

Complication of Intestinal Anastomosis

Manuel Molina, M.D.
Kings County Hospital Center

Case Presentation

The patient is a 45y/o male without significant past medical or surgical history, who presented to the ER on 9/20/05, complaining of worsening fatigue, 25lb weight loss in 6 months, vague abdominal pain and diarrhea. The patient was admitted to the medical service for workup.

PMHx: denied

PSHx: denied

Meds: no medications

FHx: paternal uncle died from colon CA at 60y/o

SHx: occasional ETOH, no smoking, no illicit drug use.

Case Presentation

On admission to the medical service:

VS: T=100.6 BP=110/66 HR=94 RR=20

Alert and oriented, no distress.

CTA Bilateral

RRR S1S2

Abdomen: hypoactive BS, mild distention, tenderness in RLQ without peritoneal signs.

Rectal: No masses, Hemoccult positive

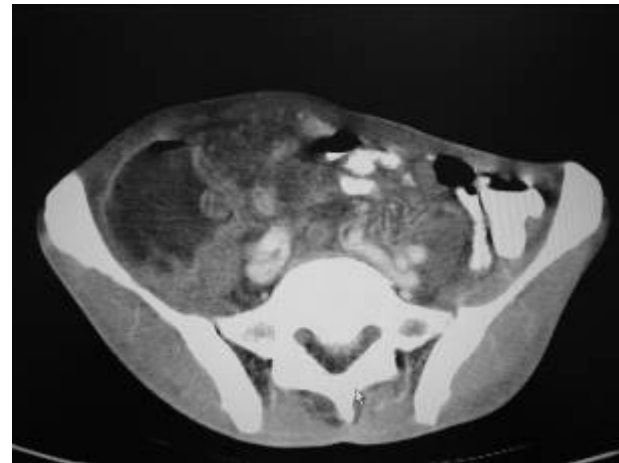
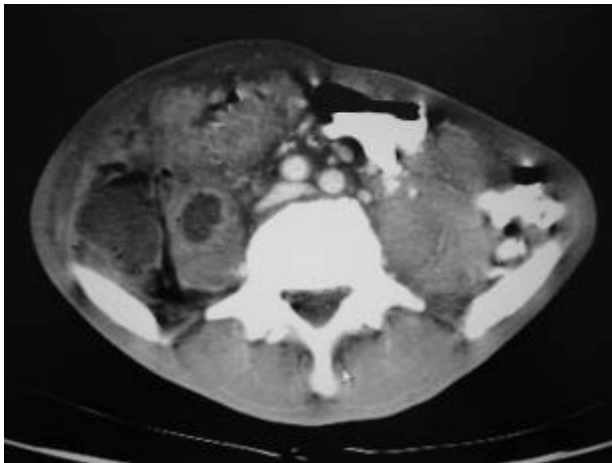
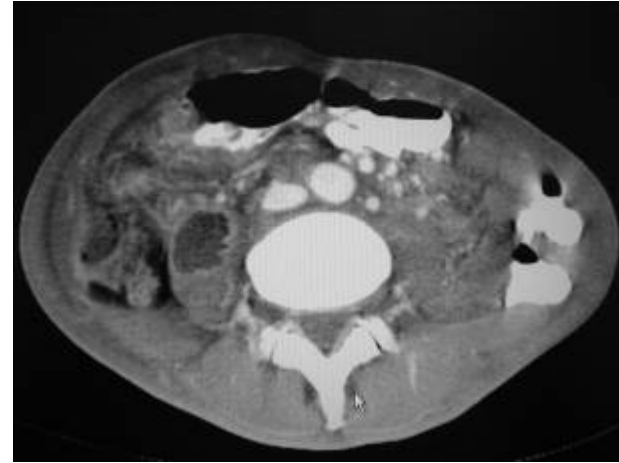
Neuro: grossly intact.

Extremities: no edema, good peripheral pulses.

