Radiation Proctitis

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Case Presentation

+ 67 year old legally blind male presented with BRBPR on 7/21
+ Denies nausea, vomiting, rectal pain, anorexia, fever/chills
  + 2 cm rectal ulcer 2/11 s/p electrocautery
  + 6/2011 with no stigmata of bleeding
  + Bx: hyperplastic colonic mucosa; negative for tumor
+ PSH: brachytherapy (2005), BKA
Case Presentation

- VS: T 97F BP 132/89 HR 72 O2 sat 100%
- General: AAO x 3
- CV: RRR, S1S2 normal
- Pulm: CTA bilaterally
- GI: soft nontender, nondistended
- Rectal: Bright red blood; no masses palpated, good sphincter tone
- Extremities: Right BKA

- GI endoscopy:
  - 7/22: poor prep
  - 7/26: deep large ulcer at base of rectum with a clot at edge
  - S/p epinephrine and clips

Hct: 29 → 27 → 25 → 26 → 24
Case Presentation

- Transferred to floor on 7/27

- 7/28/11 (HD#7) obtunded and bleeding profusely from his rectum
  - Procedure: Oversewing the rectal ulcer

- CT scan 7/29 demonstrated radiation seeds fistulizing into the rectum
Case Presentation

- Patient was stabilized with PRBCs and IVF
- 8/03/11: transverse loop colostomy
- Tolerated diet on POD #0 and discharged on POD#1
Causes

+ Acute or chronic side effect from radiation exposure to the pelvis
  + Prostate cancer 6400-7200 cGy
  + Cervical cancer 4500 cGy
  + Endometrial cancer 4500-5000 cGy
  + Rectal cancer 2500-5040 cGy

+ Brachytherapy: seeds or cervical cap

+ Can occur in sites outside primary therapeutic field
Predisposing factors

- Previous abdominal or pelvic surgery
- Chemotherapeutic agents
  - Adriamycin
  - 5-FU
  - Methotrexate
  - actinomycin
- Preexisting inflammatory conditions
  - Diverticulitis
  - IBD
Radiation Therapy Techniques

- **External beam radiation therapy**
  - Multiple ports which direct the beam through 3 or more planes focusing on the tumor

- **Brachytherapy**
  - Ultimate form of conformal therapy
  - Selective placement and exposure of radioactive beads within the tumor bed
  - Maximal radiation delivered to the tumor
### Tolerance Dose Levels

<table>
<thead>
<tr>
<th>ORGAN</th>
<th>MINIMAL DOSE (TD5/50) (CGY)</th>
<th>MAXIMAL DOSE (CGY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>3500</td>
<td>4500</td>
</tr>
<tr>
<td>Stomach</td>
<td>4500</td>
<td>5000</td>
</tr>
<tr>
<td>Small Bowel</td>
<td>4500</td>
<td>6500</td>
</tr>
<tr>
<td>colon</td>
<td>4500</td>
<td>6500</td>
</tr>
<tr>
<td>rectum</td>
<td>5000</td>
<td>8000</td>
</tr>
<tr>
<td>Esophagus</td>
<td>6000</td>
<td>7500</td>
</tr>
</tbody>
</table>

**Doses of 3000-7000 cGy in divided fractions of 150-200 cGy over 4-8 weeks**
What is injury dependent on???

- Total dose
- Beam energy and percentage depth dose
- Fractionation size
- Field size
- Duration of delivery
- Tissue proliferation
- Tissue oxygenation
How does radiation kill cells?

- Highest kill effect on rapidly dividing cells
  - Mucosa ➔ submucosa ➔ muscularis ➔ serosa

- Execution route:
  - Direct ionization of DNA
  - Production of toxic oxygen-free radicals

  Disrupt nuclear DNA integrity

APOPTOSIS
Acute Injury

- Directly related to fraction size, frequency, total volume of tissue irradiated
- Higher doses over shorter intervals induce greater toxicity
- Loss of absorptive capacity
  - DIARRHEA, TENESMUS and MUCOUS DISCHARGE (50-75%)
  - Endoscopically an ulcer appears and hematochezia
- If therapy halted regeneration of the crypts ensues
- Histologic recovery usually complete by 6 months
Chronic Injury

- 6-12 months after therapy

- Chronic:
  - Obliterative endarteritis
  - Endothelial degeneration
  - Mucosal telangiectasias
  - Intestinal fibrosis
  - Epithelial distortion

- Stasis and inefficient oxygen delivery to tissues

- Painful ulcers, draining fistulous tracts, pelvic sepsis or cancer

Permanent and irreversible damage
Pathologic changes in radiation proctitis
Epidemiology

+ **Early injury** → 50-75% - abdominopelvic radiation therapy
  + Self-limited
  + < 3-6 weeks of treatment

+ **Chronic Injury** → 5-15% incidence
  + 1-20 years after radiation exposure
  + ~50% will eventually need surgery
Which organs get most affected?

- Cecum
- Sigmoid colon
How does it present?

