

IMAGING POSTOPERATIVE COMPLICATIONS

A major factor affecting hospital cost is complications following surgery.

Complications after intra-abdominal operations prolong the patient's length of stay in the hospital and may lead to the patient's death.

Thus, strategies for improving surgical outcome include (1) optimizing the preoperative status of the patient, (2) avoiding adverse intraoperative events, (3) and instituting interventions to prevent postoperative complications.

RADIOLOGY - IMAGING / INTERVENTIONS:

- Radiological studies may help delineate the anatomy during the preoperative period

- Detecting adverse events in follow-up studies

- Radiologic interventions techniques allow nonsurgical treatment

For example: An CT examination can confirm an intra-abdominal abscess after bowel resection.

Treatment strategies include antibiotics, percutaneous drainage (eg, interventional radiologist) or relaparotomy.

The least invasive or expensive treatment that is effective should be chosen to treat a complication.

NEGATIVE OUTCOME AFTER SURGERY:

COMPLICATIONS: are defined as any deviation from the normal postoperative course. Our hospital will count as a complication event occurring in the first 30 days after surgery.

A SEQUEL: is an "after-effect" of surgery that is inherent to the procedure

(eg, inability to walk after a amputation of the leg).

"FAILURE TO CURE": If the original purpose of surgery has not been achieved.

(eg, residual tumor after surgery).

PREVENTION OF POSTOPERATIVE COMPLICATIONS:

Colorectal surgery - evidence-based interventions.

The risk of postoperative complications is influenced by:

Preoperative factors: Age. Weight control. Optimal nutritional status. Bowel

preparation in selected cases. Correction of anemia. Correction of intra-operative blood loss. Preoperative drainage for stablizarion (ascites / pleura effusion / abcess).

Risk factors associated with postoperative complications: Co-morbidity / immune deficiency / obesity.

Intraoperative events: Standardization of technique for treatment, example Total Mesorectal Excision

(TME). Significantly correlated to complexity / technique, planned vs. emergency surgery

Postoperative care: Post anesthesia care unit and closely monitoring of the patient. Assess the patient's general function / the outcome of the procedure is assessed / the surgical site is checked for signs of infection. Adequate postoperative analgesia. Prophylactic use of antibiotics. Prevention of venous thromboembolism. Catheterization. Optimal time of removal of catheters. Type of anesthesia and fluid balance.

Postoperative therapy may include adjuvant treatment such as chemotherapy, radiation therapy, or administration of medication such as anti-rejection medication for transplants.

GRADING SYSTEM REGARDING TO COMPLEXITY OF SURGERY:

The complexity of surgery significantly correlates to the length of hospital stay and the various grades of postoperative complications.

OPERATION TYPE A: includes surgical procedures without opening of the abdominal cavity
(eg, type A: hernia repair, soft tissue surgery, thyroid surgery, excision of lymph nodes)

OPERATION TYPE B: includes abdominal procedures except liver surgery and major surgery
in the retroperitoneum
(eg, type B: stomach, small bowel and colon surgery, splenectomy, and cholecystectomy)

OPERATION TYPE C: includes liver surgery, operations on the esophagus, pancreas, rectum,
and retroperitoneum

CLASSIFICATION OF SURGICAL COMPLICATIONS

A study reviewing the definition of anastomotic leakage after gastrointestinal surgery identified 56 different definitions of anastomotic leaks in 97 publications, making comparison among the studies impossible.

Parameters used for classifying complications:

- severity grades
- duration of the hospital stay
- the therapy used to treat the complication
- permanently disabling complications

GRADING SYSTEM REGARDING TO THERAPEUTIC CONSEQUENCES:

This approach allows identification of most complications and prevents down-rating of major negative outcomes.

GRADE 1: included minor risk events not requiring therapy (with exceptions of analgesic, antipyretic, antiemetic, and antidiarrheal drugs or drugs required for lower urinary tract infection).

GRADE 2: potentially life-threatening complications with the need of intervention
or a hospital stay longer than twice the median hospitalization for the same procedure.

- 2a complications required medications only
- 2b complications required an invasive procedure

GRADE 3: complications were defined as complications leading to lasting disability or organ resection.

GRADE 4: complication indicated death of a patient due to a complication.