Laboratories

- CBC: WBC=17.3, Hb=10.5, Ht=32.9, Plt=405
- Chem: Na=138, K=3.1, Cl=95, CO₂=29, BUN=22, Cr=0.6, Glc=124, Ca=9.3
- LFT's: Alb=3.6, AP=65, AST=8, ALT=14, TB=0.1
- Coags; PT=13.6, PTT=26.5
- Urinalysis: negative
- CEA=8.59, CA 19-9=442

CTscan on admission



Hospital Course

- 9/23/05: the patient underwent percutaneous drainage. Cultures revealed few Gram negative rods. Cytology was negative for malignancy. The patient was started on broad spectrum antibiotics.
- The WBC improved to 10.45 by 10/2/05.

CTScan after drainage



Hospital course

- 10/7/05: Case presented in GI conference at KCHC. Surgery consulted that day. On evaluation no acute abdomen, tolerating diet, WBC=10.5. Patient schedule for resection on 10/13/05.
- 10/13/05: The patient deteriorated, showing signs of small bowel obstruction. Resuscitation initiated. The patient remained hemodynamically stable. Taken to the OR that afternoon.
 - Labs: CBC: WBC=10.75, Hb=10.7, Ht=30.3, Plt=457
 - Chem: Na=135, K=3.8, Cl=95, CO₂=30, BUN=34, Cr=0.6, Glc=212, Ca=8.4
 - Alb=3.3
 - ABG=7.49/38/103/29.7/+5.7/98.5%

Operation

- Procedure: Right hemicolectomy with primary end to side EEA stapled anastomosis.
- Findings: Large obstructive mass in cecum and proximal ascending colon, involving the abdominal wall. Multiple large lymph nodes in the mesentery. Multiple liver metastatic lesions.
- Intraop course: after anastomosis was performed, the patient had bleeding from the tumor bed, requiring 6uPRBC, 3u FFP, 6u platelets. The patient had several episodes of hypotension responding to fluid, blood and epinephrine. Bleeding improved after small vessels ligation and topical procoagulants. JP drained left in tumor bed.

