Neoplastic Colon Polyps

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CASE

- 55M with Hepatitis C, COPD (FEV1=45%), s/p vasectomy, knee surgery
- Meds: albuterol, flunisolide, mometasone, tiotropium
- Routine colonoscopy screening
  - Multiple polyps
  - Pathology
    - Diminutive transverse colon polyp – tubular adenoma
    - 2.5 cm sessile sigmoid polyp – tubulovillous adenoma with foci of invasive adenocarcinoma
    - Diminutive rectosigmoid polyp, and three 4 mm sigmoid polyps – serrated adenoma
Despite negative margins, concern for draining lymph node bed

Repeat colonoscopy for removal of remaining polyps and tattooing of site of invasive carcinoma for surgery

Pathology
- 4 mm cecal polyp, 4 mm descending colon polyp – tubular adenoma
- Remnant of previous 2.5 cm polyp – benign
- Two flat sigmoid polyps – hyperplastic polyps
- One flat sigmoid polyp – sessile
Presented to hospital for elective sigmoid resection

Operative findings
- Tattooed area of sigmoid with no palpable mass
- Large and thick omentum; difficulty in identifying safe plane of dissection at splenic flexure

Procedure: laparoscopic converted to open sigmoidectomy with primary end-to-end anastomosis, repair of bladder dome injury
- EBL=100 ml
Postoperatively

- Extubated POD#1
- Flatus on POD#3 and diet started and advanced as tolerated
- Discharged home on POD#6 with Foley

Pathology: no malignancy; 9 LN negative
NEOPLASTIC POLYPS

Background
Risk factors
Treatment
Screening for colorectal cancer
BACKGROUND

- Adenomas, serrated adenomas
- Occur in 33% of population by age 50, 50% by age 70
- 60% adenomatous polyps are distal to splenic flexure
- Synchronous adenomas in 40%
Adenoma-carcinoma causal relationship

- Almost all colon cancer arises within an adenoma
- 30% incidence of residual adenomas in specimens
- Risk of cancer increases with larger and more polyps
- High incidence of cancer in familial adenomatous polyposis syndrome
- Risk of cancer is 4% after 5 years and 14% after 10 years
Pathways

Traditional

- Begins with *APC* tumor suppressor gene on chromosome 5q for β-catenin \(\rightarrow\) adenoma
- *DCC* tumor suppressor gene on chromosome 18 with neural cell adhesion molecule and alteration in apoptosis \(\rightarrow\) more advanced adenoma
- *p53* tumor suppressor gene on chromosome 17 for cell cycle arrest or apoptosis for DNA damage \(\rightarrow\) carcinoma
- *K-ras* oncogene on chromosome 12 for signal transduction, increased replication and exophytic growth
The diagram illustrates the stages of colorectal cancer development:

1. **Normal tissue**
   - Familial adenomatous polyposis (due to germline APC mutation)
   - Hereditary nonpolyposis colorectal cancer (May be 1–3 years)

2. **Tumor initiation**
   - Dysplastic aberrant crypt foci

3. **Tumor progression**
   - Early adenoma
   - Intermediate adenoma
   - Late adenoma

4. **Neoplasia**
   - Carcinoma
   - Metastasis

- **APC**
- **K-RAS**
- **DCC**
- **p53**
- **Other changes?**
Serrated pathway

- Begins with *BRAF* oncogene mutation in serine-threonine kinase signaling
- DNA methylation, microsatellite instability
- Elderly women, smokers
- Larger, sessile, right colon polyps
- Mix of hyperplastic and adenomatous features
RISK FACTORS

- Histologic variants
  - Tubular adenoma – <5% malignant
  - Tubulovillous adenoma – 20-25% malignant
  - Villous adenoma – 35-40% malignant
Size

- Diminutive = <6 mm - <0.5% malignant
- <1 – 1-2% malignant
- >2 cm – up to 40% malignant
**Fig. 4.** Size of adenoma related to invasive carcinoma.
Dysplasia