**Complications:**
- Hemorrhage
- Fistula formation
- Obstruction
- Incontinence

**Chronic Radiation Proctitis**
- Bleeding
- Diarrhea
- Mucous discharge per rectum
- Urgency/incontinence
- Perianal dermatitis
- Tenesmus

**RECTAL BLEEDING – 95%**

Increases risk of secondary malignancy!
Evaluation

- Rigid or flexible sigmoidoscopy
- Contrast studies if colonoscopy is not feasible (stricture)
- Lab work: nutritional status
Nonoperative Treatment

- Acute injury - Temporizing measures
  - Antidiarrheal medication
  - Perianal skin care
  - Sucralfate or 5-ASA enemas
  - Patience

- Chronic injury - no cure, poor tissue quality
  - Antidiarrheals
  - Anti-inflammatory enemas
  - Metronidazole
  - Vitamin C and E
  - Laser ablation
Formalin treatment

- First described in mid-1980s
- Evacuate rectum
- 4% formalin solution applied directly to the areas of bleeding
  - Contact for several minutes or until bleeding ceases
- Effective 80% of patients after 1-2 applications
  - 30% - recurrent bleeding
- Complications: stictures, anococcygeal pain
Laser coagulation

- Rigid proctoscope or flexible endoscope
  - Several treatments
- Argon plasma coagulator (APC)
  - “painting” the surface of the bowel
  - Uniform 2-3mm burn penetration
  - Blood is “blown” off the tissue surface by argon gas flow,

Direct effect of electrocoagulation current on the bleeding lesion

Side effects:
- ✧ Bloating
- ✧ Anal Pain
Operative Treatment

**Indications:**
- Refractory symptoms – hemorrhage, tenesmus, discharge, incontinence
- Pelvic sepsis
- Obstruction
- Fistula formation

**Consider:**
- Nutrition and overall health
- Type of radiation therapy
- Life expectancy

**Preoperatively:**
- Optimize nutrition
- Correct anemia
- Broad spectrum antibiotics
- Ureteric stents
Diverting Ostomy

- Alleviate a deep anal ulcer and help control sepsis
- Bypass a rectal stricture
- Low morbidity and mortality rates
- Important points:
  - Do not use irradiated bowel for stoma creation
  - Right transverse colon is the best place to form a colostomy
Resection

- Resection and primary anastamosis for localized disease
- If cecum is affected: ileocolic resection with non-irradiated proximal ileum and ascending or transverse colon
- After proctosigmoidectomy: a low rectal or coloanal anastamosis is feasible
  - An omental pedical graft should be placed around the anastamosis
Fistulas

- Rectovaginal - most common
  - Ileorectal, ileovaginal, and vesicovaginal

- Studies:
  - Fistulograms
  - Small bowel studies
  - Contrast enemas

- Approach to rectovaginal fistula:
  - Dissection of rectum to level below fistula
  - Interposition of omental pedicle flap to prevent recurrent fistula
  - Coloanal pull-through and diverting ostomy
Hyperbaric Oxygen Therapy for radiation induced proctopathy in Men treated for prostate cancer

- 27 patients (4- brachytherapy; 16- XRT, 7- combination)
- 100% oxygen in a multiplace hyperbaric chamber for 90 min; 5-7 days weekly for 36 sessions

**Table 3. Patient characteristics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. pts</td>
<td>27</td>
</tr>
<tr>
<td>Mean age (range)</td>
<td>71.8 (53–82)</td>
</tr>
<tr>
<td>No. bleeding via rectum (%)</td>
<td>25 (93)</td>
</tr>
<tr>
<td>No. pts requiring blood transfusions before HBO₂ (%)</td>
<td>6 (22)</td>
</tr>
<tr>
<td>No. pain (%)</td>
<td>8 (30)</td>
</tr>
<tr>
<td>No. fecal urgency (%)</td>
<td>4 (15)</td>
</tr>
<tr>
<td>No. rectal ulceration on endoscopy (%)</td>
<td>14 (52)</td>
</tr>
<tr>
<td>Median mos symptom duration before HBO₂ (range)</td>
<td>8 (1–132)</td>
</tr>
<tr>
<td>Mean mos XRT completion–beginning HBO₂ (range)</td>
<td>19 (3–240)</td>
</tr>
<tr>
<td>Mean no. HBO₂ treatments (range)</td>
<td>36 (29–60)</td>
</tr>
</tbody>
</table>
### Table 4. Patient outcomes

<table>
<thead>
<tr>
<th>Response</th>
<th>No. Pts (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bleeding:</strong></td>
<td></td>
</tr>
<tr>
<td>Resolved</td>
<td>12 (48)</td>
</tr>
<tr>
<td>Improved</td>
<td>7 (28)</td>
</tr>
<tr>
<td>Unchanged</td>
<td>5 (20)</td>
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<tr>
<td>No data</td>
<td>1 (4)</td>
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<tr>
<td><strong>Fecal urgency:</strong></td>
<td></td>
</tr>
<tr>
<td>Resolved</td>
<td>4</td>
</tr>
<tr>
<td>Improved</td>
<td>2</td>
</tr>
<tr>
<td>Unchanged</td>
<td>1</td>
</tr>
<tr>
<td>No data</td>
<td>0</td>
</tr>
<tr>
<td>Pain:</td>
<td></td>
</tr>
<tr>
<td>Resolved</td>
<td>8</td>
</tr>
<tr>
<td>Improved</td>
<td>0</td>
</tr>
<tr>
<td>Unchanged</td>
<td>6</td>
</tr>
<tr>
<td>No data</td>
<td>1</td>
</tr>
<tr>
<td><strong>Rectal ulcer:</strong></td>
<td></td>
</tr>
<tr>
<td>Resolved</td>
<td>14</td>
</tr>
<tr>
<td>Improved</td>
<td>2</td>
</tr>
<tr>
<td>Unchanged</td>
<td>5</td>
</tr>
<tr>
<td>No data</td>
<td>6</td>
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<tr>
<td>Overall response:</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>10 (37)</td>
</tr>
<tr>
<td>Partial</td>
<td>8 (30)</td>
</tr>
<tr>
<td>No change</td>
<td>9 (33)</td>
</tr>
</tbody>
</table>
References

- Fazio: Current therapy in colorectal and rectal cancer, 2nd edition
- Campell-Walsh Urology
- Formalin for haemorrhagic radiation-induced proctitis. Int J Colorectal Dis 2011 June 24
- Treatment of chronic radiation proctitis with cryoablation. Gastrointest Endosc 2011 Feb; 73 (2) 383-9