Rectal Cancer
Evolution of TME
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Colon & Rectal Surgery, Madigan Army Medical Center
SCOAP Annual Retreat
RECTAL CANCER SURGERY
PREVIOUS DOGMA

APR is the procedure of choice

LAR is the procedure of choice

local excision is the procedure of choice *

* selected tumors
RECTAL CANCER
EVOLUTION OF SURGERY

Blunt pelvic dissection

Sharp total mesorectal excision

Subtotal mesorectal excision
<table>
<thead>
<tr>
<th>MORBIDITY</th>
<th>MORTALITY</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

RECTAL CANCER THERAPY

- Morbidity
- Mortality
- Function

Optimal Cure Rate
## RECTAL CANCER

### ANALYZING THE RESULTS

- Survival/cure rates
- Local recurrence
- Stoma
- Morbidity
  - sexual
  - urinary
- Postoperative function
RECTAL CANCER
Multi-Modality Treatment

Surgery
- TME
- Technical points
- Local Excision

Adjuvant therapy
- Who?
- How
- When?
**TOTAL MESORECTAL EXCISION**

- the rectum and its mesentery are a single fascia-enveloped unit, anatomically separate from surrounding pelvic structures

- surgical violation of this anatomic package leads to a positive circumferential margin, a known predictor of local recurrence

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Surgical Options in Rectal Cancer

- Radical resection
  - Anterior resection
  - Abdominoperineal excision
  - Hartmann procedure
- Local excision
  - Transanal excision
  - TEMS
- Palliative procedures
  - Bypass procedure
  - Defunctioning stoma

Laparoscopic vs. Open
TOTAL MESORECTAL EXCISION

Cancer of Mesorectum

Cancer in Rectum

Line of Excision Includes Mesorectum

Distal Mesorectum with Tumor Deposits

Adapted From: RJ Heald et al, Br J Surg 1982
Mesorectal Fascia
Technical Approaches

Posterior Pelvic Dissection

• Retract rectosigmoid anterior and inferior
• Follow air dissection within areolar plane
  – posterior to rectum but anterior to hypogastric nerve (wishbone)
• Sharp dissection – cautery or tissue sealant device – of bi-lobed mesorectum
• Divide rectosacral fascia under direct view
Technical Approaches
Lateral Pelvic Dissection

• Dissect from posterior to lateral maintaining endopelvic fascia “envelope”
• Identify and preserve nervi erigentes on lateral pelvic sidewall
• Divide attachments anterolaterally
• Protect seminal vesicles
Technical Approaches
Anterior Pelvic Dissection

• Cul-de-sac opened
• Denonvillier’s fascia incised
  (fat looks different)
• Protect prostate and seminal vesicles
• Less Trendelenburg
Technical Approaches
Specimen Audit

- Check for violation of TME envelope
- Check for any perforation
- Check distal mural margin
- “Bread-loaf” to check radial margins
- Nodes and tumor deposits in mesorectum
<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>N</th>
<th>Follow-up (yrs)</th>
<th>Local recur</th>
<th>Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heald</td>
<td>1986</td>
<td>115</td>
<td>4.2</td>
<td>2%</td>
<td>87%</td>
</tr>
<tr>
<td>Macfarlane</td>
<td>1993</td>
<td>135</td>
<td>5.0</td>
<td>4%</td>
<td>78%</td>
</tr>
<tr>
<td>Enker</td>
<td>1995</td>
<td>246</td>
<td>&gt;5</td>
<td>7%</td>
<td>64%</td>
</tr>
<tr>
<td>Bjerkerset</td>
<td>1996</td>
<td>118</td>
<td>&gt;5</td>
<td>9%</td>
<td>65%</td>
</tr>
<tr>
<td>Hainsworth</td>
<td>1997</td>
<td>76</td>
<td>2.8</td>
<td>11%</td>
<td>63% (2yrs)</td>
</tr>
</tbody>
</table>
CIRCUMFERENTIAL RESECTION MARGIN

Local recurrence and survival rates compared to CRM (+) and CRM (-) conditions. Adam 1995.
TME
DISADVANTAGES

Mandates lower anastomosis

- higher leak rate
- inferior functional results
- greater need for diversion
Surgery Alone?
Swedish Rectal Cancer Trial: 1168 Pts

<table>
<thead>
<tr>
<th>Local Recurrence</th>
<th>Surgery + RT</th>
<th>Surgery Alone</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4</td>
<td>12</td>
<td>0.02</td>
</tr>
<tr>
<td>B</td>
<td>10</td>
<td>23</td>
<td>0.02</td>
</tr>
<tr>
<td>C</td>
<td>20</td>
<td>40</td>
<td>0.01</td>
</tr>
<tr>
<td>TOTAL</td>
<td>11</td>
<td>27</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Dukes’ Stage
SURGERY +/- RT
5-YEAR SURVIVAL