- Mild – 5.7% malignant
- Moderate – 18% malignant
- Severe – 34.5% malignant
  - 5-7% adenomatous polyps have high-grade dysplasia; 3-5% have invasive carcinoma
  - Have not yet invaded through muscularis mucosa so if completely excised, patient is cured
Haggitt level for polypoid lesions

- Invasion into submucosa with increased risk of carcinoma, lymph node metastasis, cancer-related mortality
KiKuchi classification for sessile lesions

- **Sm1** = slight invasion of submucosa, 200-300 µm
- **Sm2** = intermediate invasion
- **Sm3** = deep submucosal invasion to inner surface of muscularis propria
  - Mayo Clinic series, 23% risk of LN mets
Risk for lymph node metastasis is 8-15% in malignant polyps

Unfavorable pathologic features:
- Submucosal invasion, Haggitt level 4
- Poor differentiation, high-grade dysplasia
- Tumor budding - clusters of malignant cells away from main site of submucosal invasion
- Lymphovascular invasion
- Resection margin <2 mm
TREATMENT

- Complete colonoscopy with polypectomy
National Polyp Study

Table 2. Comparison of the Observed Incidence of Colorectal Cancer in the National Polyp Study Cohort with That Expected on the Basis of Data from the Three Reference Groups.

<table>
<thead>
<tr>
<th>Reference Group (Location)</th>
<th>Type of Study</th>
<th>Period of Patient Accrual</th>
<th>No. of Patients</th>
<th>National Polyp Study Cohort</th>
<th>P Value‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayo Clinic (United States)</td>
<td>Retrospective cohort</td>
<td>1965–1970</td>
<td>226</td>
<td>48.3</td>
<td>0.10</td>
</tr>
<tr>
<td>St. Mark’s (United Kingdom)</td>
<td>Retrospective cohort</td>
<td>1957–1980</td>
<td>1618</td>
<td>43.4</td>
<td>0.12</td>
</tr>
<tr>
<td>SEER (United States)</td>
<td>Cross-sectional</td>
<td>1983–1987</td>
<td>10% of U.S. population</td>
<td>20.7</td>
<td>0.24</td>
</tr>
</tbody>
</table>

*The values were adjusted for the age and sex distribution of the National Polyp Study cohort.
†The number of colorectal cancers observed (n = 5) in the National Polyp Study cohort divided by the number expected. The five colorectal cancers were asymptomatic malignant polyps detected by colonoscopy.
‡A Poisson distribution was assumed.
National Polyp Study

- Adenomas progress into invasive adenocarcinoma
- Search and remove polyps to prevent adenocarcinoma
More recently, polypectomy leads to a 53% reduction in colorectal cancer mortality. Zaub er et al. *NEJM* 2012.
Polypectomy technique
- Biopsy (<5 mm)
- Snare
- Piecemeal excision
- Endoscopic mucosal resection (EMR)
EMR

- Saline injection into submucosal plane, suction cautery attachment, snare polypectomy
- For small (<1cm), flat / depressed lesions
- Curative for early cancers without LVI or capable of harboring a focal cancer
- If large, sessile, villous, then surgical resection
Adverse outcomes in polypectomy

- Risk of death is 1 in 14000
- Bleeding in 4.8 per 1000
- Perforation in up to 1 in 1000
- Post-polypectomy syndrome in up to 3 in 1000
  - Cautery injury with microperforation and bacterial translocation
  - Abdominal pain, fever, leukocytosis
Resection margin

- If negative margin and no unfavorable pathologic feature, 0.8% risk of adverse outcome (residual carcinoma, recurrence, lymph node metastasis, decreased survival)
- If negative margin but have unfavorable pathologic feature, 18% risk of adverse outcome
- If +/-indeterminate margins, 27% have adverse outcome
Contraindications to polypectomy

- Signs of invasive malignancy (fungating, ulcerated, distorted, necrosis, involves surrounding bowel wall)
- Relative: bleeding diathesis, acute colitis

Indication for colectomy

- Contraindication to polypectomy
- High risk pathologic features despite complete polypectomy (margin <3 mm, poor differentiation, LVI, Haggitt level 4)
SCREENING

