Approach to Cut Up – Large Intestine

Professor Ray McMahon
Manchester Royal Infirmary
University of Manchester
Tuesday 14 March 2017
RCOG, London

British Division of the
International Academy of
Pathology
www.bdiap.org
Approach to Cut Up - Large Intestine

Prof Geraint Williams
Wales College of Medicine
Cardiff University
8th BDIAP Seminar for Trainees in Histopathology
Approach to Cut-Up: Macroscopic examination as the precursor to accurate microscopic interpretation

Lower GI tract

Professor Neil A Shepherd
Gloucester & Cheltenham

Kings Fund, London
3 March 2015
What we will consider in the ‘lower GI’ tract

Resection specimens
Polyps and local resections

Inflammatory conditions
Other benign pathologies
Before you start

• Know your anatomy

  – the peritoneum and its reflections
  – the mesentery and omentum
  – the blood vessels
  – adjacent structures
    • bladder, prostate, seminal vesicles, uterus, ovaries
Figure 32.2 Fresh subtotal colectomy specimen for multiple colonic tumours: the mesentery has been removed intact and all three major vascular ties are seen.
Before you start

- know your anatomy
- learn surgeon-talk
  - operations
    - Hartmann’s procedure
    - anterior resection, abdominoperineal excision
    - right and left hemicolectomy
  - acronyms
    - EMR, TEMS, TART, TME
  - others
    - pouches, columnar cuffs
    - ostomies
    - curative vs palliative
Before you start

• know your anatomy
• learn surgeon-speak
• get to know the endoscopists, surgeons and their support staff
Before you start

• know your anatomy
• learn surgeon-speak
• get to know the endoscopists, surgeons, and their support staff
• receive the specimen fresh (if possible)
Before you start

• know your anatomy
• learn surgeon-speak
• get to know the endoscopists, surgeons, and their support staff
• receive the specimen fresh (if possible)
• find out as much as you can about the case
  – request form
  – MDT records - diagnosis, stage, family history
  – pathology laboratory computer
  – previous treatment that might affect the pathology
Before you start

- know your anatomy
- learn surgeon-speak
- get to know the endoscopists, surgeons, and their support staff
- receive the specimen fresh (if possible)
- find out as much as you can about the case
- don’t be coy about asking the surgeon to show you what he/she has done
Before you start

• know your anatomy
• learn surgeon-speak
• get to know the endoscopists, surgeons, and their support staff
• receive the specimen fresh (if possible)
• find out as much as you can about the case
• don’t be coy about asking the surgeon to show you what he/she has done
• ask yourself “what does the clinician need to know?”
Before you start

• know your anatomy
• learn surgeon-speak
• get to know the endoscopists, surgeons, and their support staff
• receive the specimen fresh (if possible)
• find out as much as you can about the case
• don’t be coy about asking the surgeon to show you what he/she has done
• ask yourself “what does the clinician need to know?”
• expect to report the histology yourself
The specimen

- wash out luminal contents carefully
- think about taking fresh tissue
  - microbiology (esp TB), EM, cytogenetics, biobanking
- consider inflating with formalin & immersing in fixative
  - diverticular disease
  - Crohn’s disease
  - stricturing pathology
  - some tumours
Colorectal cancer – fix open or closed?

Treat every specimen on its merits
Tumours
Decide whether to open the whole specimen along its length or to leave the tumour intact with a ‘wick’ of foam sponge or absorptive paper
– opening may be better in smaller, non-circumferential tumours and after neo-adjuvant therapy
– do so along the normal-appearing anti-mesenteric border
– try to avoid the tumour
Tumours

• the circumferential surgical margin is all important, especially in rectal cancer
• longitudinal margins less important – if > 3cms, don’t submit
• don’t submit donuts unless < 3cms
• ‘paint’ the non-peritonealised ‘circumferential’ margin, NOT the serosal surface
The problem with paint......
To paint or not to paint?