*\( p < 0.004 \)

**Swedish Rectal Cancer Trial**
Swedish Rectal Cancer Trial

- Radiation was given pre-op
- No chemotherapy given
- TME not standardized
- One of only 3 studies to report a significant survival advantage with pre-op XRT
Does adequate TME obviate the need for (chemo)radiation?
DUTCH TME TRIAL
Pre-op RT + TME vs TME only

Operable rectal cancer

RANDOMIZE

N=1805

TME

RT

(25 Gy/5f)

TME

Kapiteijn E, et al. NEJM, 2001; 345 (9): 638
LOCAL RECURRENCE
DUTCH TME +/- RT TRIAL

2 year follow up

% local recurrence

TNM stage

surgery

surgery & RT

p<0.001

p=0.01
SURGERY +/- RT
Overall Local Recurrence Rate

<table>
<thead>
<tr>
<th>%</th>
<th>p&lt;0.001</th>
</tr>
</thead>
<tbody>
<tr>
<td>surgery</td>
<td>8.2</td>
</tr>
<tr>
<td>surgery/RT</td>
<td>2.4</td>
</tr>
</tbody>
</table>

F/U 2 years
Dutch TME +/- RT Trial
SURGERY +/- RT
LOCAL RECURRENCE

<table>
<thead>
<tr>
<th></th>
<th>SRCT</th>
<th>Dutch TME Tri</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery</td>
<td>27</td>
<td>8</td>
</tr>
<tr>
<td>Surgery/ RT</td>
<td>11</td>
<td>2</td>
</tr>
</tbody>
</table>
Dutch TME +/- RT Trial

82% overall survival at 2 yrs
Kapiteijn E, et al. NEJM, 2001; 345 (9): 638
Cochrane Review
Lap vs. Open for CRC

• 33 RCT; 12 with long-term outcome reported
• 3346 patients
• Cancer-related mortality:
  – Colon cancer: 5 RCT, 1575 pts, 14.6% vs 16.4%; OR (fixed) 0.80 (95% CI 0.61 to 1.06) (P=0.15)
  – Rectal cancer: 3 RCT, 578 pts, 9.2% vs 10.0%; OR (fixed) 0.66 (95% CI 0.37 to 1.19) (P=0.16)
• Recurrence: HR for laparoscopic group 0.92; 95% CI 0.76-1.13)

Cochrane Conclusions

“Laparoscopic resection of carcinoma of the colon is associated with a long term outcome no different from that of open colectomy... Laparoscopic surgery for cancer of the upper rectum is feasible, but more randomised trials need to be conducted to assess long term outcome.”

## Laparoscopic Rectal Resection for CA

### Clinical Outcomes

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N</th>
<th>LAR/APR</th>
<th>Conversion%</th>
<th>LOS (d)</th>
<th>Survival%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Franklin</td>
<td>1996</td>
<td>200</td>
<td>74/26</td>
<td>4</td>
<td>5.7</td>
<td>12/87</td>
</tr>
<tr>
<td>Fleshman</td>
<td>1999</td>
<td>42</td>
<td>0/42</td>
<td>21</td>
<td>7</td>
<td>19/69</td>
</tr>
<tr>
<td>Hartley</td>
<td>2001</td>
<td>28</td>
<td>21/7</td>
<td>33</td>
<td>--</td>
<td>7/--</td>
</tr>
<tr>
<td>Anthuber</td>
<td>2003</td>
<td>101</td>
<td>77/24</td>
<td>3</td>
<td>14</td>
<td>3/--</td>
</tr>
<tr>
<td>Morino</td>
<td>2003</td>
<td>100</td>
<td>98/--</td>
<td>12</td>
<td>11.4</td>
<td>3.2/80</td>
</tr>
<tr>
<td>Leung</td>
<td>2004</td>
<td>203</td>
<td>203/--</td>
<td>23</td>
<td>8.2</td>
<td>7/76</td>
</tr>
<tr>
<td>Barlehner</td>
<td>2005</td>
<td>143</td>
<td>127/16</td>
<td>1</td>
<td>7</td>
<td>6.7/66.3</td>
</tr>
<tr>
<td>CLASSIC</td>
<td>2005</td>
<td>259</td>
<td>196/63</td>
<td>34</td>
<td>10</td>
<td>---</td>
</tr>
<tr>
<td>Kim</td>
<td>2006</td>
<td>312</td>
<td>214/44</td>
<td>2.6</td>
<td>11</td>
<td>2.9/--</td>
</tr>
<tr>
<td>Dulucq</td>
<td>2006</td>
<td>218</td>
<td>142/--</td>
<td>12</td>
<td>6.4</td>
<td>6.8/67</td>
</tr>
<tr>
<td>Law</td>
<td>2006</td>
<td>98</td>
<td>98/0</td>
<td>12</td>
<td>7</td>
<td>3.3/55.5</td>
</tr>
</tbody>
</table>
Laparoscopic Rectal Resection for CA Complications