- Initial screening
  - Fecal occult blood testing (FOBT)
  - Sigmoidoscopy
    - 60 cm; use with FOBT or double barium enema study
    - Every 5 years; if positive, colonoscopy
  - Colonoscopy
Double contrast barium enema (DCBE)

- For polyps >1 cm
- For those who refuse or unable to have full colonoscopy
- Paired with flex sigmoidoscopy
- Every 5 years; if positive, colonoscopy

Glick. AJR 2000
CT colonography = virtual colonoscopy

- Air-distended, prepped colon
- Identified 90% lesions >10 mm
- Every 5 years; if positive, colonoscopy

Johnson et al. *NEJM* 2008
Yucel et al. *AJR* 2008
<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Initial Screening</th>
</tr>
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</table>
| Average risk, asymptomatic (Age >50, consider >45 for African Americans)      | FOBT each year  
Flexible sigmoidoscopy every 5 years  
Colonoscopy every 5-10 years  
CT colonography every 5-10 years                                                                 |
| 1<sup>st</sup> degree relative with CRC, adenomatous polyps at age <60  
Two 2<sup>nd</sup> degree relatives with CRC | Same as for average risk but starting at age 40  
Colonoscopy every 5 years at age 40, or 10 years younger than age of earliest diagnosis in family |
| Gene carrier or at risk for FAP                                                | Flexible sigmoidoscopy each year, starting at age 10-12                                                                                           |
| Gene carrier or at risk for HNPCC                                             | Colonoscopy every year, starting at age 20-25, or 10 years younger than age of earliest diagnosis in family                                         |
Surveillance screening after polypectomy

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Recommended</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous History of Polyp</td>
<td>Colonoscopy</td>
<td>5 to 10 years</td>
</tr>
<tr>
<td>One to two small tubular adenomas</td>
<td>Colonoscopy</td>
<td>3 years</td>
</tr>
<tr>
<td>1. Three to ten small adenomas or</td>
<td>Colonoscopy</td>
<td></td>
</tr>
<tr>
<td>2. One adenoma $&gt;1$ cm or</td>
<td>Colonoscopy</td>
<td></td>
</tr>
<tr>
<td>3. A polyp with villous or high-grade dysplasia</td>
<td>Colonoscopy</td>
<td>$&lt;3$ years</td>
</tr>
<tr>
<td>$&gt;10$ adenomas</td>
<td>Colonoscopy</td>
<td>3 to 6 months</td>
</tr>
<tr>
<td>Sessile adenomas removed piecemeal</td>
<td>Colonoscopy</td>
<td></td>
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CONCLUSIONS

- Risk factors for malignancy include histology, size, and depth of invasion
- Polypectomy reduces incidence and mortality from colorectal cancer
- Past medical history and family history help direct appropriate screening for polyps
1. The appropriate screening strategy for a 50 year old man with no family history of colon cancer and a sibling with adenomatous polyps removed at age 50 would be to begin

   a. Colonoscopy at age 30, repeated every 2 years
   b. Colonoscopy at age 40, repeated every 5 years
   c. Sigmoidoscopy and fecal occult testing at age 40, repeated every 5 years
   d. Colonoscopy at age 50, repeated every 10 years
   e. Sigmoidoscopy and fecal occult testing at age 50, repeated every 5 years
2. Findings at colonoscopy that indicate decreased interval for screening are all except

a. Adenomatous polyp >1 cm
b. Nonserrated hyperplastic rectal polyp

c. >3 adenomatous polyps
d. Villous adenoma
e. Sessile polyp removed piecemeal
3. A 60 year old woman had 2 polyps removed from the left colon during screening colonoscopy. She began having left abdominal pain at night, especially when lying on her left side or coughing. Which is not true?

a. Previous abdominal operation is a risk factor
b. Symptoms typically occur within 24 hours after colonoscopy

c. Abdominal plain film is the radiologic study of choice

d. Splenic injury can be managed nonoperatively

e. Hypotension suggests a splenic injury
That’s all, folks!
Thank you