Only surgical resection margins should be painted

The intelligent, thoughtful and restricted use of paint on such surgical specimens is recommended

*Ludeman and Shepherd 2005*
Good old coloured gelatin....
The relationship of the peritoneum to the rectum
Macroscopic assessment of peritoneal involvement in colorectal cancer

- where does it occur?
  unusual on flat surfaces: much more likely in fat-lined crevices

- how to assess it?
  at least two blocks of most likely areas
  may need levels
Peritoneal involvement in colorectal cancer

where does it occur?
• in the crevices…
RCPath datasets & guidelines

- first dataset (P Quirke, GT Williams), 1998
- second revision (GT Williams, P Quirke, NA Shepherd), 2007
- third revision (MB Loughrey, P Quirke, NA Shepherd), 2014
- wide consultation with ACPGBI, NCRI, BSG, BDIAP, NHS Bowel Cancer Screening Pathology Group & the membership of the College
- a long gestation!
It is therefore recommended that pathologists audit their reports at regular intervals (perhaps yearly) to ensure that their overall results are not significantly different from what might expected. Three standards are recommended for this purpose, namely that in a series of at least 50 resection specimens:

a) the median number of lymph nodes examined is 12
b) the frequency of serosal involvement is at least 20% for colonic cancers and 10% for rectal cancers
c) the frequency of extramural vascular invasion is at least 25%

We believe there is a reasonable evidence base to suggest that the mean harvest of lymph nodes should be at least 12 but accept that there is less evidence base for the two other outcome measures. Nevertheless, we believe that this is a start at setting such standards and evidence will follow to allow us to adjust these levels in the future.
• The median number of lymph nodes examined should be greater than 12.
• The frequency of serosal involvement should be at least 20% for colonic cancers and 10% for rectal cancers.
• The frequency of venous invasion, including intramural (submucosal and intramuscular) and extramural, should be at least 30%.

These are minimum standards with many good centres in the UK finding 18 lymph nodes as a median count, 30–40% serosal involvement and venous invasion in over 40% of cases.
Gloucestershire BCSP QA visit, October 2013:
Colorectal cancer quality standards

<table>
<thead>
<tr>
<th>Parameter</th>
<th>median lymph node harvest</th>
<th>PI colon</th>
<th>PI rectum</th>
<th>EMVS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality standard</td>
<td>12 or more</td>
<td>&gt; 20%</td>
<td>&gt; 10%</td>
<td>&gt; 25%</td>
</tr>
<tr>
<td>Pathologist A</td>
<td>25</td>
<td>36%</td>
<td>14%</td>
<td>51%</td>
</tr>
<tr>
<td>Pathologist B</td>
<td>19</td>
<td>49%</td>
<td>8.3%</td>
<td>42%</td>
</tr>
<tr>
<td>Pathologist C</td>
<td>19</td>
<td>33%</td>
<td>27%</td>
<td>48%</td>
</tr>
</tbody>
</table>
LYMPH NODE HARVESTS
• The median number of lymph nodes examined should be greater than 12.
• The frequency of serosal involvement should be at least 20% for colonic cancers and 10% for rectal cancers.
• The frequency of venous invasion, including intramural (submucosal and intramuscular) and extramural, should be at least 30%.

These are minimum standards with many good centres in the UK finding 18 lymph nodes as a median count, 30–40% serosal involvement and venous invasion in over 40% of cases.
The influence of the number of lymph nodes on the proportion of involved nodes in rectal cancer

Hermanek et al, 1993
Influence of number of nodes on pN status: South & West colorectal cancer LN audit

Weekes & Shepherd, 2007
Influence of neo-adjuvant therapy on rectal LN harvest

Weekes & Shepherd, 2007
What can we do to improve?

- time and motivation of pathologists and/or dissecting BMSs
- methods to improve identification of nodes:
  - fat clearance
  - tattooing
  - intra-arterial injection
Postoperative intra-arterial methylene blue injection of colorectal cancer specimens increases the number of lymph nodes recovered

Tornroos et al, 2011
What can we do to improve?

• time and motivation of pathologists and/or dissecting BMSs
• methods to improve identification of nodes:
  fat clearance
  tattooing
  intra-arterial injection
• if your rates are low........
Lymph node harvests in colorectal cancer

- lymph node involvement (hence numbers) is the most important determinant of the decision to institute adjuvant therapy
- lymph node numbers themselves are prognostically informative
- be suspicious when you see the word ‘sample’
- UK pathologists are now all being assessed using this simple and readily auditable parameter
Pathologists assessing the quality of rectal surgery

Muscular plane
(1 or poor)

Poor bulk to mesorectum with defects down to muscularis propria and/or very irregular CRM

Intramesorectal plane
(2 or moderate)

Moderate bulk to mesorectum but irregularity of mesorectal surface. Moderate coning of the specimen toward distal margin. At no site is MP visible except at the levator insertion. Moderate irregularity of CRM

Mesorectal plane
(3 or good)

Intact mesorectum with only minor irregularities of the smooth mesorectal surface. No defect deeper than 5mm. No coning at distal margin. Smooth CRM on sectioning.
Figure 32.3 Grading the plane of surgery for the mesorectum: note the intact mesorectal envelope lined by shiny mesorectal fascia in the mesorectal plane (a); significant defects should be graded as intra-mesorectal (b) or muscularis propria (c) if they extend down to the muscle layer.

