Early Recognition and Management of Common Complications after Gynecologic Cancer Surgery

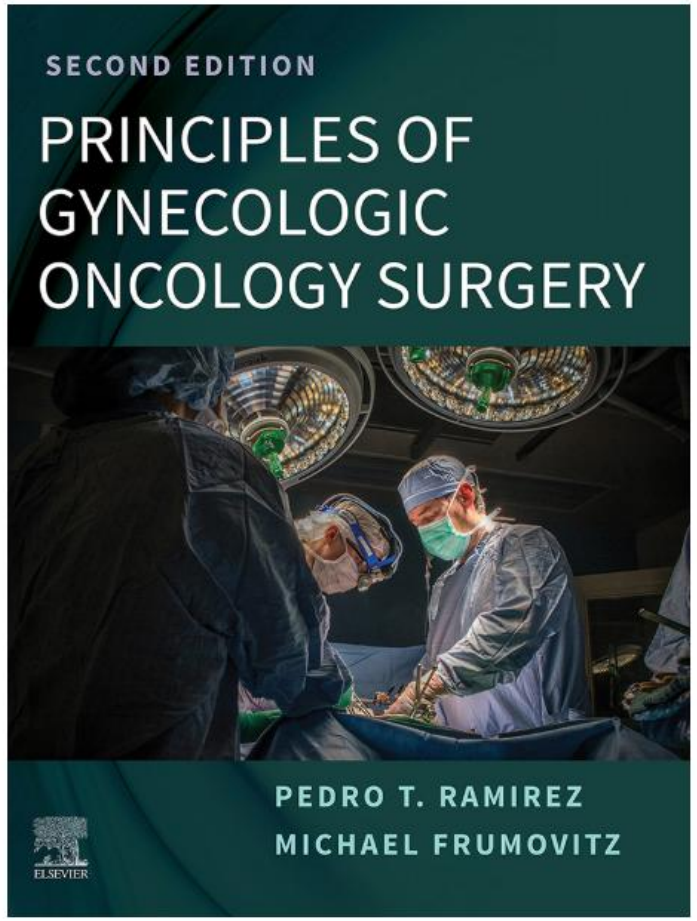
Eun Taeg Kim, MD, PhD
(Kosin University College of Medicine)

DECLARATION OF INTERESTS

Nothing to declare

SOURCE

Primary reference



Ramirez PT, Frumovitz M, eds. **Principles of Gynecologic Oncology Surgery.** 2nd ed. Elsevier; 2025.

Chapters reviewed

- Ch 13 Complications and Management of Radical Cytoreduction (Ferron, Mezghani, Fite)
- Ch 17 Management of Bowel Surgery Complications (Messick, Santos)
- Ch 18 Management of Urologic Complications in Gynecologic Oncologic Surgery (Singh, Cunningham, Karam)
- Ch 21 Management of Vascular Complications (Khan, Mehran)
- Ch 26 Complications of Minimally Invasive Surgery (Foley, Tanner)

Selected figures were updated with primary studies and the ESGO 2021 peri-operative guidelines.

OVERVIEW

Complications after cytoreductive surgery

I–II	IIIa, IIIb	IVa, IVb	V
Drugs, transfusion, TPN	Intervention without / under GA	Single / multi-organ dysfunction, ICU	Death

Clavien-Dindo grade; III–IV = major complication (Dindo 2004; Clavien 2009)

34%

Any complication within 30 days of optimal cytoreduction; major 11.5% (6 centers, n=180)

Rafii 2012

7% → 30%

Complication rate with 0 vs ≥3 extended procedures (NSQIP, n=2,870)

Patankar 2015

22%

Grade 3–5 after extensive upper-abdominal surgery; 68% resolved with percutaneous drainage (n=141)

Chi 2010

9.9% / 2.7%

30-day readmission / reoperation at a high-volume center (n=700)

Straubhar 2021

Failure to rescue (Nationwide Inpatient Sample, n=36,624)

Death after a complication: **8.0%** at low-volume vs **4.9%** at high-volume hospitals

