

Management of Complications of Gynecologic Surgery

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Introduction of Complication

- ❑ Gynecologic surgery: 0.2%-26% complication rate.
- ❑ Increase with surgical difficulty.
- ❑ At the time of surgery, postoperative period, a chronic process.
- ❑ Best management strategy: avoidance of complications.

Complication

- ❑ Gastrointestinal injury
 - ❑ Wound complication
 - ❑ Hemorrhage
 - ❑ Neurologic injury
 - ❑ Genitourinary injury
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Gastrointestinal Injury

- Gastric and small-bowel injury
 - Colonic injury
 - Ileus and obstruction
 - Which radiologic studies are useful in small-bowel obstruction?
 - Small-bowel obstruction (SBO) management
 - Large-bowel obstruction management
 - Fistula
 - Malabsorption
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Bowel surgery in gynecologic oncology

- ❑ Most common indications: metastatic disease, obstruction, fistula, radiation-induced injury.
- ❑ Planning by GI radiologic study, CT, MRI, fistulograms.
- ❑ Preoperative mechanical preparation (contraindication for complete SBO), prophylactic antibiotic, NG decompression.
- ❑ Bowel adhesiolysis: not bluntly.
- ❑ Packing: avoid excessive pressure

Gastric and small-bowel injury

- Jejunal injury results in peritonitis , adhesion formation, fistula, severe dehydration, electrolyte abnormalities.
- Distal small-bowel injury: fatty acid, bile and vitamin malabsorption.

Repair

- Gastric lacerations: 2 layers repair
Inner: 3-0 or 4-0 absorbable running sutures
outer : 3-0 or 4-0 permanent sutures
 - Duodenal injury: less common, mortality 15%.
 - Small-bowel injury: 2 layer repair
Inner: whole 3 layer
outer : seromuscular
suture line: transverse to bowel axis
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Key principles for bowel reanastomosis

- ❑ Indication: ischemic bowel.
 - ❑ Proximal and distal ends: patent and healthy
 - ❑ Preserve the largest length of functional bowel
 - ❑ Avoid tumor in the anastomosis
 - ❑ Avascular distended bowel should be decompressed and reassessed.
 - ❑ Prevent intestinal spillage in surgical field. (irrigation, antibiotics)
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Successful resection and reanastomosis

- Healthy and vascular bowel segments
 - Ample lumen
 - Tight and tension-free anastomosis
 - Hemostasis
 - Exclusion of distal or proximal areas of obstruction
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Colonic injury

- High risk:

 - Hemorrhage > 1L

 - Significant fecal spillage

 - Hypotension

 - Elapsed time since injury > 6 hours

- Low risk

Colonic injury

- Rate of anastomotic breakdown and leakage

High risk: 42%

Low risk: 3%

- Repair

High risk: resection and colostomy

Low risk: primary 2 layer repair (small, easily repaired, no tension)

Indication for colostomy

- Colonic resection
 - High risk of suture line leak:
 - Multiple medical comorbidities.
 - Significant fecal leakage.
 - Blood product transfusion requirement.
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Ileus and Obstruction

- ❑ Interruption of normal flow of intestinal contents.
- ❑ Mechanical obstruction or paralytic ileus.
- ❑ Incidence after GYN surgery: 4-5%
- ❑ Clinical sign: intolerance of oral intake, distension, pain, absence of bowel sound, flatus and stool.
- ❑ Cause: surgery, drug, chemo, electrolyte abnormalities, hematomas, peritonitis, abscess, carcinomatosis.

Ileus

- Usually resolves in 2-5 days, may longer than 1 week.
 - A flat plate with decubitus and upright views: air in the CI tract, dilatation of small bowel and air-fluid levels
 - Treatment: NG tube decompression, IV fluid resuscitation, bowel rest.
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Mechanical obstruction

- ❑ Result form postoperative adhesion, hernia, tumor.
- ❑ Goal: maximize the outcome of conservative therapy without encountering increased morbidity.
- ❑ Differential diagnosis: ileus, **ischemia**, fecal impaction, gastroenteritis, mesenteric thrombosis.
- ❑ **The most significant morbidity**: delay in recognizing the ischemia→ sepsis.

Mechanical obstruction

- ❑ Jejunal obstruction: intolerance for oral intake, nausea, emesis, bloating, colicky abdominal pain.
 - ❑ Ileal obstruction: less symptomatic.
 - ❑ Bowel dilatation worsen by swallowed air and accumulation of bacterial fermentation.
 - ❑ Obstruction → edema → absorptive function loss → ascitis.
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Laboratory studies for SBO

- Amylase
 - Lipase
 - Plain abdominal radiographs
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Radiologic studies in SBO

