Anatomy of the Colon and Rectum
Rectal Cancer

- Defined as <12 cm from the anal verge by rigid proctoscopy.

- Distinct clinical management issues:
  - Increased local recurrence
  - Use of adjuvant radiation therapy
  - Use of neoadjuvant therapy and need to stage prior to surgery
  - Sphincter preservation
  - Concerns of urinary and sexual dysfunction
Goals of Rectal Cancer Surgery

- Improved local control
- Improved overall survival
- Maintaining quality of life
- Sphincter preservation
- Satisfactory bowel function
- Maintain genitourinary function
- Maintain sexual function
Sphincter Preservation for Rectal Cancer

OUTLINE

1. What is the minimal distal margin bowel margin?
2. Importance of the circumferential margin and total mesorectal excision.
3. Impact of neoadjuvant therapy on sphincter preservation.
4. Reconstruction techniques & laparoscopy.
5. Role of diverting ileostomy.
6. Transanal local excision.
Distal Intramural Spread of Rectal Cancer: End of the “5-cm Rule”

<table>
<thead>
<tr>
<th>Stage</th>
<th>Distal Spread</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>I (n=150)</td>
<td>100%</td>
</tr>
<tr>
<td>II (n=162)</td>
<td>98.8%</td>
</tr>
<tr>
<td>III (195)</td>
<td>90.2%</td>
</tr>
</tbody>
</table>

Adequacy of Even ≤1-cm Distal Margin After Neoadjuvant Therapy?

Disease Free Survival

Local Recurrence

Low Anterior Resection (LAR)
Abdominoperineal Resection (APR)
Total Mesorectal Excision

Mesorectum

TME specimen

Tumor
52 patients, 1983-1985
transabdominal resections
whole-mount pathologic evaluation
of radial resection margin
prospective follow-up

Results:
• 27% with positive radial margin
• 12 of 14 with positive margins
developed local pelvic recurrence (85%)
• 1 of 38 with negative margins
developed LR (3%)

Pelvic Recurrence Rates Following Curative Resection for Rectal Cancer

![Bar chart showing pelvic recurrence rates for different treatments and trials.](chart.png)

- **Conventional Surgery**
  - NCCTG: 25%
  - NSABP R-01: 30%

- **Total Mesorectal Excision**
  - Heald: 5%
  - Enker: 7%

Heald Enker NCCTG NSABP R-01
Preoperative vs. Postoperative Adjuvant Therapy for Rectal Cancer

**POTENTIAL ADVANTAGES:**
- Conversion to sphincter-preservation
- Less irradiated small bowel
- Improved late bowel function
- Earlier systemic therapy

**POTENTIAL DISADVANTAGES:**
- Staging uncertainty
- Overtreatment in some patients
- Delay in surgical therapy
- Increased operative complications?
Importance of an Adequate of Lymph Node Harvest

Survival for N0 patients by nodes-examined

Neoadjuvant Chemoradiation

German Rectal Cancer Study Group

- Randomized trial
  preop vs. postop CRT
- Conventional therapy

RESULTS:
- Improved local control
- Less toxicity
- No difference in survival

# Neoadjuvant Chemoradiation

**German Rectal Cancer Study Group**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Preoperative Chemoradiotherapy (N=415)</th>
<th>Postoperative Chemoradiotherapy (N=384)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominoperineal resection deemed necessary — no. (%)</td>
<td>116 (28)</td>
<td>78 (20)</td>
<td></td>
</tr>
<tr>
<td>Sphincter-preserving surgery performed — no./total no. (%)</td>
<td>45/116 (39)</td>
<td>15/78 (19)</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Neoadjuvant Short-Course Radiotherapy vs. Conventional Chemoradiation Therapy for Rectal Cancer

Polish randomized trial (n=316)

<table>
<thead>
<tr>
<th></th>
<th>Short Course RT</th>
<th>CRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sphincter preservation</td>
<td>61.2%</td>
<td>58.0%</td>
</tr>
<tr>
<td>Path CR</td>
<td>0.7%</td>
<td>16.1%*</td>
</tr>
<tr>
<td>Circum margin positive</td>
<td>12.9%</td>
<td>4.4%*</td>
</tr>
<tr>
<td>Late toxicity</td>
<td>28.3%</td>
<td>27%</td>
</tr>
<tr>
<td>Local recurrence</td>
<td>10.6%</td>
<td>15.6%</td>
</tr>
</tbody>
</table>
Rectal Cancer