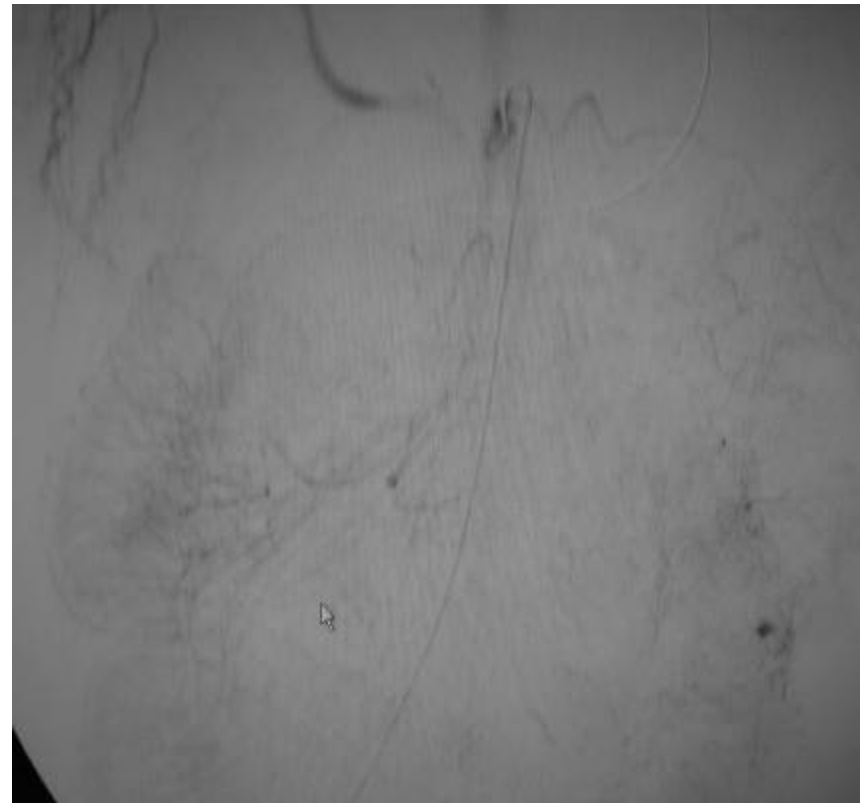
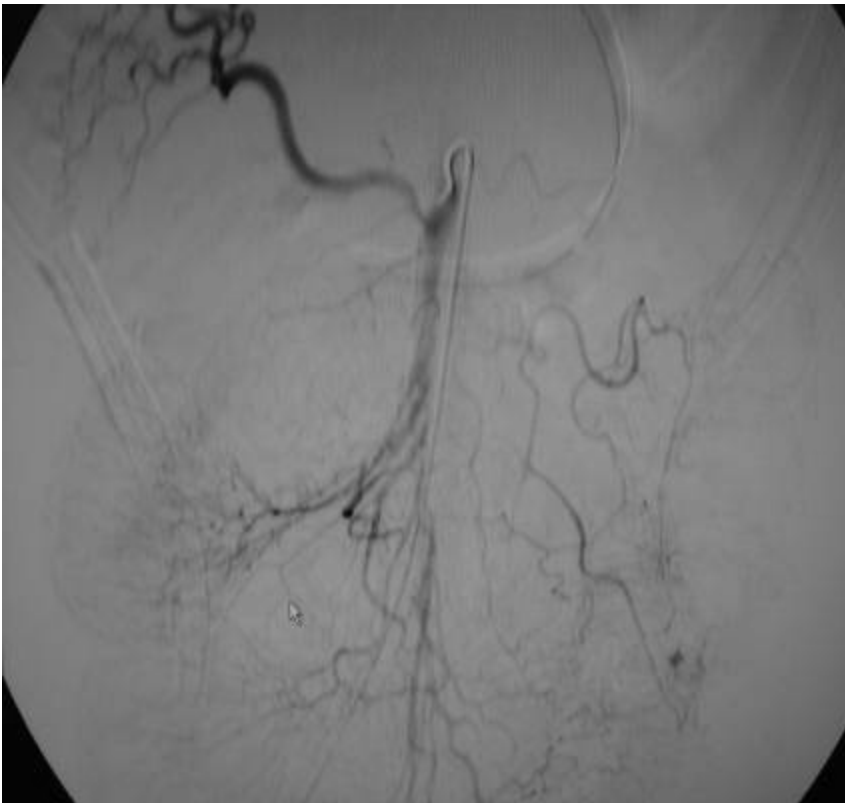
Post op Course

- Patient transferred to the ICU intubated, on Vasopressors.
- In the SICU patient remained hemodynamically stable and was able to be weaned from the vasopressors. The labs revealed coagulopathy and Hb of 7.6 Ht of 22.3, responding to blood transfusions.
- On POD#1 the patients coagulopathy improved. JP output bloody but improving.

Post op course

- POD#3 the patient remained tachycardic and slightly hypotensive. ECHO: EF=15-20%. Patient started on dobutamine with improvement in the hemodynamics.
- POD#4 The JP output increased and the patient had multiple episodes of BRBPR#2 with episodes of hypotension responding to fluid. The platelet count dropped to 17, Fibrinogen 235, D-dimer 4.67, PT 12.7, PTT 35.4, but H/H stable. Bleeding improving after platelet transfusion.
- POD#5 More episodes of BRBPR #5, hypotension and tachycardia. Hb=7, Ht=20.9, Plt=57. The patient underwent an Angiogram

Angiogram



Post op course

- POD#6 the patient responded to blood and fluids, came off vasopressors, but continued with BRBPR. The patient was taken back to the OR for reexploration

Operation

- Procedure: anastomosis resection, side to side stapled ileocolostomy.
- Findings: small anastomosis dehiscence without spillage or peritonitis. Large adherent clot at anastomosis, no active bleeding.
- Intraop course: the patient remained hemodynamically stable. Was transferred back to the SICU, intubated and off vasopressors.

Post op course

- POD#1 The patient remained stable, and was extubated by POD#3 after the second operation.
- POD#5 The H/H dropped to 8.7/25.7. But patient was hemodynamically stable, no LGIB, but JP output still bloody. The patient underwent an Angiogram. No bleeding identified.
- POD#7 The patient was transferred to the floor.