Major complications 20.4% vs 24.6%, low-volume hospital OR 1.48 for death after a complication

Wright 2012

KEY POINTS

- **Extent drives morbidity.** Surgical complexity correlated with 30-day morbidity (P<.001) and showed no correlation with 3-month mortality (P=.266). **Aletti 2007**
- **Patient factors drive mortality.** Age ≥65 (SEER-Medicare, n=5,475): 30-day mortality 8.2%; 20.1% after emergent admission(ileus); 12.7% at age ≥75 with stage IV, or stage III with comorbidity. **Thrall 2011**
- **Complications delay chemotherapy.** Median interval to chemotherapy 29 days (Dutch registry, n=4,097). Longest quartile: OS HR 1.43 after PDS and 1.22 after IDS, seen only with no macroscopic residual disease. Start within 5–6 weeks. **Timmermans 2018**

- **Rescue decides survival**

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 13 (Ferron et al.)

RISK Preoperative risk factors

Factor	Effect on outcome
Age ≥75 years	Morbidity ×2, longer stay; mortality up to ×10
ASA III–IV	Morbidity and mortality ×2–4
Frailty index ≥4 (9–11 items) or >0.26 (30–40 items)	Major morbidity ×5: unfit for CRS unless optimized
Severe malnutrition **weight loss >10%/3–6 mo, BMI <18.5, albumin <30 g/L, prealbumin <10 mg/dL**	Major complications 40–60%; anastomotic leak ×7
Prealbumin <10 mg/dL	30-day mortality 23% vs 0%
Albumin <34 g/L	Mortality ×3
>3 extended procedures **(Aletti SCS ≥8 = high)**	Adverse outcomes ×3–4
Obesity	Major morbidity up to 35% (SSI, VTE)

Fixed: age, ASA class. Modifiable before surgery: nutrition, anemia, frailty.

OPTIMIZE

- **Prehabilitation** for ≥4 weeks.
- **Nutrition** 7–14 days when malnourished; operate with prealbumin >10 mg/dL; oral immunonutrition 5–7 days before any CRS.
- **Smoking and alcohol:** stop ≥4 weeks.
- **Anemia** (39–48% of candidates): transfuse if Hb <7 g/dL, correct iron deficiency.
- **Recent VTE:** postpone surgery ≥1 month.
- **Unfit → NACT.** Major complications 6–9.5% after IDS vs 14–46% after upfront surgery.

  SCORPION: major complications 7.6% vs 25.9% (Fagotti 2020)

  CHORUS: grade 3–4 AE 14% vs 24%; 28-day death <1% vs 6% (Kehoe 2015)

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 13 (Ferron et al.)

WARD ROUNDS

Postoperative warning signs

Signal	Think of	First step
Unexplained tachycardia or hypotension, falling Hb, bloody drain, distension	Hemorrhage (retroperitoneal bleed may stay hidden after MIS)	Resuscitate, correct coagulopathy; re-operation or embolization by interventional radiology (IR)
Worsening abdominal pain + tachycardia + fever	Bowel injury or leak; thermal perforation at 72–96 h	CT with water-soluble contrast
Ileus that persists, or returns after initial recovery	Mechanical obstruction	Abdominopelvic CT
CRP rising from POD 5; high lactate in ICU	Major complication brewing	Search for the source
Flank pain, fever, ileus, ascites, oliguria at 24–72 h	Urinary tract injury, urinoma	Drain:serum Cr >1.0 → CT urogram, 10-min delay
Continuous watery vaginal discharge	VVF (POD 7–10), UVF (1–4 weeks)	Cysto-vaginoscopy, double-dye test, CT urogram
Sudden vaginal fullness, pain, bleeding, discharge	Cuff dehiscence ± evisceration	Low threshold for exam under anesthesia
New bulge or pain at a port site weeks to months later	Port-site hernia	Ultrasound or CT

Litigated ureteral injuries after benign gynecologic surgery (n=20): 70% diagnosed after discharge; 45% unfavorable legal outcome (Jacob 2020)
Most frequent reasons: conduct of surgery, failure to act in a timely fashion postoperatively