POSTOPERATIVE COMPLICATIONS:

- general or specific *
- early and delayed complications
- minor / major complications

* Specific to the type of surgery undertaken and should be managed with the patient's history in mind

RADIOLOGICAL POSTINTERVENTIONAL COMPLICATIONS

- PERFORATION
- INFECTION
- BLEEDING

GENERAL POSTOPERATIVE COMPLICATIONS

IMMEDIATE: Primary hemorrhage (either starting during surgery / following postoperative increase in blood pressure - may require blood transfusion / return to theatre to re-explore. Basal atelectasis: minor lung collapse. Shock: blood loss, acute myocardial infarction, pulmonary embolism or septicemia. Low urine output: inadequate fluid replacement intra-operatively and postoperatively.

EARLY: Acute confusion: exclude dehydration and sepsis. Paralytic ileus. Nausea and vomiting (anesthetic-related / paralytic ileus). Postoperative fever (tissue damage, necrosis and hematoma). Secondary hemorrhage. Pneumonia. Postoperative wound infection. Wound or anastomosis dehiscence. DVT. Acute urinary retention / infection. Bowel obstruction due to fibrinous adhesions.

LATE: Bowel obstruction due to fibrous adhesions. Incisional hernia. Recurrence of reason for surgery - eg, malignancy

SURGICAL INJURY: Unavoidable tissue damage to nerves may occur during many types of surgery. There is also a risk of injury whilst under general anesthetic and being transported and handled in the theatre (falls from the trolley, joint-luxation, diathermy burns...)

Gas gangrene is uncommon and life-threatening.

SPECIFIC COMPLICATIONS OF BOWEL SURGERY / INTRA-ABDOMINAL:

Different surgical procedures presents complications in specific locations that are unique to the procedure.

Cesarean delivery for example can be complicated with typical puerperal infections, dehiscence, uterine dehiscence, rupture and hematomas in typical locations (bladder flap hematoma / subfascial hematomas)

I. INFECTIOUS COMPLICATIONS

Infectious complications are the main causes of postoperative morbidity in abdominal surgery.

ANASTOMOTIC LEAKAGE OR BREAKDOWN: small leaks are common, causing small localized abscesses with delayed recovery of bowel function. It is often diagnosed late in the postoperative period. It may resolve with IV fluids and delayed oral intake but may need surgery.

SUPERFICIAL WOUND INFECTION: most common (skin staphylococci). Drainage of the infection may be required.

INTRA-ABDOMINAL INFECTION / PERITONITIS: This complication is one where there is inflammation of the lining of the abdominal cavity (peritoneum) and may be caused by leakage of intestinal or other secretions into the abdominal cavity which can then become infected. Can progress to sepsis. Require: antibiotics / radiological intervention / surgical re-exploration.

CELLULITIS AND ABSCESS.

Mostly present within the first week, but can be seen even after leaving hospital.

(Attenuation /presence of gas within the collection/ fat stranding around the collection helps differentiating from SEROMA/ HEMATOMA).

Require: antibiotics / radiological intervention / surgical re-exploration.

II. FISTULA / SINUS

A FISTULA is an abnormal canal passing from a mucous surface to the skin or to another mucous surface.

WOUND SINUS is a track leading from a focus of suppuration to a cutaneous or mucous surface.

Is a late infectious complication from a deep chronic abscess that can occur after apparently normal healing. It usually needs re-exploration to remove non-absorbable suture or mesh, which is often the underlying cause.

III. ILEUS

PARALYTIC ILEUS - post-operative temporary disruption of peristalsis of the intestine (ileus).

After a major procedure the intestine may not begin to function again properly for 4 or 5, or even more days, but may be prolonged because the surgery has been complicated or because of the development of an infection or inflammation within the abdominal cavity.

Temporary disruption of peristalsis: the patient may complain of nausea, anorexia and vomiting and it usually appears with the re-introduction of fluids.

ADYNAMIC OBSTRUCTION: more prolonged extensive form with vomiting and intolerance to oral intake and needs to be distinguished from mechanical obstruction. It involves the large bowel and is usually described as pseudo-obstruction.

MECHANIC ILEUS

- post-surgical adhesions (most frequent)
- abdominal wall hernias (second)

EARLY MECHANICAL OBSTRUCTION: this may be caused by a twisted or trapped loop of bowel or adhesions occurring approximately one week after surgery. It may settle with nasogastric aspiration plus IV fluids or progress and require surgery.

LATE MECHANICAL OBSTRUCTION: string-like adhesions can organize and persist, commonly causing isolated episodes of small bowel obstruction months or years after surgery. Interventions: as for early obstructions.

IV. INCISIONAL HERNIA

Prevalence: ranges from 0.5% to 13.9% for most abdominal surgeries.