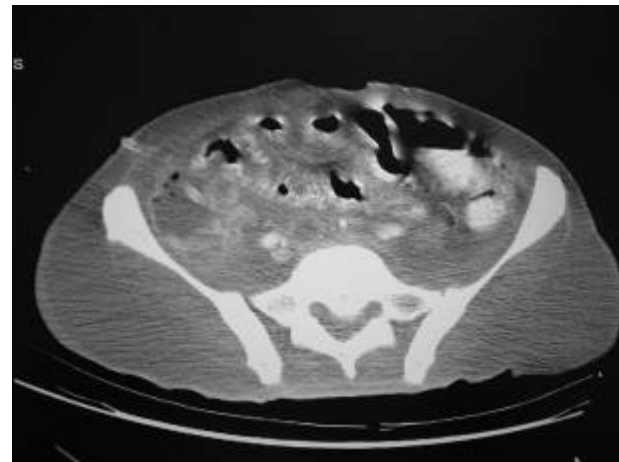
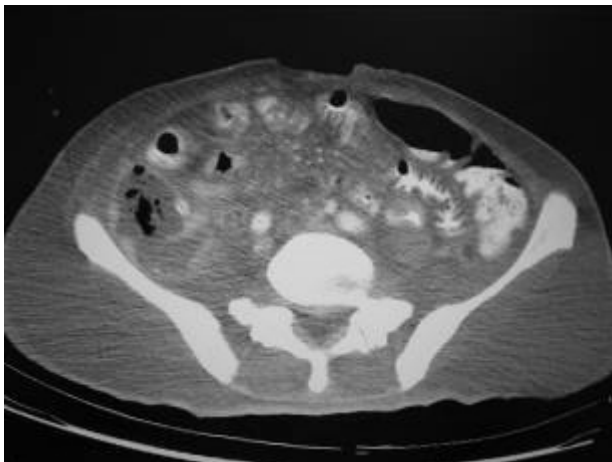
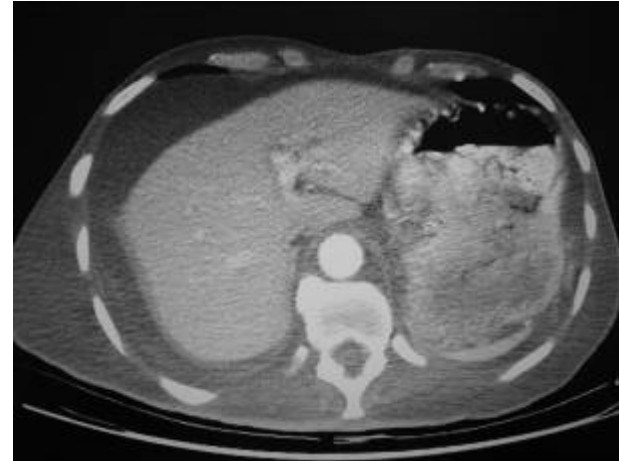
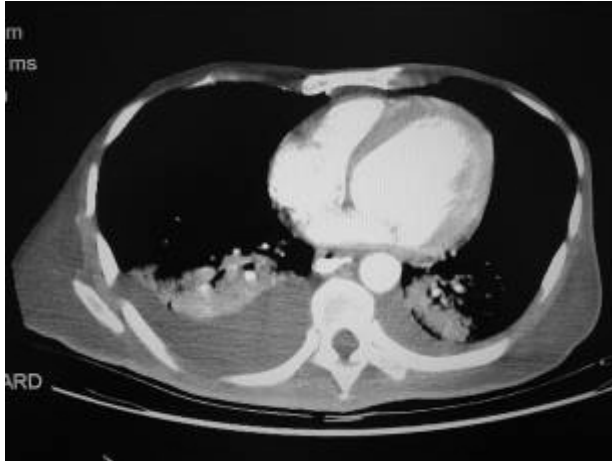
Angiogram



Post op Course

- POD#10 The patient had fever to 102 and WBC to 24.3. H/H stable at 14/40. The patient underwent CTScan