- **Mortality 1-2%**
  - (Leroy J. Surg Endosc 2004; 18:281-9)

- **Morbidity 18-37%**
  - Leak 9-17%
  - Perceived sexual dysfunction (41% lap vs. 23% open, P<0.05)
    - (MRC CLASSIC trial; Guillou PJ. Lancet 2005; 365: 1718-26.)

- **Conversion 3-33%**
  - Tumor fixity
  - Uncertain anatomy
  - Obesity
  - Bleeding
  - Adhesions
  - Narrow pelvis
Laparoscopic APR
Pre-op vs. Post-op Chemo/XRT
German Rectal Cancer Study Group

- n=823
- T3, T4, or node positive (stage II-III)
- Preoperative
  - 5040 cGy and 5-Fu at weeks 1 and 5
  - TME 6 weeks later
  - 4 cycles 5-Fu 4 weeks post-op
- Postoperative
  - TME
  - Chemo/XRT 4 weeks post-op
  - Additional 540 cGy boost to tumor bed

Sauer, et al. NEJM, 2004; 351: 1731
Local Recurrence

Sauer, et al. NEJM, 2004; 351: 1731
Overall Survival

Sauer, et al. NEJM, 2004; 351: 1731
Disease-free Survival

Sauer, et al. NEJM, 2004; 351: 1731
Sphincter-Preserving Aspect

<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>

Sauer, et al. NEJM, 2004; 351: 1731
Pre-op vs. Post-op CRT
Take-home Points

- Pre-op CRT decreases local recurrence
- Pre-op CRT increases sphincter preservation
- No difference in complications
- No difference in survival
RECTAL CANCER AS BREAST CANCER: PARADIGM FOUND?
RECTAL CANCER
LOCAL EXCISION

**pro**
- Low morbidity/mortality
- Avoids sexual/urinary/bowel dysfunction
- Avoids colostomy

**con**
- Nodal status not pathologically assessed
- Involved nodes not excised
- ? Equivalent oncologic results to radical excision
SELECT TUMORS WITH A LOW LIKELIHOOD OF REGIONAL METASTASES
LOCAL EXCISION DESIDERATA

- Accurate pre-op staging
- Adequate local control
- Reliable follow-up protocol
- Salvage option for local failures
<table>
<thead>
<tr>
<th></th>
<th>submucosal</th>
<th>transmural</th>
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<tbody>
<tr>
<td>accuracy</td>
<td>87%</td>
<td>87%</td>
</tr>
<tr>
<td>sensitivity</td>
<td>77%</td>
<td>78%</td>
</tr>
<tr>
<td>specificity</td>
<td>95%</td>
<td>91%</td>
</tr>
<tr>
<td>PV+</td>
<td>87%</td>
<td>72%</td>
</tr>
<tr>
<td>PV-</td>
<td>90%</td>
<td>93%</td>
</tr>
</tbody>
</table>
N - STAGE
ACCURACY

- 64 correct
- 25 overstaged
- 11 understaged
# Local Excision

? Local Control

<table>
<thead>
<tr>
<th>Tumor Stage</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>follow</td>
</tr>
<tr>
<td>T2</td>
<td>RT/CT follow</td>
</tr>
</tbody>
</table>

- 177 patients enrolled
- 59 T1 follow
- 51 T2 RT/CT follow
- 16 ineligible
- 51 postoperative exclusions

48 mo follow-up

CALGB 8984

Steele 1999
LOCAL RECURRENCE
CALGB 8984

25

% 14
3 T1 T2
"However, because recurrences continue 48 months after primary tumor treatment, the effect or lack of effect of protocol-defined treatment adequacy is not secure."