**MRC CRO7: Sebag-Montefiore et al, 2008**

<table>
<thead>
<tr>
<th>plane by pathology</th>
<th>pre-operative DXR</th>
<th>selected post-operative DXR based on CRM positivity</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>muscular plane (1 or poor)</td>
<td>9.0%</td>
<td>18.7%</td>
<td>14.0%</td>
</tr>
<tr>
<td>intramesorectal plane (2 or moderate)</td>
<td>4.5%</td>
<td>11.0%</td>
<td>7.8%</td>
</tr>
<tr>
<td>mesorectal plane (3 or good)</td>
<td>1.3%</td>
<td>6.1%</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

figures are 3 year local recurrence rates
APR specimens
Figure 32.4 Grading the plane of surgery around the anal sphincters in abdomino-perineal excisions of the rectum and anus. (a) Note the adherent levator muscle in the levator excision that prevents the waist seen (b) when following the sphincteric plane. (c) Any defects into the sphincter muscles, submucosa or lumen should be classed as an intersphincteric excision.

How many blocks?

- Tumour blocks (4-6) to allow assessment of
  - histological type and differentiation
  - extramural spread and its extent in mm
  - tumour closest to serosal surface (NB crevices)
  - tumour in relation to non-peritonealised CRM (especially anteriorly in the rectum)
  - extramural venous invasion
  - involvement of adjacent organs
A right hemicolecctomy specimen consisting of 47mm of terminal ileum, caecum with a 58mm appendix and 138mm of proximal colon. Although the ileo-caecal valve appears moderately prominent diffusely, suggesting lipo-hyperplasia, there is also a localised fatty nodule 11mm in diameter on the supero-posterior aspect of the valve, suggesting a lipoma. In the caecum is a polypoid tumour 34mm in axial length and 42mm in transverse diameter. There are no other polyps or tumours. [The Shepherd approach] NOT 200mm of bowel............

BUT personal preference is absolutely fine
Block-taking

- standardised block-taking can abrogate the need for block keys (eg appendix, gall bladder, standard cancer resections)
- it should always be possible to identify where a particular block has been taken from (and hopefully why)
- a pathologist reviewing a case should be able to find his/her way around
- also helpful when molecular testing is required (K-Ras, MMR etc)
Introduction of BMS (technician) cut-up

• the vast majority of UK consultant histopathologists support biomedical scientist (BMS) cut-up to some degree
• utilisation of BMS cut-up is rather limited and patchy at present. Reasons cited are cost, staffing levels and concerns related to quality, boundaries of staff roles and the effect on training
• further measures taken by the Institute for Biomedical Sciences to extend training and examination of BMS cut-up to include more complex specimens will help provide assurance on quality and standards
Audit of enhanced BMS cut-up role in colorectal cancer reporting

DSA Sanders, AP Smith, RA Carr, SE Roberts, S Gurusamy, EJV Simmons
After the cut-up is done, what evidence is there of its efficacy?

- Quality of macroscopic description
  - digital dictation
  - standard dictation
  - scribe and dictate at the time of final report

- Quality is all important
  - don’t show anatomical and surgical ignorance
  - standardise descriptions
  - may abrogate the need for tedious block keys:

  **Gall bladder:** A = fundus and cystic duct margin; B = cross section of body

  **Appendix:** A = LS of tip and XS of base margin; B = cross sections of ‘body’

- Photography
  - standard for many cancers, TEMS
  - useful for certain diseases, eg CIBD
H J R ‘Dick’ Bussey, St Mark’s Hospital, London, 1936
What we will consider in the ‘lower GI’ tract

- Resection specimens
- Polyps and local resections
- Inflammatory conditions
- Other benign pathologies
Local excisions

- polypectomy
- endoscopic mucosal resections
- transanal endoscopic microsurgical excision of rectal tumours (TEMS)
Local excisions

• orientation is vital

• embed the whole of the lesion to allow assessment of margins

• work with endoscopic & surgical colleagues and their staff to obtain properly presented specimens
Polyp measurement in BCSP
Terminal digit preference

Frequencies of Polyp Size recorded (mm) from Bowel Screening
TART.....
TEMS
A rectal TEMS
A rectal TEMS: economy of blocks (and work for BMSs and you!)
What we will consider in the ‘lower GI’ tract

Resection specimens
Polyps and local resections

Inflammatory conditions
Other benign pathologies
Inflammatory bowel disease

Macroscopic pathology is just as important as microscopic pathology to differentiate UC, CD and indeterminate colitis.