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 13 (Ferron et al.); Ch 18 (Singh et al.); Ch 26 (Foley & Tanner)

Part 1

Common postoperative complications

BLEEDING

Postoperative hemorrhage

Suspect bleeding
Tachycardia, hypotension, bloody drain, abdominal distension, falling Hb ± consumption coagulopathy

↓

Resuscitate
Transfusion, restore normovolemia, correct coagulopathy, inform anesthesia / ICU

↓

Unstable
Re-operation
Packing: remove no earlier than POD 1; >3 days raises infection risk (ESGO IV, B)

Stable, arterial source
IR embolization (ESGO III, B)

- **Major hemorrhage protocol** in every center performing ovarian cancer surgery, reviewed periodically (ESGO IV, B).

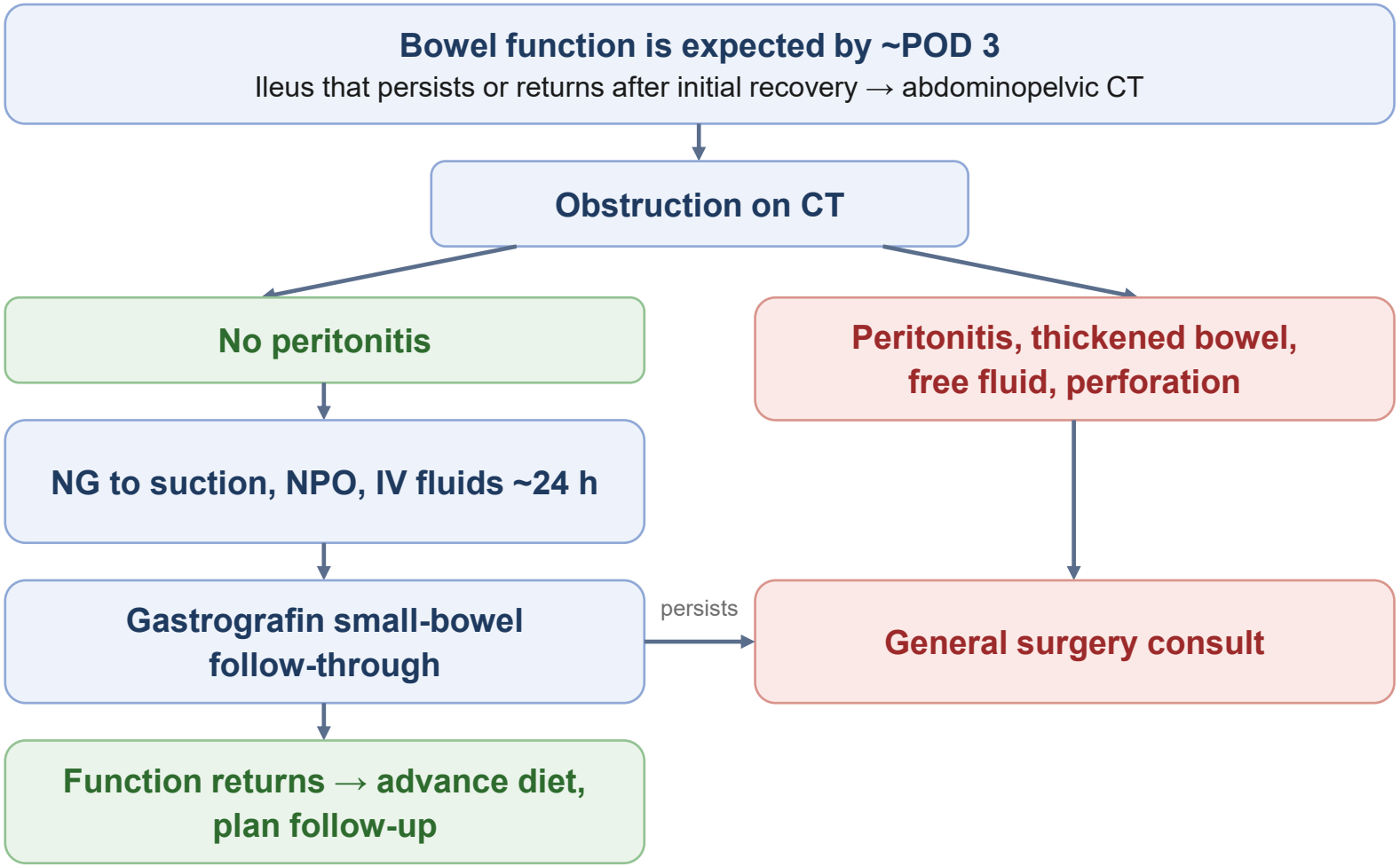
KEY POINTS

- Post-operative hemorrhage **1–11.5%** after cytoreduction; EBL >1000 mL in up to 25%.
- Hemorrhage causes **14–20% of re-operations**.
- **After MIS** a retroperitoneal bleed can stay hidden: unexplained hypotension or tachycardia should raise it. Unrecognized major vascular injury: mortality approaching 15%.

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 13 (Ferron et al.); Ch 21 (Khan & Mehran); Ch 26 (Foley & Tanner)

BOWEL

Postoperative ileus and bowel obstruction



KEY POINTS

- Prolonged ileus **1–4%** overall, **7.8–21%** after bowel resection, up to 40% after multiple resections; fluid overload and HIPEC add risk.
- Correct hypokalemia, which sustains ileus.
- NG output 200–500 mL/day + flatus = end of decompression. **No flatus by 72 h,** peritonitis, ischemia, or obstruction persisting after Gastrografin. → **reassess with general surgery**
- SBO after hysterectomy: **5%** without vs **20–22%** after pelvic radiation (Montz).

Algorithm adapted from Fig 17.11

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 13 (Ferron et al.); Ch 17 (Messick & Santos)

BOWEL

Anastomotic leak and delayed bowel injury

Leak rate by distance from the anal verge