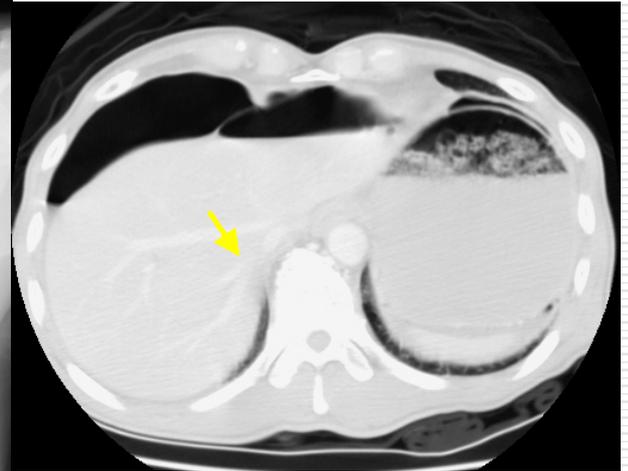
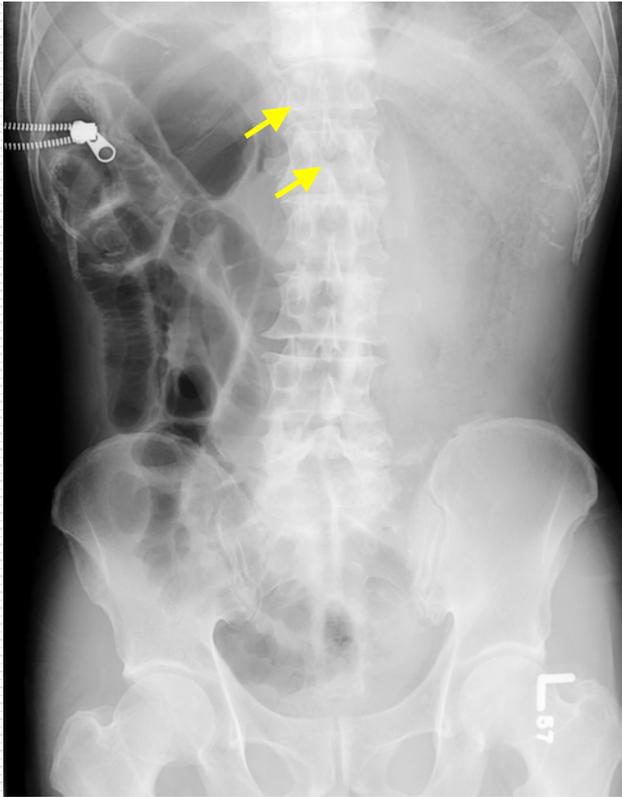
- Plain radiography
 - CT scan
 - Upper GI contrast study:
 Water-soluble contrast or barium
 - Lower GI tract:
 barium enema or colonoscopy
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Plain radiography

- ❑ False-negative rate of 5-10%
 - ❑ Equivocal in 20-30%
 - ❑ A flat and upright radiography with the diagnosis of SBO in 75-95% cases.
 - ❑ Pattern: gas distribution, dilated loop of bowel, multiple air-fluid levels.
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Perforation of Hollow organ

Falciform Ligament Sign



Schultz:
Radiology
1958;70:728

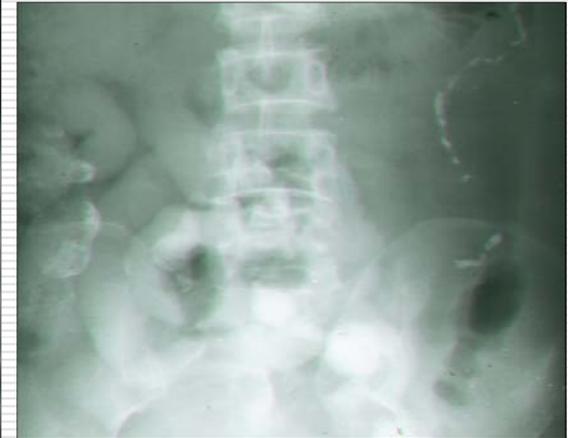
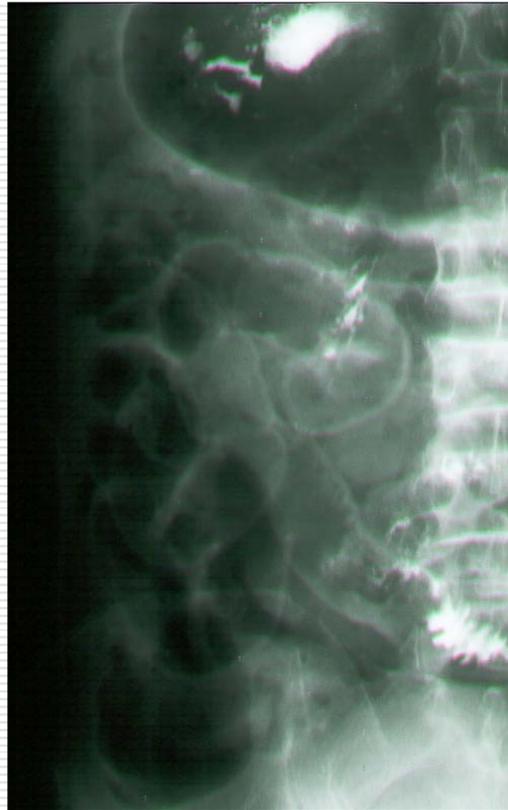
Triangle Sign

- Small amounts of free intraperitoneal gas may accumulate in the space in which **three loops of bowel** adjoin each other to form a radiolucent curvilinear triangle.



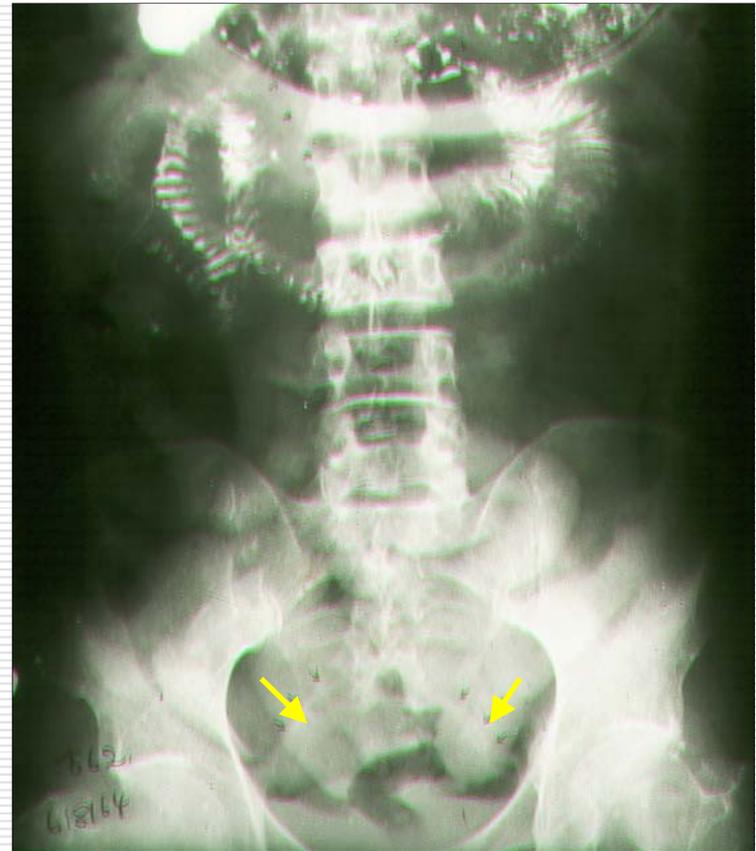
Double Wall Sign (Rigler's sign)

