domain	Tool / Metric	High-Risk Cutoff · Action
Cardiovascular	RCRI · NT-proBNP · METs	RCRI ≥ 2, METs < 4 → cardiology consult · biomarkers
Frailty	mFI-5 · CFS	CFS ≥ 5 → individualize scope · comprehensive geriatric assessment
Nutrition	NRS-2002 · Albumin	Albumin < 3.0 → 7–14 days optimization (immunonutrition)
Tumor resectability	Fagotti Score (PIV)	PIV ≥ 8 → favor NACT → interval debulking
VTE	Caprini	Score ≥ 5 → preop LMWH + 28-day extended prophylaxis
Blood	Hemoglobin	Hb < 10 → high-dose IV iron 2–3 weeks before surgery
Respiratory	ARISCAT · OSA screen	Score ≥ 45 → pulmonary rehab · postop monitoring plan
Renal	eGFR · hydronephrosis	Obstruction → consider DJ stent · avoid nephrotoxins

Thank you for your attention