Each 5 cm closer to the anal verge adds about **5%** to the leak rate (cumulative 5–15%). Highest at **≤5 cm** from the anal verge (low colorectal or coloanal anastomosis).

Consider a diverting ileostomy

- Prior pelvic radiation
- Poor nutrition
- Incomplete stapler donuts
- Active chemotherapy or high-dose steroids
- Anastomosis ≤7 cm from the anal verge

How a leak presents

- Peritonitis or abscess
- Enteric content from wound, drain, urine, or vagina
- Free air increasing on serial upright CXR over 2 days
- CT: extraluminal air, fluid around the staple line

→ CT with water-soluble oral contrast

Routine protective stoma is not recommended to reduce anastomotic leak after colorectal resection in ovarian cancer (ESGO III, B).

Two rules for any anastomosis: zero tension and adequate blood supply.

KEY POINTS

- Leak or fistula accounts for **38–55%** of re-operations after CRS.
- **After laparoscopy, 40–50% of bowel injuries are missed at surgery.**
- Thermal injury necroses beyond the visible zone; perforation follows at **72–96 h**.
- **Stable leak:** radiologic or endoscopic management. **Extensive peritonitis:** reoperation, lavage, repair or diversion (ESGO II, B).

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 13 (Ferron et al.); Ch 17 (Messick & Santos); Ch 26 (Foley & Tanner)

BOWEL

Enterocutaneous fistula

1 Recognize & control

- Open the wound to drain
- Wound manager / ostomy appliance; protect skin
- **Measure daily output**
- CT with contrast; IR drain for any undrained abscess
- Broad-spectrum antibiotics for sepsis

2 Stabilize & investigate

- Fistulogram to define the tract
- Fluids, electrolytes; **TPN for high output**
- Oral trial when output stays <200–500 mL/day
- PPI; octreotide 100 µg IV q8h , 3-day trial, ; reserve for high-output fistula
- Weekly labs; weight gain = positive N balance

3 Definitive repair

- **Wait ≥3 months** (hostile abdomen, nutrition)
- En bloc resection of tract and bowel
- Re-anastomose healthy, well-perfused ends; consider proximal diversion
- Success 75–85%; mortality 5–20%