- Large quantities of free intraperitoneal gas permits visualization of the outer margins of the intestinal wall. Demonstration of the outer and inner wall of bowel is a virtually pathognomonic sign of pneumoperitoneum.

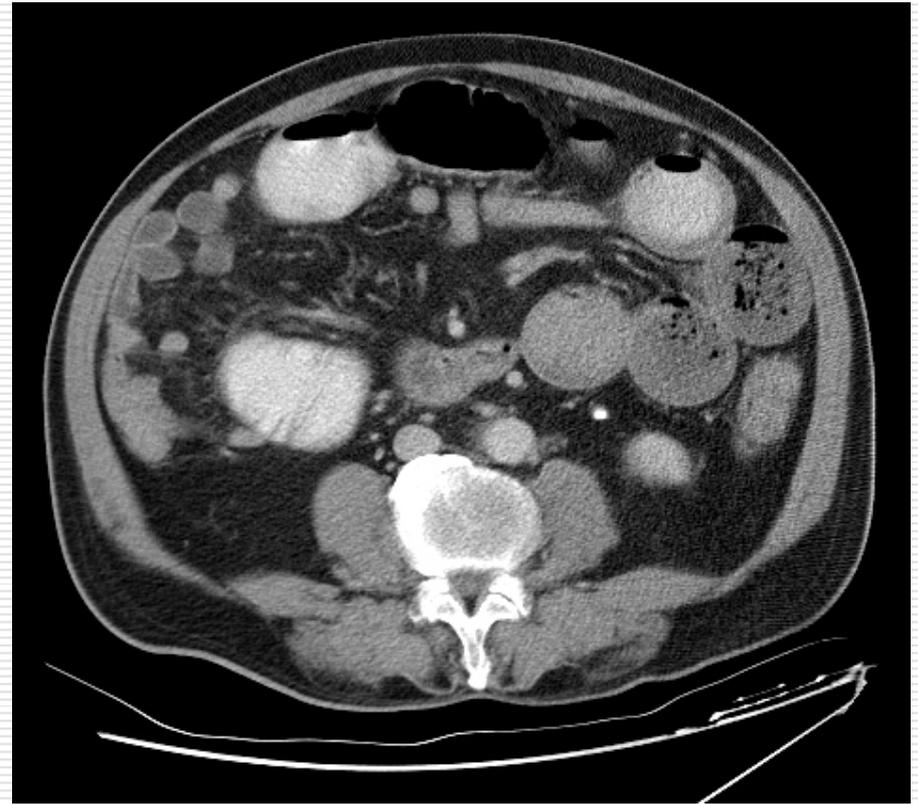


Inverted V Sign

- Free gas outlining the **lateral umbilical ligaments** makes these structures visible in the lower abdomen, where they form an inverted “V” as they course inferiorly and laterally from the umbilicus.