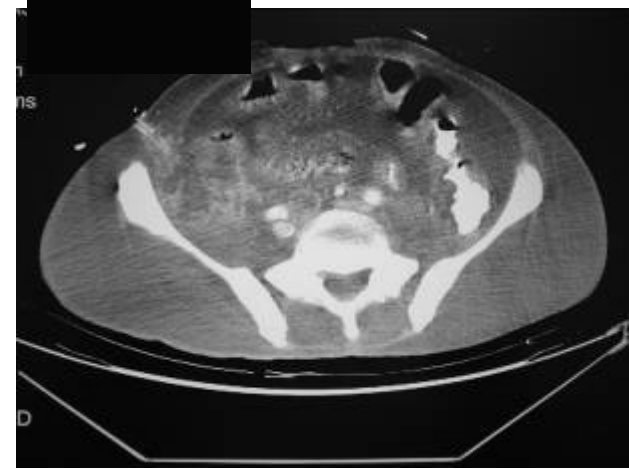
CTScan



Post op Course

- POD#11 the patient underwent percutaneous drainage.
- POD#12 the patient remained afebrile, and the WBC improved to 15.01. H/H stable at 13.8/41.6. The patient tolerated clear liquids. The patient was having bowel function.
- POD#17 Repeat CTscan revealed improved RLQ collection

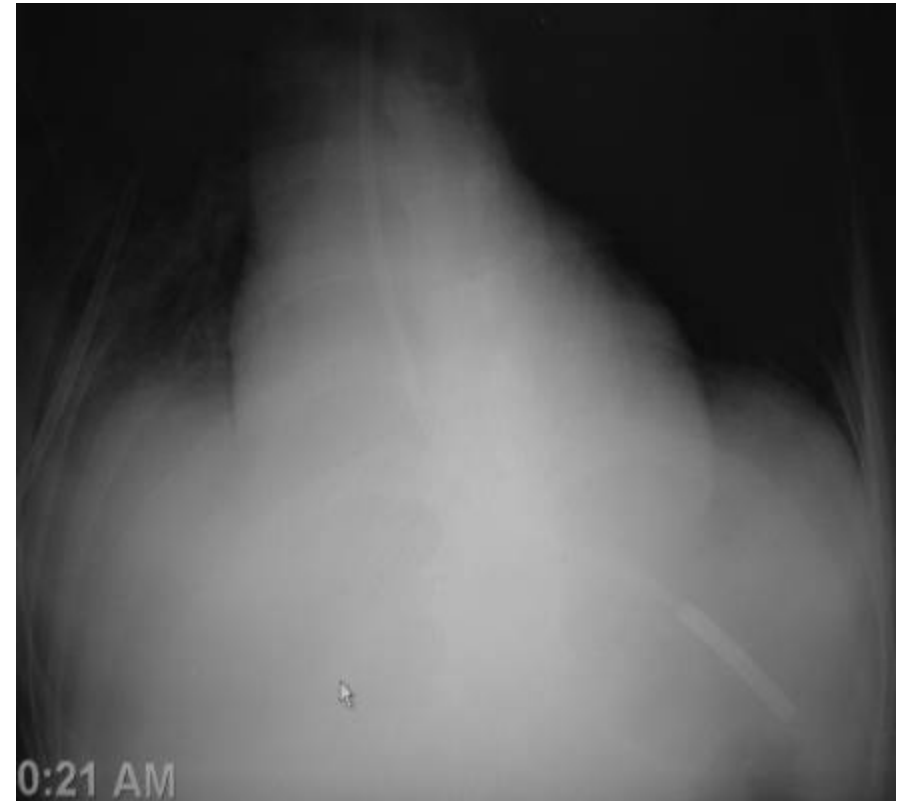
CTScan



Post op course

- POD#22 The patient had poor appetite and several episodes of hypoglycemia. A feeding tube was inserted without complications. Patient started on tube feeds. On aspiration precautions.
- POD#23 The patient was found unresponsive, hypotensive, hypoxemic and with severe respiratory acidosis. During intubation large amount of feeds were noticed in the endotracheal suctioning. ACLS protocol initiated without success. The patient expired.