Output (mL/day)	Low <200	Moderate 200–500	High >500

Fistula risk after CRS: malnutrition, long operation, intraoperative chemotherapy, **negative-pressure wound therapy**

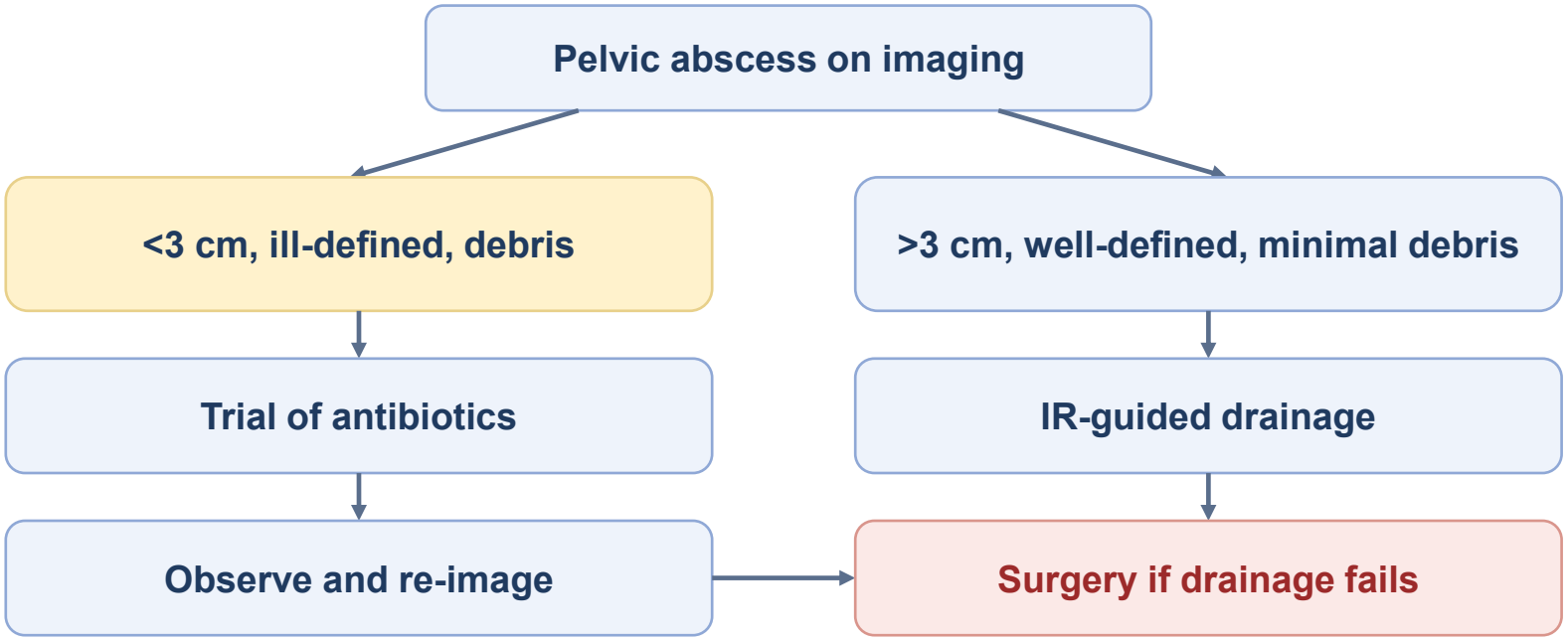
KEY POINTS

- Bowel fistula after CRS: **0.5–4%**.
- Spontaneous closure: 15–30% of ECFs overall; up to 90% of **low-output small-bowel** fistulas after CRS at 4–6 weeks, ~8% need surgery.

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 17 (Messick & Santos); Ch 13 (Ferron et al.)

INFECTION

Intra-abdominal abscess and surgical site infection



Abscess arm adapted from Fig 17.5

Wound

SSI **1–21%**: antibiotics, open the wound, NPWT for large or deep wounds.