Intestinal obstruction



Cecal carcinoma

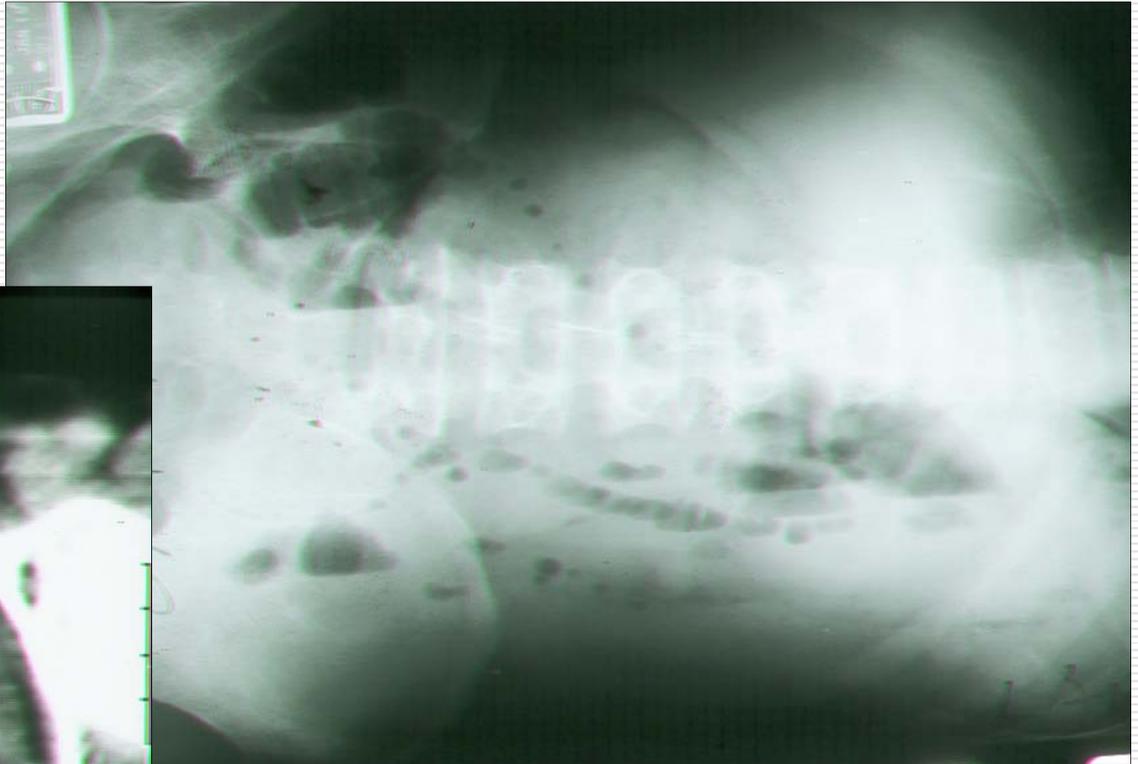


Stepladder Sign

- In a patient with small bowel distention, **supine film** of abdomen shows **centralized distended** small bowel loops with typical Kerckring's folds and **an empty colon**.



String of Beads Sign



CT scan

- ❑ Location, severity and cause of the obstruction
- ❑ Dilute barium or a water-soluble contrast agent orally, 30-120 mins before CT scan
- ❑ Complete obstruction: absence of air or fluid in the distal small bowel or colon.
- ❑ Strangulation: intestinal pneumatosis, hemorrhagic mesenteric
- ❑ CT is superior in detecting a close loop obstruction or **ischemia**

Upper GI contrast study

- ❑ **Gold standard** for determining whether the obstruction is partial or complete obstruction
 - ❑ Helpful in atypical obstruction cases
 - ❑ Surgical intervention: contrast agent does not reach colon within 24 hour, discrete site of obstruction.
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Contrast medium

- ❑ Barium: not diluted by intestinal contents, no stimulate peristasis. (Barium-fecal peritonitis: fatal event; appendicitis, aspiration, embolization)
 - ❑ Water-soluble contrast: favored in large bowel obstruction, no irritating to peritoneal cavity, stimulate peristasis. (hypertonic solution: hydration is need)
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NG tube

- ❑ Complication rate: 5%
 - ❑ Otitis media, aspiration, sinusitis, hemorrhage, esophageal trauma
 - ❑ Usually decompressed.
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Conservative treatment for a small-bowel obstruction

- Conservative treatment: bowel rest, IV hydration, correction of electrolyte abnormality, NG suction.
 - 50-90% Partial obstruction and **15-20% complete** obstruction resolve with conservative management.
 - Most patients who respond to nonsurgical interventions show complete resolution in **48-72 hours**.
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Surgical treatment for small bowel obstruction

- ❑ **Indication:** symptoms persist or deteriorate, bowel ischemia or strangulation (worsening pain, new-onset pyrexia, leukocytosis)
 - ❑ Conservative treatment is **riskier** in patient s/p abdominal radiation therapy.
 - ❑ Adequate IV resuscitation, electrolyte, antibiotic prophylaxis, avoid spillage of fecal content to operative field, decompress the bowel, assessment of vascular viability of the entire bowel.
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Large-bowel obstruction

- ❑ Usually **primary colonic malignancy**.
 - ❑ Recurrent ovarian , cervical endometrial cancer.
 - ❑ Symptoms: constipation, thin stools to abdominal distention, vomiting, pain.
 - ❑ PE: high-pitched bowel sounds, tenderness over right lower quadrant, rectal vault is empty.
 - ❑ Lab: hypokalemia and anemia
 - ❑ Plain radiography: colon is dilated with air proximal to the site of obstruction. Gaseous distention of the small bowel with absent ileocecal valve.
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- ❑ Colostomy for cases of impending colonic perforation
 - ❑ Risk of **colonic perforation**: increased pain, cecal diameter greater than 10-12cm, obstruction longer than 4 days.
 - ❑ High-risk cases: IV hydration, broad spectrum antibiotic, NG tube.
 - ❑ **Mechanical bowel preparation** before surgery is **contraindicated**.
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Fistula

- ❑ An abnormal communication between two epithelial surfaces.
- ❑ Cause: previous radiation, tumor invasion, necrosis, suture or mesh, distal obstruction.
- ❑ Initial management: correction of electrolyte abnormalities, IV resuscitation, control of fistula output, treatment of sepsis, improved nutritional status.

Conservative therapy for fistula

- ❑ Abscesses should be **drained** under CT or sono guidance.
 - ❑ Catheters should be left in place until sepsis resolved, cavity has collapsed, drain output < 30 ml/day and fistula closure (fistulogram)
 - ❑ **TPN 2-3 weeks** for severe malnutrition (3000 calories daily)
 - ❑ **Smomatostatin analog** (octreotide): decrease fistula output.
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Surgery indication for fistula

□ Surgery indication for fistula

Sepsis

High-output fistula

Radiation injury

Fistulas not close after 2-3 weeks of conservative treatment.

□ Primary anastomosis, omental flap to protect the suture line.

Malabsorption

- Normal nutrient absorption 3 steps:
 - Luminal processing
 - Absorption into mucosa
 - Transport into circulation
 - Small intestine: 600-675cm, jejunum: 40%
 - Patients can survive removal of **50% small bowel** without any major nutritional deficits
 - Serious nutritional deficits with a small bowel length 150-200cm.
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Location and absorptive function

- ❑ Amino acids absorbed in jejunum
 - ❑ Sugar, fatty acid through small intestine
 - ❑ Terminal 100cm of ileum for vitamin B12 and bile salts
 - ❑ Vitamin by whole small intestine
 - ❑ Loss of ileum (lumen is smaller, intestinal contents are thicker) → increase in transit times
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Short Bowel Syndrome

- ❑ Dehydration, diarrhea, electrolyte abnormalities, nutritional deficiency.
- ❑ Compensatory response (a few weeks until 12-24 months after surgery) : hypertrophy of the bowel wall, dilation, lengthening of bowel
- ❑ TPN, H2 blocker, ant motility agent, cholestyramin (aids absorption of bile salts).

