Background to abdominoperineal excision. Techniques, outcomes and discussion

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Contents

• High circumferential margin involvement and perforation
• Anatomy
• Optimal anatomical planes of resection
• Grading the planes
• Types of operation
• Types of specimen
• Examination and dissection
APE - still a problem

- APE
  - Variable frequency 2%-50%
  - Higher local recurrence
    - Double AR
  - Poorer survival
    - 8-10%

Den Dulke et al 2009
CRM involvement, local recurrence and survival by operation APE’s and AR’s only Leeds 1986-1997 (n=536)

<table>
<thead>
<tr>
<th></th>
<th>APE’s (n=181)</th>
<th>AR’s (n=355)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRM positive</td>
<td>66 (36.5%)</td>
<td>79 (22.3%)</td>
<td>0.002</td>
</tr>
<tr>
<td>Local recurrence</td>
<td>43 (23.8%)</td>
<td>48 (13.5%)</td>
<td>0.002</td>
</tr>
<tr>
<td>Cancer specific 5 yr survival</td>
<td>52.3%</td>
<td>65.8%</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Annals of Surgery July 2005
### CRM involvement APE’s and AR’s

<table>
<thead>
<tr>
<th>Study</th>
<th>APE’s</th>
<th>AR’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leeds 1986-1997 All cases n=686</td>
<td>36.5%</td>
<td>22.3%</td>
</tr>
<tr>
<td>Mercury &lt;6 cm tumours n=282</td>
<td>33%</td>
<td>13%</td>
</tr>
<tr>
<td>Dutch TME trial Curative n=1586</td>
<td>29%</td>
<td>13%</td>
</tr>
<tr>
<td>Classic trial Curative n=400</td>
<td>21%</td>
<td>10%</td>
</tr>
<tr>
<td>Trent Pelican post education</td>
<td>21%</td>
<td>10%</td>
</tr>
<tr>
<td>CR07 n=1350</td>
<td>17%</td>
<td>8%</td>
</tr>
<tr>
<td>Norwegian audit</td>
<td>12%</td>
<td>5%</td>
</tr>
</tbody>
</table>
## Rate of perforation of APE’s 4-5X AR

<table>
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<tr>
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<tr>
<td>Dutch TME Trial  n=1586</td>
<td>13.7%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Norwegian audit  n=2136</td>
<td>16%</td>
<td>4%</td>
</tr>
<tr>
<td>Swedish audit n=4600</td>
<td>14%</td>
<td>3%</td>
</tr>
</tbody>
</table>

CR07 Local recurrence 9% vs 44% perforated  
HR (95%CI)=5.26 (2.62, 9.91) p<0.0001

CR07 Survival 73% vs 38% perforated  
HR (95%CI)=3.23 (2.03, 5.08) p<0.0001
APE

• Cause
  – CRM +ve 2-3x AR
  – Perforation x4 AR

• Issues
  – Awareness
  – Type and plane of surgery
  – Effectiveness of achieving the plane
Virtual human rectal anatomy

Figure 2: Key anatomical landmarks used in the novel rectal anatomical staging system

MRI's Gina Brown

LOREC | Low Rectal Cancer National Development Programme
Anatomy

From Netter

Thilo Wedel

LOREC
Low Rectal Cancer National Development Programme
Sphincter complex

coccyx
anococcygeal lig.
levator ani m.
puborectal m.
external anal sphincter
Sphincter complex

external anal sphincter
Sphincter complex

- rectum
- levator ani m.
- anal canal
- external anal sphincter
Advanced Course in Colorectal Surgery: **Rectal Cancer – Thilo Wedel**

**Denonvillier fascia**

- Urinary bladder
- Seminal vesicle
- Prostate
- Rectum

LOREC | Low Rectal Cancer National Development Programme
Pre intervention Leeds APE’s
Trent APE’s post Pelican TME pre APE intervention
Grading surgical planes

- Whole rectum 1987-2004 – CR07/Dutch trial
- 2005 grade mesorectum and sphincters separately
  - Mesorectum
  - Sphincters
- Inter-observer agreement grading Harm Ruttens series n=55
  - 69% Mesorectum
  - 71% Sphincters
  - 85% colon (Lancet oncology West et al)
  - PQ and NW – Kappa value moderate agreement
Grading the plane of resection

- Based on anatomical plane
- Initially whole rectum
  - 3 grades
    - Muscularis
    - Intramesorectal
    - Mesorectal

- Related to local recurrence and in some studies survival
- Strongest association - two grades muscularis propria vs other (incomplete vs complete)
Effect of the plane of surgery achieved on local recurrence in patients with operable rectal cancer: a prospective study using data from the MRC CR07 and NCIC-CTG CO16 randomised clinical trial