Prevention: prophylaxis within 2 h before incision, redose by half-life; no prolonged postoperative prophylaxis (ESGO III, A).

KEY POINTS

- Symptoms are vague: dull pain, nausea, ileus, mass, leukocytosis; older patients may have none.
- Post-splenectomy leukocytosis can mask infection.
- Localized abscess **1–8%** after CRS.
- Intra-abdominal abscess mortality was ~33% before IR drainage became standard.
- IR drainage succeeds in up to **82%**; best when well-defined, >3 cm, little debris.
- CT is the best imaging for a suspected collection; image-guided percutaneous drainage is preferred over relaparotomy (ESGO III, B).

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 13 (Ferron et al.); Ch 17 (Messick & Santos)

URINARY

Ureteral injury

When the injury is recognized

Intra-op	≤72 h	72 h – 1 week	>1 week
Repair now Unstable: ligate + PCN or cutaneous ureterostomy, repair later	**Re-explore and repair**	**Individualize** Prior RT, infection, hostile abdomen	**Divert, repair later** Stent or PCN; reconstruct at 6–12 weeks

First line for most ureteral injuries

Cystoscopy + retrograde pyelogram + stent → fails → PCN ± antegrade stent. Keep the Foley. Drain any urinoma; drains near a leak to gravity.

ESGO (III, B): immediate primary repair when recognized during surgery; postoperative injury → ureteral stent or nephrostomy, surgical repair.

Level	Repair (Table 18.1)
Upper / mid	Ureteroureterostomy (defects 2–3 cm), transureteroureterostomy, Boari flap
Distal	Ureteroneocystostomy ± psoas hitch

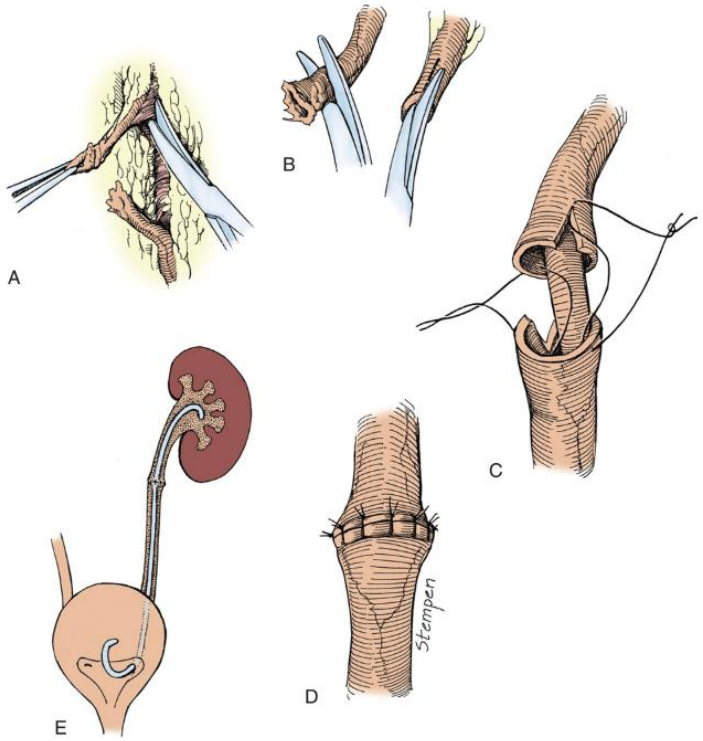
Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 18 (Singh et al.); Ch 26 (Foley & Tanner)

KEY POINTS

- Incidence **0.5–1.5%** in radical pelvic surgery; bladder > ureter.
- 15–30% unrecognized at surgery. **Injuries recognized intraoperatively are easier to repair, with better outcomes** (Sakellariou, n=76).
- Signs at 24–72 h: flank or abdominal pain, fever, ileus, ascites, oliguria, AKI.
- Drain fluid: **drain:serum Cr >1.0** suggests a leak.
- **CT urogram with 10-min delayed phase for the ureter; cystogram for the bladder.** Ultrasound and plain film lack specificity.
- Prophylactic stents raise intra-op recognition; injury rates unchanged (n=3,141). ESGO: consider in high-risk patients, e.g., prior urologic surgery or hydronephrosis (III, B).
- **Intra-op cystoscopy with indigo carmine:** detection 97.4%. No ureteral jet in 20–30 min → retrograde pyelogram or stent.