**CLINICAL STAGE**

- **T3, N0 or T any, N1-2**
  - Preoperative continuous 5-FU/RT (preferred) (category 1 for node positive disease) or bolus 5-FU + leucovorin/RT or capecitabine/RT\(^k\) (category 2B)
  - Transabdominal resection\(^f\)
  - **ADJUVANT TREATMENT\(^h, j, n\)** (6 mo perioperative treatment preferred)
    - 5-FU ± leucovorin (category 1)
    - or FOLFOX\(^i, o\)
    - or Capecitabine\(^j\)

- **pT1-2, N0, M0**
  - Transabdominal resection\(^f\)
  - **Observe**
  - **Reconsider:**
    - 5-FU ± leucovorin or FOLFOX\(^i, o\) or capecitabine,\(^j\)
    - then continuous 5-FU/RT or bolus 5-FU + leucovorin/RT or capecitabine/RT\(^k\) (category 2B)
    - then 5-FU ± leucovorin or FOLFOX\(^i, o\) or capecitabine\(^j\)

- **T4 and/or locally unresectable**
  - Continuous IV 5-FU/RT or bolus 5-FU + leucovorin/RT or capecitabine/RT\(^k\) (category 2B)
  - Resection, if possible → Any T
  - 5-FU ± leucovorin (category 1)
  - or FOLFOX\(^i, o\)
  - or Capecitabine\(^j\)
Restorative Proctectomy
Restorative Proctectomy

Colonic J-pouch
Restorative Proctectomy

Coloplasty
144 patients
5.5 cm (range 1–12) from the anal verge
123 patients received preoperative radiotherapy

**Results**
Mortality & morbidity were 1% and 34%
Conversion was 14% ($n = 20$)
Intact mesorectum in 88% of the cases
Compared to matched open group, no difference in margin status, local recurrence or overall survival.

Local Excision: Selection Criteria

Lesion amenable to local excision
  • Within reach of technique
  • Full thickness
  • Nonfragmented
  • Negative margins

No adverse pathologic criteria
  • High grade lesion
  • Lymphovascular invasion
  • Signet-ring cells
  • Colloid histology

uT1 or ?uT2 on ERUS

No evidence of lymph node metastases
Patient not a candidate for LAR or APR
### Incidence of Positive Lymph Nodes by Pathologic Features

<table>
<thead>
<tr>
<th>T-Stage</th>
<th>n</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nelson (1987)</td>
<td>76</td>
<td>20%</td>
<td>67%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morson (1979)</td>
<td>2084</td>
<td>11%</td>
<td>12%</td>
<td>58%</td>
<td></td>
</tr>
<tr>
<td>Minsky (1989)</td>
<td>168</td>
<td>0%</td>
<td>28%</td>
<td>36%</td>
<td>53%</td>
</tr>
<tr>
<td>Brodsky (1992)</td>
<td>154</td>
<td>12%</td>
<td>22%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Differentiation</th>
<th>n</th>
<th>Well</th>
<th>Mod</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohen (1980)</td>
<td>247</td>
<td>29%</td>
<td>32%</td>
<td>63%</td>
</tr>
<tr>
<td>Nelson (1987)</td>
<td>76</td>
<td>38%</td>
<td>57%</td>
<td></td>
</tr>
<tr>
<td>Minsky (1989)</td>
<td>168</td>
<td>0%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>Brodsky (1992)</td>
<td>154</td>
<td>0%</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>STUDY (yr)</td>
<td>N</td>
<td>FU (mo)</td>
<td>LR (%)</td>
<td>OS (%)</td>
</tr>
<tr>
<td>-------------</td>
<td>----</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>Chakavarti (99)</td>
<td>52</td>
<td>52</td>
<td>11 (T1)</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>62 (T2)</td>
<td></td>
</tr>
<tr>
<td>Steele (99)</td>
<td>110</td>
<td>48</td>
<td>7 (T1)</td>
<td>87 (T1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 (T2)</td>
<td>85 (T2)</td>
</tr>
<tr>
<td>Mellgren (00)</td>
<td>108</td>
<td>53</td>
<td>17 (T1)</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>46 (T2)</td>
<td></td>
</tr>
<tr>
<td>Paty (02)</td>
<td>125</td>
<td>80</td>
<td>17 (T1)</td>
<td>74 (T1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>26 (T2)</td>
<td>72 (T2)</td>
</tr>
<tr>
<td>Madbouly (05)</td>
<td>52</td>
<td>55</td>
<td>29 (T1)</td>
<td>89 (T1)</td>
</tr>
</tbody>
</table>
Local Excision for Rectal Carcinoma Followed by Radiation Therapy

