

## RADIATION ENTERITIS

Radiation is the mainstay of both primary and adjuvant therapy for pelvic malignancies, being used more frequently and at higher doses over the last 2 decades, resulting in an increased number of complicated patients.

### Pathogenesis of radiation damage

- Radiation effect – targeting cellular DNA, protein and membrane lipids.
- Damage –
  - direct: energy transfer
  - indirect: oxygen free radicals.
- Most pronounced effect on cells with high rate of division
  - therapeutic effect with malignant tissues
  - BM, GI tract toxicity

Acute radiation injury to the GI tract:

- occurs in most of the patients
- Symptoms: diarrhea, blood and mucus in BMs, tenesmus and weight loss
- Histologic findings: shortened vili, flattened crypts and superficial ulceration
- Usually responds to antidiarrheal medications and decreasing dose per fraction of radiation. Does not require surgical intervention.

Late radiation injury:

- Obliterative endarteritis → ischemia
- Epithelial atypia, atrophy and fibrosis of the intestinal wall → strictures, fistulas and destruction of tissue planes.

### Risk factors

- Preexisting vascular disease (atherosclerosis, HTN, DM, old age, collagen vascular disease)
- Prior abdominal surgery (adhesions of bowel to the radiation field)
- Thin patients
- Highest susceptibility to injury based on exposure
  - small bowel, especially duodenum.
- Position of bowel segment relative to the radiation field will determine the incidence of injury.

### Surgical prevention

- Partitioning the abdominal and pelvic cavities to prevent exposure of the small bowel to pelvic irradiation.
  - Closure of the available peritoneum to occlude the pelvic inlet.
  - Omentum if sufficient (transposition flap, hammock or envelope techniques).
  - Absorbable mesh if omentum is lacking (may be complicated by bowel incarceration, ureteral obstruction, pelvic abscess).
  - Implantable devices
    - require subsequent removal
    - complications – unplanned deflation, infection,
  - small bowel fistula, iliac artery damage)

### **Clinical presentation**

- Occurs in 5% of patients who receive radiation.
- Mostly presents within 2 years of treatment.
- Perforations occur earlier, but are rare.
- Obstruction – the most common presentation (accounts for 1% of SBOs).
- Fistulization.
- Bleeding.

### **Diagnosis**

- Consider other etiologies for obstruction/fistula (recurrent disease, adhesions for obstruction)
- Pelvic and rectal exam.
- CT.
- Small bowel series.
- Surgical exploration if complete obstruction.

### **Surgical treatment**

- In general, try to avoid surgery.
  - Conservative treatment for patients with partial obstruction who are able to maintain good nutritional status and QOL.
  - Consider the initial indication for radiation therapy – 40% of patients will not survive beyond 2 years from the resection for malignancy.
- Ensure adequate nutritional status preoperatively, using TPN if indicated.
- Consider the use of ureteral stents, as scarring can make identification of the ureters difficult.
- Limit lysis of adhesions to a minimum. (Small bowel loops can be densely adherent, with imperceptible tissue planes)
- Resect and anastomose when feasible (ideal therapy).
- Consider bypass for extensive distal disease with bowel fixed in the pelvis.
- Attempt to use disease-free bowel for the anastomosis for resection or bypass (transverse colon is often a good target). Relative ischemia can extend beyond visibly damaged bowel.
- Stricturoplasty should not be used if resection is feasible.
- Total exclusion is a good option for fistulae in the setting of severe disease.

### **Operative and long term results after surgery for chronic radiation enteritis** Am J Surg 2001

- 109 patients operated for chronic radiation enteritis.
  - 65- resection (54 with anastomosis, 11 without anastomosis).
  - 42-conservative treatment (bypass-14, LOA-3, diverting ileostomy-15).
- Postoperative mortality – 5% (bleeding, leak).
- Complications in 33% of patients.
  - Leak-10%.
  - No difference between resection vs. conservative.
- 35% required TPN
- Reoperations – 40% (mostly for chronic obstruction), higher rate in the conservative group, associated with 12% mortality.

- Long term survival- 85, 79, 69% at 1, 3, 5 years for patients with no recurrence of cancer. Significantly lower for patients in the conservative group.

**Reappraisal of surgical treatment for radiation enteritis** World J Surg 2005

- 48 patients (39 operated for obstruction, 2 for perforation, 7 for proctitis)
- Mortality- 2% (sepsis and MOF in patients operated emergently for perforation).
- Complications – 22%. No anastomotic leakage.
- Survival – 89, 79, 69% at 1, 3, 5 years if no recurrence of cancer.
- Bowel motility, albumin level and body weight returned to normal within 6 months.

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