CXR



Complications of Intestinal Anastomosis

General Considerations

- Anastomotic failure in 1.5 to 11% depending on what type of anastomosis and if is elective or emergency. (Carty NJ et al, Br J Surg 78:1439, 2001)
- Radiographic studies are more sensitive and indicate some degree of anastomotic disruption in up to 50% of patients regardless of the technique used. (Irvin et al Br J Surg 1973;60:461)
- Leaking anastomosis double the length of stay and increases the mortality rate as much as 10 fold.
- Anastomosis leak has been associated with 1/5 to 1/3 of all postoperative deaths. (Schrock et al, Ann Surg 177:513,1973).
- Low anterior resections are associated with leakage rate ranging from 4.5% to 70%. (O'Dwyer et al. Br J Surg 76:756, 1989.)
- Esophageal anastomosis are associated with leakage rates of about 5%. (Fok et al., Br J Surg 78:342, 1991).
- Pancreaticojejunostomy has a leak rate of 15 to 20%

Preoperative factors

- Adequate preoperative fluid resuscitation.
- In elective patients any active coexisting illness should be stabilized or controlled as possible.
- Patient should be well nourish not anemic
- Adequate antibiotic prophylaxis.
- Mechanical bowel preparation:
 - May not be essential for successful healing. (Irving et al, Br J Surg 74:580, 1987.)
 - 72 patients without mechanical bowel preparation and single preop dose of Antibiotics.
 - No anastomotic leak.
 - Wound infection rate 8.3% and overall mortality 2.7%.
 - Comparable to studies including bowel preparation.

Preoperative factors

- Increase bursting pressure and reduced anastomosis leak in dogs after LAR if mechanical bowel prep was given. (O'Dwyer et al, Br J Surg 76:756, 1989)
- Adding erythromycin and kanamycin to bowel preparation led to significant increased bursting pressure at 7 days after operation.
(LeVeen et al. Am J Surg 131:47 1976).
- Inadequate bowel preparation increased the incidence of anastomotic complications in several clinical series. (Irving et al, Br J Surg 60:457, 1973)

Preoperative factors

- Poor anastomotic healing in patients with anemia, diabetes, radiation, chemotherapy, malnutrition with hypoalbuminemia, vitamin deficiencies.
- Crohn's disease carry a significant risk of anastomotic dehiscence (12%) even when macroscopically normal margins obtained. (Carty et al, Br J Surg 78:1439, 1991).
- Supranormal and subnormal cortisol levels results in significant impaired wound healing from slow protein turnover or delayed healing and negative nitrogen metabolic balance).

Factors that influence healing in colonic anastomosis

- Colonic obstruction.
- Perianastomotic infection due to perforation or gross fecal spillage
- Condition of the bowel with respect to ischemia, radiation changes or other secondary consequence of chronic obstruction.
- Anemia
- Recent significant blood loss or perioperative transfusion.
- Malnutrition
- Chronic steroid therapy
- Carcinoma at the anastomotic margin

Principles of Successful Intestinal Anastomosis

- Well-nourished patient with no systemic illness.
- No Fecal contamination, either within the gut or in the surrounding peritoneal cavity.
- Adequate exposure and access.
- Well-vascularized tissues.
- Absence of tension at the anastomosis.
- Meticulous technique. Accurate seromuscular apposition
- Distal obstruction causes anastomotic failure.
- Gentle tissue handling.

Principles of Large Bowel Surgery

- Colonic perforation:
 - In generalized peritonitis or peritoneal contamination, segmental resection with end stoma with closure of the distal colon or construction of a mucus fistula should be performed.
 - Walled of perforation primary anastomosis with protective proximal ileostomy is often possible.
 - Localized cecal perforation in a healthy, good risk patient right colectomy with ileocolostomy may be done.
 - Patient with significant co-morbidities hemodynamically unstable, or pulmonary insufficiency, primary anastomosis is hazardous.