Wound complications

- Infection
 - Dehiscence
 - Hernia
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Surgical site infection (SSI)

- ❑ 2/3 involve superficial and deep incisional tissues
- ❑ 1/3 affect organs
- ❑ Operative factor: duration of surgical scrub, preoperative shaving, duration of the operation, operating room ventilation, prophylactic antibiotic, drain, surgical technique.

SSI

- ❑ Symptoms: heat, redness, pain, swelling.
 - ❑ Usually in 5th or 6th postoperative day,
 - ❑ With pyrexia and cellulitic changes.
 - ❑ Necrotizing fasciitis: cloudy gray fluid, frank necrosis of fascia
 - ❑ Antibiotic : cover gram-positive and negative. Therapy should be broadened if infection is not remitting in 48 hours
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Prevention of SSI

- ❑ Diabetic patient: tight glycemic control preoperatively
 - ❑ Tobacco stopped 2-4 weeks before surgery
 - ❑ Dental infection should be treated before surgery
 - ❑ Hair should not be shaved in the operative room immediately before skin preparation.
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Surgeon to prevent SSI

- Avoid hypothermia
 - Hemaostasis
 - Gently
 - Remove devitalized tissue
 - Obliterate dead spaces
 - Monofilament suture
 - drain
-

Table 48-17. Patient-Related Factors Potentially Influencing Surgical Approach, Incision Placement, and Wound Outcome

Age
Cardiopulmonary disease
Current chemotherapy
Diabetes
Hepatic insufficiency
Hypoxemia
Immunocompetence
Nutritional status
Obesity
Previous incision site, outcome, or current abdominal wall anatomy
Prior radiation therapy
Renal insufficiency
Sepsis
Surgical indication or expectation
Vascular disease

Table 48-18. Surgeon-Related Factors Potentially Influencing Surgical Approach, Incision Placement, and Wound Outcome

- Antibiotic prophylaxis
 - Closure technique
 - Drains
 - Dressing
 - Experience
 - Incision management
 - Placement
 - Method
 - Hemostasis
 - Oxygenation
 - Preoperative stay
 - Preparation
 - Patient
 - Staff
 - Suture material
 - Temperature homeostasis
 - Vasoconstrictors
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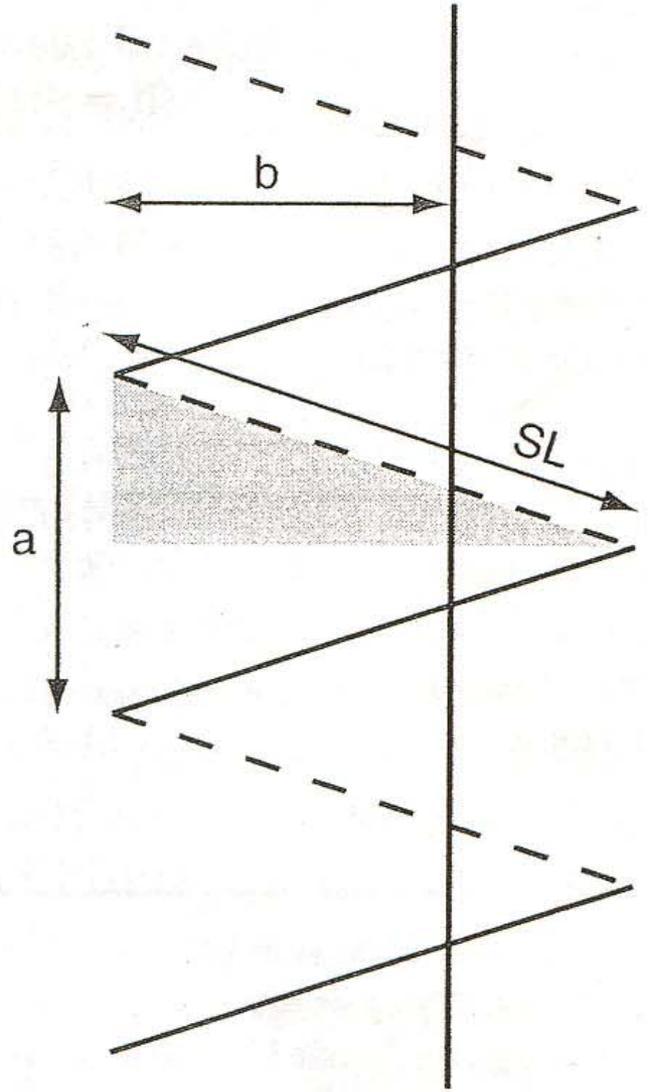
Table 48-19. Adverse Surgical Events

Type of Event*	Surgical Events (%) (n = 402)	Preventable (%)
Technique-related complication	24.2	68
Wound infection	11.2	23
Postoperative bleeding	10.8	85
Postpartum or neonatal events	8.3	67
Other infections	7.0	38
Drug-related injury	6.5	46
Wound problem	4.0	53
Deep venous thrombosis	3.7	18
Pulmonary embolism	2.3	14
Acute myocardial infarction	2.1	100
Congestive heart failure	1.2	33
Stroke	1.2	0
Total		54