URINARY

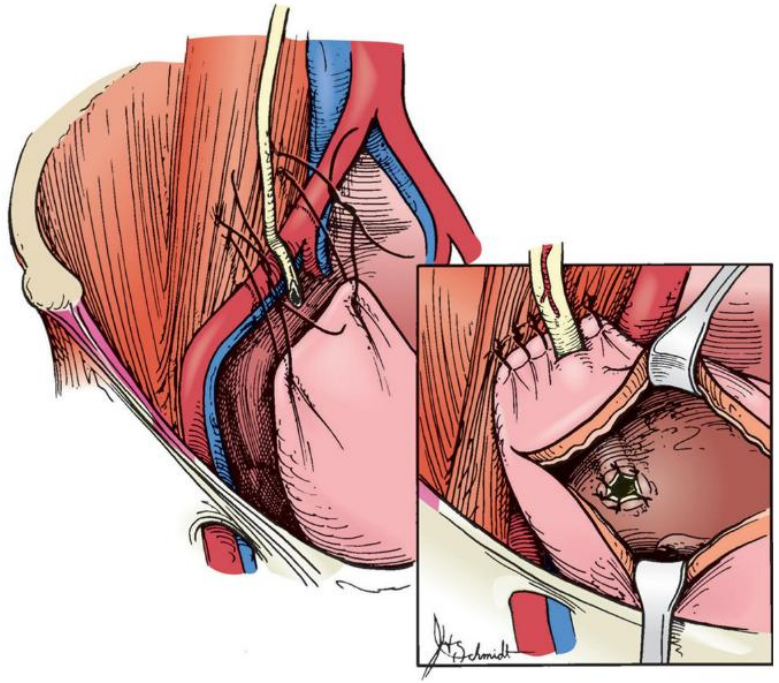
Ureteral reconstruction



Ureteroureterostomy

Upper or mid ureter, defect 2–3 cm;
spatulated end-to-end anastomosis over a stent

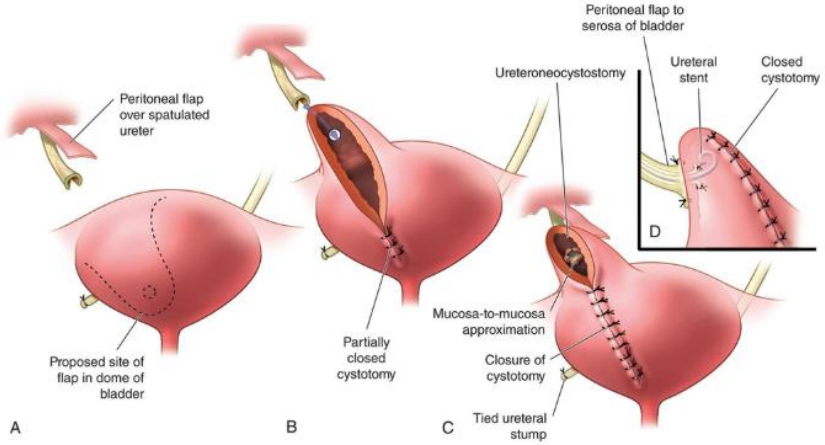
Fig 18.4



Ureteroneocystostomy with psoas hitch

Distal ureter; bladder mobilized and fixed
to the psoas tendon

Fig 18.7



Boari flap

Mid ureter (Table 18.1); bladder-wall flap tubularized
to reach the ureter

Fig 18.8

Figures: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 18 (Singh et al.). Fig 18.4, 18.7 from Wein AJ, et al. Campbell-Walsh Urology, 11th ed. 2016; Fig 18.8 from Baggish M, Karram MM. Atlas of Pelvic Anatomy and Gynecologic Surgery, 4th ed. 2016.