Lancet 2009; 373: 821-28

Low Rectal Cancer National Development Programme

LOREC

Dutch trial, Holland

Hull, England

Valencia, Spain

Coimbra, Portugal

N=1156

N=180

N=130

N=294

N=127

N=1156
Mesorectal assessment for: AR vs APE
Grading sphincters

- Identified problem low rectum
  - 3 grades
    - Intrasphincteric
      - Within the sphincters-submucosa-perforation
    - Sphincteric
      - On the sphincters
    - Extralevator
• Low rectal cancer \( \leq 5 \) cms from anal verge
• Margin positive LRC
  – 26.5% vs 12.6%
  – T2 11.4% CRM +
• APE vs AR CRM+ve
  – 30.4% vs 10.7%
• Perforations
  – APE 13.7% vs AR 2.5%
  – Survival 44.5% vs 68.5%
Types of resection and outcomes

- Intersphincteric
- Standard APE
- Extralevator
  - Prone
  - Supine
- Primary approach
  - Abdominal
  - Perineal
- Both
Extended Extra levator

Standard

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Outcomes

Karolinska, Stockholm
4% Perforation
7% CRM +ve
5% LR rate first 80 cases

St Antoine Paris - Tiret
Dehni et al Dis Colon Rectum 46 867-874 2003
10% Local recurrence
5% curative Local recurrence
76% 5 yr survival

Wroclaw, Poland
Bebenek et al Ann Surg Oncol 16 2211-2217 2009
4% Perforation
8% CRM +ve
4.4% Local recurrence
68% 5 year survival
Is the extralevator APE better?

176 extra levator cases
124 standard cases
Rates of CRM involvement (CRM+) in cases with residual invasive tumour and intraoperative perforations (IOP) for extra-levator and standard APE in all cases (A) and all cases given pre-operative therapy (B).
Amount of tissue removed
Prone vs supine EL study

- Frequency of CRM involvement was not influenced by patient position
- Exalevator perforation rate
  - prone jack-knife position 8/125 (6%)
  - supine or Lloyd-Davis positions 6/29 (21%)
  \[p=0.0268\]
Training programmes

- Trent – 5M
- Denmark - 5M
  - Jutland
  - Copenhagen
  - North
  - South
- Scotland- 5M
- England funded LoRec – 49M
Summary

• Standard APE
  – high CRM +ve
  – high perforation rate

• Extralevator surgery
  – Removes more tissue
  – Reduces CRM +ve
  – Reduce perforation
Thanks to:

• Nick West, Eva Morris, Iris Nagtegaal and Leeds Pathologists
• Torbjorn Holm, Harm Rutten, Paul Finan, Bill Heald, Brendan Moran, Emmanuel Tiret, Soren Laurberg,
• David Sebag Montefiore and CR07 trialists
• Thilo Wedel, Gina Brown, Mercury
• European extra levator APE group
• Yorkshire Cancer Research and MRC
Pathology dissection and grading
Pathology examination

- Careful photography of specimens can define the operation and its planes
- Front, back and cross sections with a scale
- Permanent record
- Discussed at MDT and compared to radiology
- Allows comparison
  - Techniques
  - Centre's
- Audit changes
Photography
## Grading the mesorectum

<table>
<thead>
<tr>
<th>Grade</th>
<th>Short description</th>
<th>Long description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesorectal plane</td>
<td>Good surgery</td>
<td>Intact smooth mesorectal surface with only minor irregularities (&lt;5mm). No distal coning and smooth CRM on slicing.</td>
</tr>
<tr>
<td>Intramesorectal plane</td>
<td>Moderate surgery</td>
<td>Moderate bulk to mesorectum but irregularity of the surface. Moderate distal coning. Muscularis propria not visible with the exception of levator insertion. Moderate irregularity of CRM.</td>
</tr>
<tr>
<td>Muscularis propria plane</td>
<td>Poor surgery</td>
<td>Little bulk to mesorectum with defects down onto the muscularis propria and/or very irregular CRM. Includes infraperitoneal perforations.</td>
</tr>
</tbody>
</table>
### Grading Sphincters

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</tr>
</thead>
<tbody>
<tr>
<td>Extra-levator plane</td>
<td>Good surgery</td>
<td>The specimen has a cylindrical shape due to the presence of levator muscle removed en bloc with the mesorectum and sphincters. Any defects must be no deeper than 5mm. No waisting of the specimen. Smooth CRM on slicing.</td>
</tr>
<tr>
<td>Sphincteric plane</td>
<td>Moderate surgery</td>
<td>The specimen is waisted and the CRM in this region is formed by the surface of the sphincter muscles which have been removed intact.</td>
</tr>
<tr>
<td>Intramuscular/submucosal plane/perforation</td>
<td>Poor surgery</td>
<td>The specimen is waisted and includes deviations into the sphincter muscles, submucosa and complete perforations.</td>
</tr>
</tbody>
</table>
Sphincter 1 Mesorectum 1
Sphincter 2 Mesorectum 2
Sphincter 3 Mesorectum 2
Sphincter 3 Mesorectum 3
P450 M PFA: Sp 3 Me 3
Sphincter 3 Mesorectum 3
Dissection

- Same as anterior resection
- Well fixed
- Ink margins
- Serial cross sectional slicing
- Lay out slices
- Close inspection