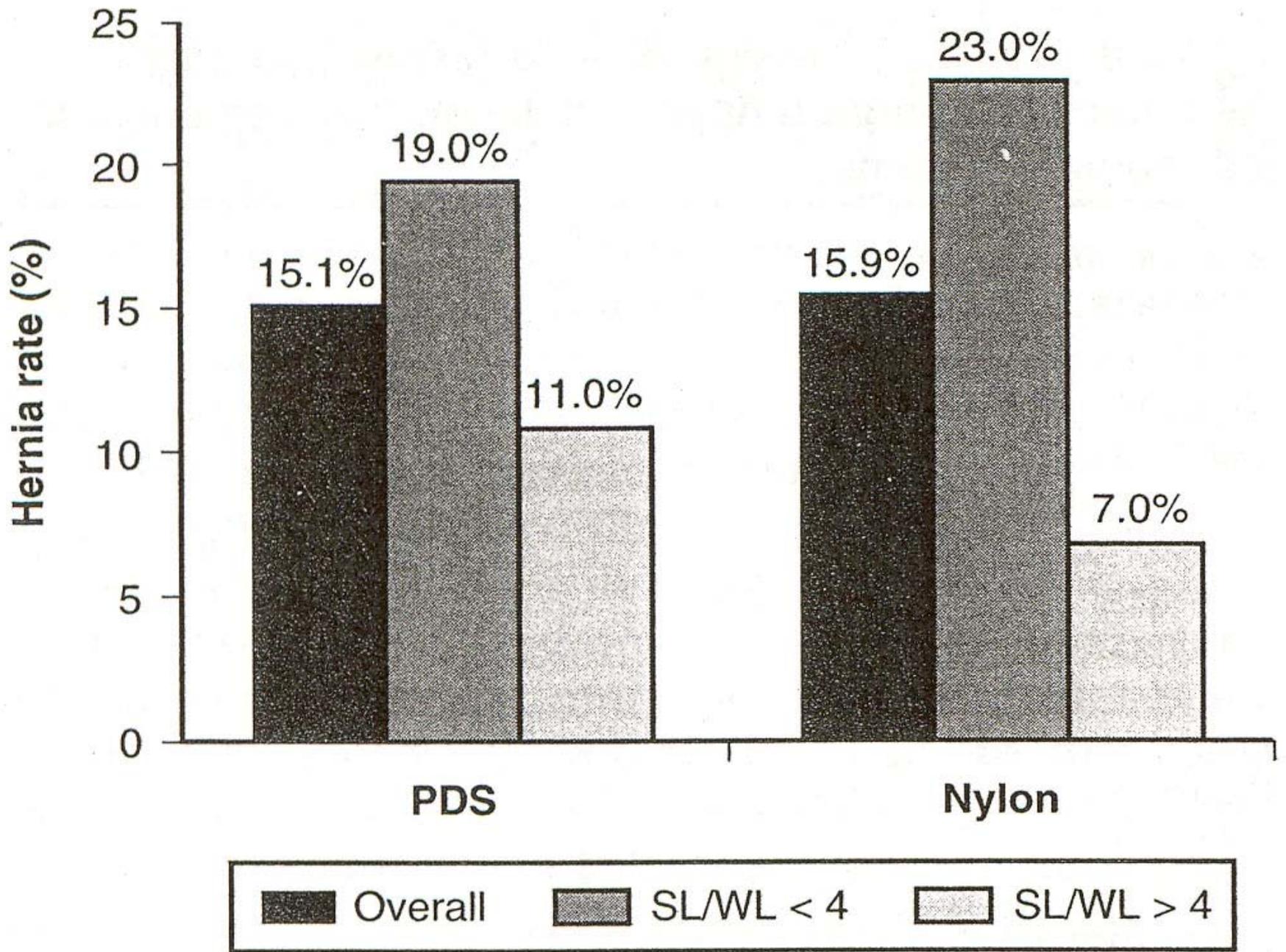
Dehiscence

- ❑ Separation of fascial layer
 - ❑ 0.5-3%
 - ❑ Risk factor: malnutrition, obesity, advanced age, immune deficiency, DM, renal insufficiency, cancer, infection, hematoma, ischemia
 - ❑ Evisceration: covered sterile, saline-soaked gauzes or towel and emergently surgery for closure.
-

When $a = 1.5$ cm
 $b = 1.5$ cm
 $SL/WL = 4.12$



An incision (vertical line) sutured in an over-and-over fashion (solid and dashed line). Suture length to wound ratio (SL:WL) may be calculated with the Pythagorean theorem applied to the shaded triangle: $(SL)^2 = (a/2)^2 + (2b)^2$, where a = stitch interval and b = width of tissue bite; $WL = a/2$.