Principles of Large Bowel Surgery

- Large bowel obstruction:
 - Standard approach has been a stage resection due to the inability to prepare the obstructed bowel, and using dilated edematous bowel to construct an anastomosis.
 - Intestinal decompression takes 10 to 15 minutes. Decreases colonic distention which facilitates abdominal closure and improves colonic perfusion and tone. (Nyam et al, Br J Surg 1996;83:786).
 - On table intestinal lavage takes 30 to 45 minutes. Successful outcome depends on the absence of significant contamination, no hemodynamic instability and a patient with otherwise excellent performance status with minimal co-morbid disease. (Forloni et al, Dis Colon Rectum 1998;41:23)

Primary anastomosis vs. staged procedures

- Malignant large bowel obstruction
- Generalized peritoneal contamination
- Hemodynamically instability
- Pulmonary and renal insufficiency
- Severely malnourished. 10 to 15% weight loss.

(Golub et al JACS, 1997;184:364-372). Albumin < 3gm%. (Jex et al, Ann Surg; 1987;206::138-141)

- Medically intractable colitis

Colon injuries requiring resection: diversion or primary anastomosis

Demetriades et al, J Trauma 2001 May;50(5): 765-75

- Prospective study from 19 trauma centers.
- Included patients with colon resections because of penetrating trauma who survived at least 72 hours.
- 297 patients total: 66.3% primary anastomosis and 33.7% diversion.
- Colon related mortality 1.3%
- Colon-related abdominal complications in 22% of primary repair and 27% of diversion.
- Independent risk factors for abdominal complications:
 - Severe fecal contamination
 - Transfusion of >4 units of blood in 24h
 - Single agent antibiotics prophylaxis

- Comparison of primary anastomosis with diversion using multivariate analysis showed no significant difference for all factors above and others previously studied (Shock, delay >6h to OR, PATI >2, severe fecal contamination and transfusion >6 units)
- No difference in high risk patients.
- Conclusions:
 - Surgical method of colon management after resection does not affect the incidence of abdominal complication
 - Severe fecal contamination, >4 units in 24h and single agent antibiotic prophylaxis are independent risk factors for abdominal complications.

- In 1999 included 140 patients with colon injuries. Retrospective review of patients that underwent colostomy vs resection and anastomosis
 - 61% had colon related complications.
 - 21% developed abscess.
 - 13% anastomotic leak in colocolostomy and 4% in ileocolostomy.
 - Anastomotic leak was associated with $ATI > 25$ or hypotension in the ER.
 - Conclusions:
 - Ileocolostomy has a low leak rate and is a good option for right colon injuries.
 - Colocolostomy higher leak rate specifically in patient with $ATI > 25$ or hypotension. Still a role for colostomy

Management of Colonic Obstruction

- The University of Minnesota experience. JACS
1998;187:573-576.
 - Retrospective. 143 patients. Review the management of left colon obstruction.
 - 85% underwent resection with anastomosis (32% subtotal and 68% segmental). 28% intraoperative colonic cleansing.
 - 11% complication rate (1 anastomosis leak). 3% mortality.
 - Conclusion: one stage procedure facilitated by intraoperative colonic cleansing strongly suggested by their experience

Emergency Surgery for obstructing colorectal cancers.

Lee et al, JACS 2001; 1992: 719-725

- Retrospective study. 243 patients (107 proximal to splenic flexure and 136 distal to splenic flexure).
- In 197 patients was feasible to perform resection with primary anastomosis. (101 left and 96 right)
 - 75% of left sided lesion patients underwent on table lavage, 25% subtotal colectomy.
 - Mortality 7.3% in right and 8.9% in left colon resections.
 - Leak rate 5.2% in right and 6.9 % in left colon resections. Colocolostomy 6.1% and ileocolostomy 6.0%.
- Conclusion: Single stage procedure should be the objective except when the patient is hemodynamically unstable during surgery or when the condition of the bowel is not optimal for anastomosis.

Conclusions

- In emergency surgery intestinal anastomosis are safe if patient overall status is satisfactory.
- Leak rate increases in patients that are hemodynamically unstable, malnourished, multi transfused or have severe fecal contamination.
- Left colon can be anastomosed safely after on table cleansing procedure
- Good surgical technique is important to prevent tissue damage.