Incisional hernias usually manifest during the first few months after surgery - can be delayed by up to 15 years after surgery. (Risk factors include obesity, distension and poor muscle tone, wound infection and multiple use of the same incision site). Hernia recurrence may be seen in up to 30% after surgery.

Subtypes of incisional hernia: PARASTOMAL HERNIAS - particularly difficult to detect at physical examination. LUMBAR HERNIAS - defects in the lumbar muscles or the posterior fascia, below the 12th rib and above the iliac crest (usually after surgery or trauma).

Complications:

STRANGULATION (ischemia caused by a compromised blood supply)

INCARCERATION (irreducible sac)

BOWEL OBSTRUCTION secondary to the incarcerated bowel requires immediate surgery to prevent bowel necrosis.

V. INTERNAL MESENTERIC HERNIA (“INWARD PROTRUSION”):

If a loop of bowel passes through a mesenteric defect, that loop is at risk for incarceration, strangulation, or for becoming the lead point of a small bowel obstruction. Internal hernias can also trap adipose tissue and nerves.

Mesenteric defects intentionally created in the ROUX-EN-Y GASTRIC BYPASS procedure - gastric bypasses for obesity / gastrectomy for stomach cancer (or after trauma).

8 CT SIGNS:

- (1) Mesenteric swirl sign, (2) hurricane eye sign, (3) mushroom sign, (4) small bowel obstruction, (5) clustered small bowel loops, (6) small bowel other than duodenum located behind the superior mesenteric artery (SMA), (7) presence of the jejunal anastomosis to the right of the midline, (8) and engorged mesenteric lymph nodes.

Mesenteric swirl (indicator of internal hernia) is the most predictive sign of internal hernia and there was substantial inter-observer agreement in detecting mesenteric swirl sign (ref 3), but agreement was relatively poor for all other signs.

VI. ISCHEMIA

Hernias: Strangulation refers to ischemia caused by a compromised blood supply. It usually occurs when the hernia defect obstructs the afferent and efferent bowel loops, creating a closed loop within the herniated bowel.

Thromboembolism.

CT SIGNS ISCHEMIA: (1) Reduced enhancement of the bowel wall (sensitivity of 48%), (2) mural thickening, (3) mesenteric fluid, (4) congestion of mesenteric veins (engorgement), and (5) ascites.

Helical CT is a highly sensitive: A diagnosis of ischemia was made if enhancement of the bowel wall was reduced or if at least two of the other signs were found (ref 4).

VII. WOUND DEHISCENCE

It is due to failure of wound closure technique (usually between 7 and 10 days postoperatively).

Clinical findings are often distended abdomen / high intraabdominal pressures.

This affects about 2% of midline laparotomy wounds. It is a serious complication with a mortality of up to 30%. Early return to theatre for re-suture under general anaesthesia.

VIII. IATROGENIC INJURIES

Iatrogenic gastrointestinal injury during abdominal or pelvic surgery is often preventable, but on occasion unavoidable. Surgeons can easily miss injuries especially during laparoscopy.

The small intestine is most susceptible to injury.

The extent of a diathermy burn is usually difficult to determine.

The mesentery may be injured, particularly by traction, resulting in a segment of ischemic bowel.

Hemorrhage: vessels / organ.

Iatrogenic diaphragmatic hernias (when diagnosed -> surgery).

Iatrogenic urethral injuries / ureteral injuries (pelvic surgery).

Perforation of gall bladder / bile leakage.

When injury occurs, it should be recognized early and isolated to minimize contamination.

May need a stoma.

IX. MISCELLANEOUS

ERRATIC BOWEL ACTIVITY – major bowel operations can sometimes be associated with unpredictable bowel activity in the post-operative period which may last for some months. In certain circumstances this may be permanent, but usually improvement can be expected for 1 or 2 years.

SEXUAL FUNCTION – Post-operative interference with sexual function (impotence) is extremely uncommon. Usually temporary, but if permanent, can still be treated.

MALABSORPTION

DISABILITY, defined as any impairment of a body function (such as neurologic deficits of an extremity due to positioning of the patient during surgery or hoarseness after thyroid surgery).

CONCLUSION:

Infectious complications are the main causes of postoperative morbidity in abdominal surgery.
Strategies for improving surgical outcome:

- optimizing the preoperative status of the patient
- standardization of technique for treatment
- avoiding adverse intraoperative events
- identify complications
- instituting interventions to prevent postoperative complications

Knowledge of when specific complications occur throughout the postoperative period is essential for early detection / prevention / management.

The least invasive or expensive treatment that is effective should be chosen to treat a complication.

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