<table>
<thead>
<tr>
<th>Study</th>
<th>Local Control</th>
<th>Survival</th>
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<tbody>
<tr>
<td>Princess Margaret Hospital</td>
<td>76%</td>
<td>80% 6-yr median</td>
</tr>
<tr>
<td>Fox Chase Cancer Center</td>
<td>81%</td>
<td>75% 5-yr DFS</td>
</tr>
<tr>
<td>MSKCC</td>
<td>82%</td>
<td>79%</td>
</tr>
<tr>
<td>CALBG</td>
<td>98%</td>
<td>96% 2-yr</td>
</tr>
</tbody>
</table>
Management of Rectal Cancer

- **ERUS**
  - **T1N0 No adverse pathologic features**
    - Local Excision
      - **T1 w/o adverse pathologic features**
        - Observe vs radical resection
      - **T1 with adverse pathologic features**
        - Radical resection
  - **T2N0 or T1N0 w/adverse features**
    - Radical resection
      - **T1-2, N0**
        - Observe
      - **T1-2, N1**
        - CRT
  - **T3/T4 and/or N1**
    - Preop CRT
      - Radical resection
Temporary Ileostomy: When is it Necessary?

• Arguments in favor of ileostomy:
  – “protects” from anastomotic leaks
  – Allows time for healing before bowel restoration

• Routine covering stoma has not been shown to be necessary

• Considered to be useful in patients at higher risk for anastomotic leak
  – Neoadjuvant radiotherapy
  – Coloanal anastomosis
  – Several comorbidities

• Take down is best performed after the completion of adjuvant therapy
Protective Defunctioning Stoma in Low Anterior Resection for Rectal Carcinoma

German prospective study (2000-2001)
881 of 2729 LAR pts received protecting ostomy

<table>
<thead>
<tr>
<th></th>
<th>Stoma</th>
<th>No stoma</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anastomotic leak</td>
<td>14.5%</td>
<td>14.2%</td>
<td>ns</td>
</tr>
<tr>
<td>Leak req. reoperation</td>
<td>3.6%</td>
<td>10.1%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mortality</td>
<td>0.9%</td>
<td>2.0%</td>
<td>0.037</td>
</tr>
</tbody>
</table>

Stomal closure complications:
- Colostomy: 15.3%
- Ileostomy: 22.4% (p=0.031)
Patient Case

A 55 yr. old college professor reports a 2 month history of narrow stools and occasional rectal bleeding. Colonoscopy demonstrates a mass 7 cm from anal verge and biopsy shows moderately differentiated adenocarcinoma.
Patient Case

Appropriate staging work-up includes:

a) CT scan chest, abdomen & pelvis
b) Endorectal ultrasound
c) FDG-PET scan
d) pelvic MRI
The imaging studies show that the tumor invades into the bowel wall (T₂) and that there is a single 2-cm perirectal node. What management options best pertain to this case?

a) Low anterior resection; postoperative adjuvant chemoradiotherapy if nodes positive

b) Neoadjuvant chemoradiotherapy using 5FU 300 mg/d CIV 5 days per week to coincide with radiotherapy, followed by surgery

c) Neoadjuvant chemoradiotherapy using capecitabine 825 mg/m² po bid. continuously during RT, followed by surgery
Outcomes Following Hepatic Resection for Metastatic Colorectal Cancer

R0-resection (n = 473)
disease-free survival
R1/2-resection (n = 72)

operative mortality excluded

years from liver resection

Colorectal Cancer with Hepatic Metastases

- Approximately 30% to 40% of patients will have liver-only metastases at time of recurrence
- Approximately 20% to 30% will have liver-only metastases on initial evaluation

25-30,000 patients with liver-only metastases

Management Options for Synchronous Colorectal Cancer and Resectable Liver Metastases

Resection of primary

Chemotherapy

Liver resection

Resection of Primary and liver (combined or staged)

Chemotherapy

Chemotherapy

Resection of Primary and liver (combined or staged)
1. Sphincter preservation and surgical technique
2. Importance of TME
3. Preoperative staging
4. Neoadjuvant therapy
5. Selected role of local excision for early disease
6. Management of Stage IV rectal cancer
Management of Rectal Cancer

CONCLUSIONS

1. Better understanding of the importance of circumferential vs distal margin and TME
2. Preoperative chemoradiation therapy
3. Refined surgical techniques
   • stapled low bowel attachment
   • coloanal reconstruction
   • J-pouch and coloplasty
   • local excision in selected cases