URINARY

Urinary fistula

	Ureterovaginal (UVF)	Vesicovaginal (VVF)
Onset	1–4 weeks	POD 7–10
Site / cause	Pelvic ureter, 1.5–2 cm from the cervix, close to the vaginal fornix	Unrecognized cuff-level bladder injury, thermal necrosis; 75% follow abdominal hysterectomy
Work-up	CT/MR urogram; retrograde pyelogram. Cystogram: up to 10% also have a VVF	Cysto-vaginoscopy, CT urogram. Biopsy the tract after cancer surgery
Conservative	PCN ~50%; ureteral stent 50–70% resolution	Catheter bladder drainage and after a cystogram (ESGO III, B) => small, non-irradiated fistulas only
Repair	Reimplantation when conservative care fails	≤2–4 wk: repair now >4 wk: wait 2–3 mo irradiated: 6–12 mo

Double-dye test Oral phenazopyridine + intravesical blue dye (indigo carmine or methylene blue), tampon in vagina.
Orange proximal = UVF; blue mid-portion = VVF; blue distal = urethrovaginal fistula or incontinence

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 18 (Singh et al.)

VTE Venous thromboembolism

Prevent

- IPC and early ambulation
- LMWH from 8–12 h after surgery, for **28 days** (ESGO I, A)
- Low-risk patients: apixaban 2.5 mg bid for 28 days as an alternative (ESGO II, A)

Treat

- Therapeutic LMWH without delay
- Anticoagulation contraindicated → retrievable IVC filter
- Duration ≥3–6 months
- Massive PE → ICU, catheter-directed thrombectomy, no thrombolysis within 4–6 weeks of surgery

KEY POINTS

- VTE after CRS: 20–30% historically, **<10% with ERAS**.
- Massive PE mortality up to **30%**.
- Acute VTE before surgery: delay surgery ≥1 month.

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 13 (Ferron et al.); Ch 21 (Khan & Mehran)

MIS Port-site hernia and vaginal cuff dehiscence

	Port-site hernia	Vaginal cuff dehiscence
Incidence	1.9% at 1 year (8% after laparotomy); **3.1% at 12 mm ports**	Laparoscopic hysterectomy 0.64% (abdominal 0.2%, vaginal 0.13%)
Risk	**Age >60, BMI >28, port ≥12 mm, operation >80 min**	Malignancy (RT, chemo), diabetes, smoking, steroids, raised IAP
Presentation	Bulge or pain weeks to months later; obstruction	Sudden vaginal fullness, pain, bleeding, discharge; often after intercourse
Action	US or CT; incarceration = emergency	Low threshold for EUA; evisceration → OR, inspect bowel
Prevention	**Close fascia at ports ≥10 mm**	**Pelvic rest 6–8 weeks**

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 26 (Foley & Tanner)

SUMMARY

Timeline of postoperative complications

Intra-op	POD 0–2	POD 1–3	POD 3–5	POD 5–10	Weeks	Months
40–50% of lap bowel injuries missed	Hemorrhage: vitals, drain, Hb	Bowel function expected by ~POD 3	Thermal perforation: 72–96 h	CRP rising from POD 5	UVF at 1–4 weeks	Cuff dehiscence: intercourse at ~7 weeks
15–30% of urinary injuries missed	SC emphysema settles in 24–48 h	Urinary leak signs at 24–72 h	No flatus by 72 h → reassess with general surgery	VVF at POD 7–10	VTE prophylaxis to day 28	Port-site hernia: weeks to months
No ureteral jet in 20–30 min → retrograde pyelogram or stent	LMWH from 8–12 h	Leak on CXR: free air rising over 2 days	Urinary injury >72 h: re-exploration less favorable	Urinary injury >1 week → divert, repair later	Chemotherapy by 4–6 weeks	ECF repair ≥3 months

Source: Ramirez PT, et al., eds. Principles of Gynecologic Oncology Surgery, 2nd ed. Elsevier; 2025. Ch 13 (Ferron et al.); Ch 17 (Messick & Santos); Ch 18 (Singh et al.); Ch 26 (Foley & Tanner)