<table>
<thead>
<tr>
<th>Table 35.1 Macroscopic differences in the pathology of ulcerative colitis and Crohn’s disease in the large intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ulcerative colitis</strong></td>
</tr>
<tr>
<td>Disease in continuity</td>
</tr>
<tr>
<td>Rectum almost always involved</td>
</tr>
<tr>
<td>Terminal ileum involved in 10%</td>
</tr>
<tr>
<td>Granular and ulcerated mucosa (no fissuring)</td>
</tr>
<tr>
<td>Often intensely vascular</td>
</tr>
<tr>
<td>Normal serosa (except in acute fulminating colitis)</td>
</tr>
<tr>
<td>Muscular shortening of colon; fibrous strictures very rare</td>
</tr>
<tr>
<td>Never internal spontaneous fistulae</td>
</tr>
<tr>
<td>Inflammatory polyposis common and extensive</td>
</tr>
<tr>
<td>Dysplasia and malignant change well recognised</td>
</tr>
<tr>
<td>Anal lesions in less than 25%; acute fissures, excoriation and oedematous anal tags less common</td>
</tr>
<tr>
<td><strong>Crohn’s disease</strong></td>
</tr>
<tr>
<td>Disease usually discontinuous</td>
</tr>
<tr>
<td>Rectum normal in 50%</td>
</tr>
<tr>
<td>Terminal ileum involved in 30%</td>
</tr>
<tr>
<td>Discretely ulcerated mucosa; cobblestone appearance; fissuring</td>
</tr>
<tr>
<td>Vascularity seldom intense</td>
</tr>
<tr>
<td>Serositis common</td>
</tr>
<tr>
<td>Shortening due to fibrosis; fibrous strictures common</td>
</tr>
<tr>
<td>Enterocutaneous or intestinal fistulae in 10%</td>
</tr>
<tr>
<td>Inflammatory polyposis less prominent and less extensive</td>
</tr>
<tr>
<td>Malignant change possibly less common</td>
</tr>
<tr>
<td>Anal lesions in 75%; anal fistulae (often multiple); anal ulceration</td>
</tr>
</tbody>
</table>
Fat-wrapping in Crohn’s disease
Ulcerative colitis

- ‘Ulcerative colitis goes up to where it stops’

*The late Professor Bryan Warren*

- the caecal patch lesion of UC
Indeterminate colitis

- diagnosis made only in resection specimens
- 10-20% of colectomies, especially ‘fulminant’ colitis
- some features of UC and Crohn’s
- generally behave as UC
- cautious positive approach to pouch surgery
What we will consider in the 'lower GI' tract

- Resection specimens
- Polyps and local resections
- Inflammatory conditions
- Other benign pathologies
Intestinal resections for ischaemia

• It is important to confirm ischaemic change but also determine the cause of the ischaemia:
  – mechanical
  – arterial
  – venous
  – vasculitis
  – obscure vascular pathologies

• assessment of margins, the interface of ‘normal’ & ischaemic macroscopically and frank infarcted segments

• AND the mesentery – multiple transverse blocks, including surgical tie-offs
Take home messages

• appropriate receipt, preparation, photography and macroscopic dissection of specimens are critical for accurate intestinal pathological practice
• the quality of pathology is all important in colorectal cancer management
• the macroscopic assessment of CRC is just as important as the microscopic analysis
• pathologists are being assessed by standards in CRC reporting, two of which are strongly influenced by the macroscopic assessment
• the differential diagnosis of inflammatory bowel disease is critically dependent on the macroscopic pathological features
• please take post-operative specimens and ischaemic bowel resections seriously
More take home messages

• clean, tidy, ‘standardised’ assessment
• good macroscopic description showing anatomical and surgical knowledge
• economy of blocks
• accurate measurement in millimetres with no terminal digit preference
• sensible use of gelatin rather than paint may be possible
• photography is cheap and easy
• BMS cut-up increasing when appropriate and suitably trained
• microscopy cannot undo a poorly performed and executed macroscopic assessment, dissection and description
Datasets and guidelines

Colorectal cancer, v3
July 2014

at:
www.rcpath.org
Acknowledgements

Neil Shepherd
Maurice Loughrey
Phil Quirke
Bryan Warren
Geraint Williams

Royal College of Pathologists
Thank you for listening!

Any questions?