Steele 1999
U of M EXPERIENCE 87-96

- 82 patients
  - 55 $T_1$ tumors
  - 27 $T_2$ tumors
- favorable histology
- follow-up 50 months
RECTAL CANCER SURGERY

1367 patients 1987-96

Mellgren 1998

radical surgery
local excision
<table>
<thead>
<tr>
<th>T1</th>
<th>Local Excision</th>
<th>Radical Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18%</td>
<td>0</td>
</tr>
<tr>
<td>T2</td>
<td>47%</td>
<td>6%</td>
</tr>
</tbody>
</table>
## LOCAL EXCISION
NO RADIATION

### LOCAL RECURRENCE

<table>
<thead>
<tr>
<th>Series</th>
<th>N</th>
<th>T1 tumors</th>
<th>T2 Tumors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Killingback 1992</td>
<td>31</td>
<td>0%</td>
<td>17%</td>
</tr>
<tr>
<td>Bleday 1997</td>
<td>21</td>
<td>10%</td>
<td>-</td>
</tr>
<tr>
<td>Taylor 1998</td>
<td>23</td>
<td>40%</td>
<td>50%</td>
</tr>
<tr>
<td>Steele 1999</td>
<td>60</td>
<td>3%</td>
<td>-</td>
</tr>
<tr>
<td>Varma 1999</td>
<td>32</td>
<td>5%</td>
<td>46%</td>
</tr>
</tbody>
</table>
# LOCAL EXCISION AND RADIATION

## LOCAL RECURRENCE

<table>
<thead>
<tr>
<th>Series</th>
<th>N</th>
<th>T2 tumors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ota 1992</td>
<td>31</td>
<td>7%</td>
</tr>
<tr>
<td>Minsky 1994</td>
<td>16</td>
<td>17%</td>
</tr>
<tr>
<td>Fortunato 1995</td>
<td>15</td>
<td>13%</td>
</tr>
<tr>
<td>Bleday 1997</td>
<td>21</td>
<td>0%</td>
</tr>
<tr>
<td>Taylor 1998</td>
<td>9</td>
<td>11%</td>
</tr>
<tr>
<td>Steele 1999</td>
<td>51</td>
<td>12%</td>
</tr>
</tbody>
</table>
OVERALL SURVIVAL T_1

![Graph showing overall survival rates for Local excision and Radical surgery over 14 years.](image)
OVERALL SURVIVAL $T_2$

The graph compares overall survival rates for Local excision and Radical surgery over various years. The survival rates are shown as percentages on the y-axis, ranging from 0% to 100%, and the years are marked on the x-axis from 0 to 14 years. The graph indicates a statistically significant difference between the two methods, with $p=0.03$. The Local excision method shows a steeper decline in survival rates compared to Radical surgery.
LOCAL EXCISION IS FIRST A COMPLETE EXCISIONAL BIOPSY
## LOCAL RECURRENCE

### collected series

<table>
<thead>
<tr>
<th></th>
<th>negative</th>
<th>positive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>no CRT</strong></td>
<td>4%</td>
<td>32%</td>
</tr>
<tr>
<td><strong>CRT</strong></td>
<td>13%</td>
<td>37%</td>
</tr>
</tbody>
</table>
SALVAGE SURGERY

• 29 patients with local recurrence following transanal excision
  – all patients with initial stage I lesions
  – time to second operation 26 (5-89) months
  – postoperative follow up 39 (2-147) months

Friel 2002
## SALVAGE SURGERY PATHOLOGIC STAGE

<table>
<thead>
<tr>
<th>stage</th>
<th>RT (n=12)</th>
<th>no RT (n=17)</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>I</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>II</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>III</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>IV</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

Friel 2002
SALVAGE SURGERY
RESULTS

- 29 patients
- 23 curative resections
  - 5 positive margins
  - 1 unresectable hepatic metastases

Friel 2002
### SALVAGE SURGERY STATUS

<table>
<thead>
<tr>
<th>Status</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>unresectable hepatic mets</td>
<td>1</td>
</tr>
<tr>
<td>additional recurrence</td>
<td>11</td>
</tr>
<tr>
<td>free of disease</td>
<td>17</td>
</tr>
<tr>
<td>(positive margin, NED)</td>
<td>3*</td>
</tr>
</tbody>
</table>

*follow-up 12 months

Friel 2002
SALVAGE SURGERY
AFTER LOCAL EXCISION

don’t count on it!
CONCLUSIONS

• ‘Optimal therapy’ of rectal cancer remains patient directed
• Surgical technique correlates with patient outcome
• Multi-modality therapy plays a major role outside of stage I disease
• Local excision alone may be appropriate for T1 tumors
Conclusions

- Laparoscopic or open—still need equivalent and excellent oncological outcomes
- Know your anatomy
  - Ensure proper oncologic resection
  - Lessen morbidity
- Conversion ≠ failure