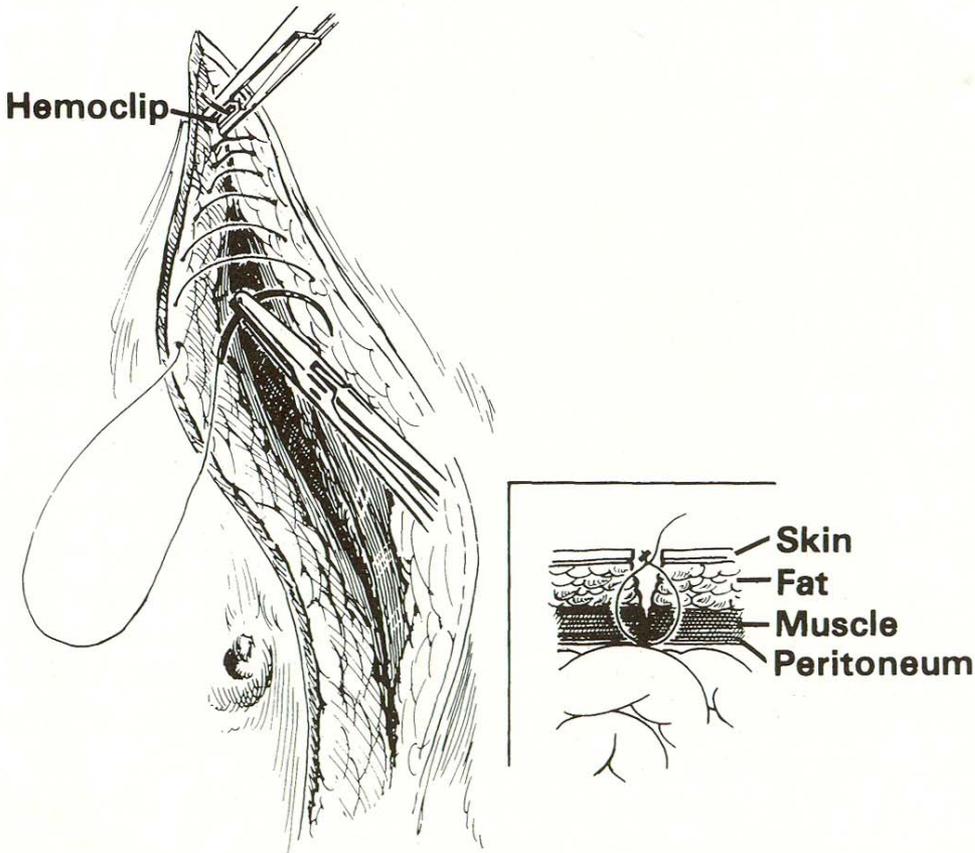
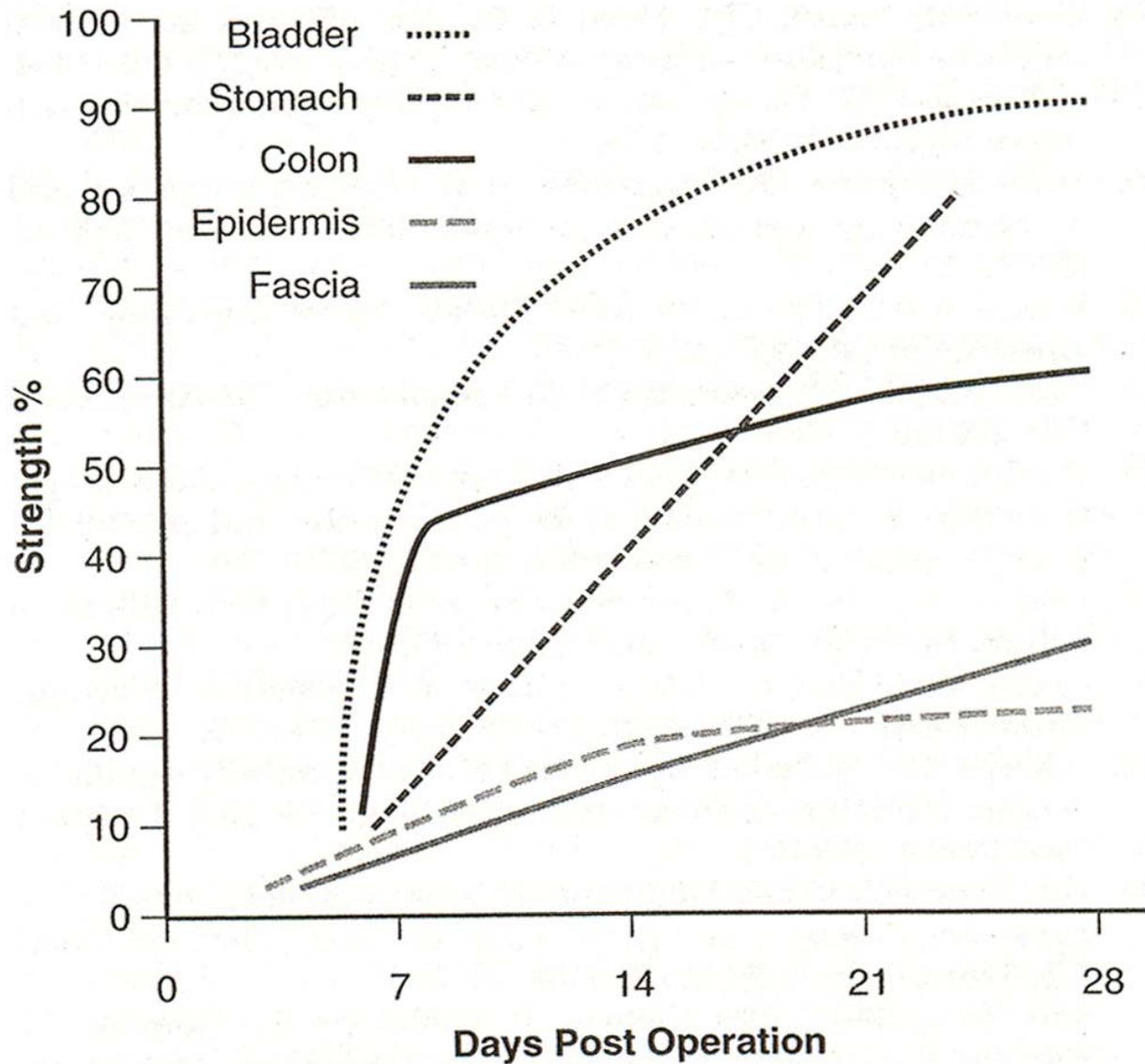


FIGURE 15-16. Closure of a midline incision using a no. 2 polypropylene, running mass closure. The anterior fascia, muscle, posterior fascia, and peritoneum are included in the bites (*inset*), which are taken 1.5 to 2 cm from the fascial edge and about 1 cm apart. With permanent polypropylene suture, a hemoclip can be used on the short end to avoid suture unraveling. (Gallup DG. Opening and closing the abdomen. In: Phelan JP, Clark SL, eds. *Cesarean delivery*. New York, Chapman & Hall, 1988:449)



Bladder 92% at 28 days
Stomach 80% at 23 days
Colon 70% at 120 days
Epidermis 100% at 560 days
Fascia 83% at 360 days

Hernia

- ❑ Late disruption or nonhealing of the fascial layer
 - ❑ 1%, it increases to 30% in wounds with SSI
 - ❑ Risk factor: multiple previous operation, obesity, collagen formation disorder
 - ❑ Surgical repair: tensionless closure (mesh)
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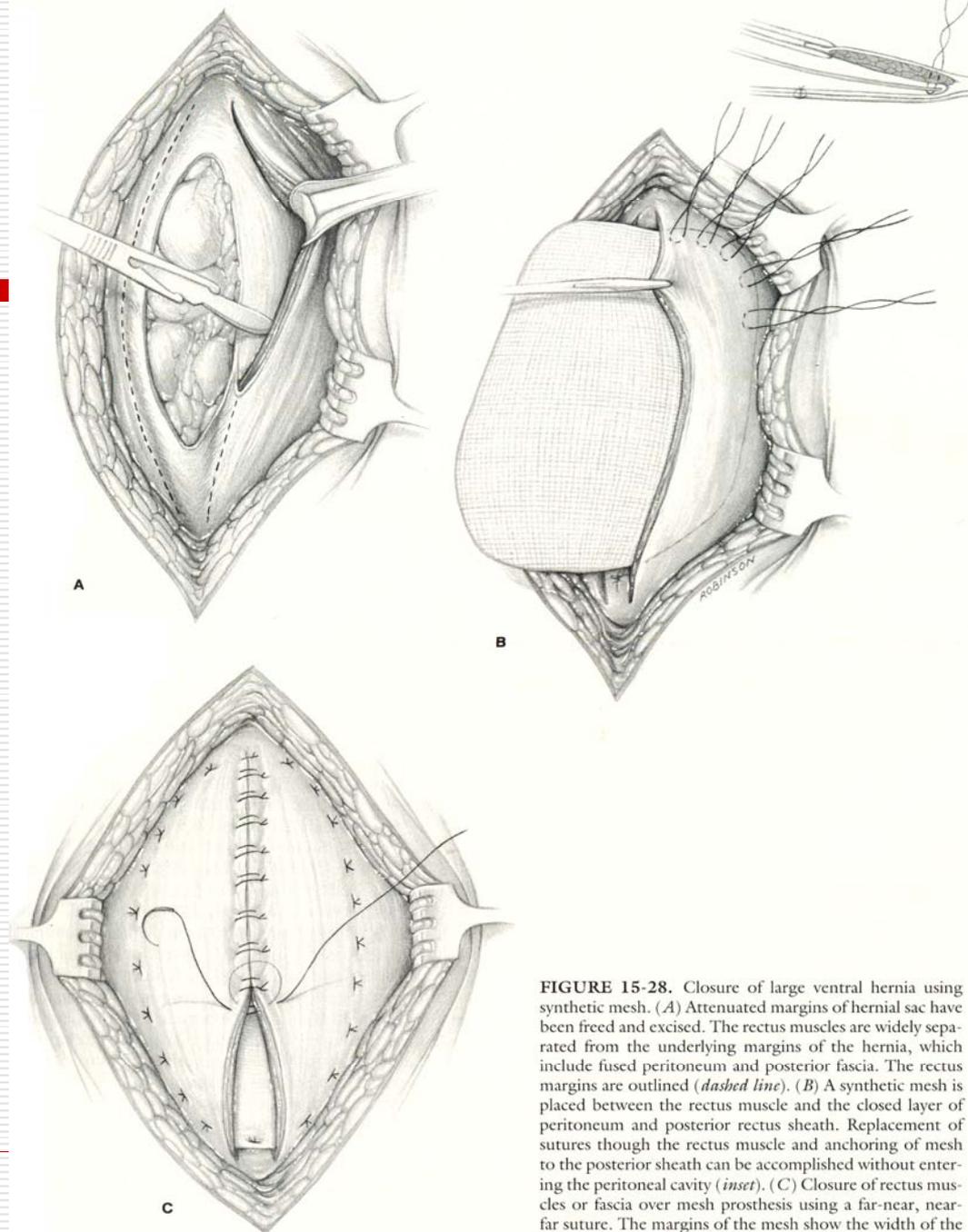


FIGURE 15-28. Closure of large ventral hernia using synthetic mesh. (A) Attenuated margins of hernial sac have been freed and excised. The rectus muscles are widely separated from the underlying margins of the hernia, which include fused peritoneum and posterior fascia. The rectus margins are outlined (*dashed line*). (B) A synthetic mesh is placed between the rectus muscle and the closed layer of peritoneum and posterior rectus sheath. Replacement of sutures through the rectus muscle and anchoring of mesh to the posterior sheath can be accomplished without entering the peritoneal cavity (*inset*). (C) Closure of rectus muscles or fascia over mesh prosthesis using a far-near, near-far suture. The margins of the mesh show the width of the permanent hernial support.

Taking home message

- ❑ What is the most appropriate operative management for a colonic injury?
 - ❑ Which radiologic studies are useful in small-bowel obstruction?
 - ❑ How is a small bowel obstruction optimally managed?
 - ❑ What is conservative therapy appropriate in the management of a fistula?
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Taking home message

- Infection
 - Dehiscence
 - Hernia
-



Thank you for your attention.