Handling of Lower GI Specimens

Prof Ray McMahon
Histopathology Department
Manchester Royal Infirmary
Bryan Warren School
Sarajevo
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Approach to Cut Up – Large Intestine

Professor Ray McMahon
Manchester Royal Infirmary
University of Manchester
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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
The accurate macroscopic assessment of intestinal pathology: it’s all about attitude......
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-speak
  – operations
    • Hartmann’s procedure
    • anterior resection, abdominoperineal excision
    • right and left hemicolecction
  – acronyms
    • EMR, TEMS, TART, TME
  – others
    • pouches, columnar cuffs
    • ostomies
    • curative vs palliative
Before you start

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• get to know the endoscopists, surgeons and their support staff
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• receive the specimen fresh (if possible)
Before you start

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- 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

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• 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!
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• ask yourself “what does the clinician need to know?”
Before you start

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• 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?

“There remains considerable contention about the practice of painting surgical specimens in the GI tract. Indeed we believe that there has been an unfortunate explosion in this practice such that barely a specimen can escape the dissection room without being covered in paints of various colours, often to the detriment of accurate macroscopic pathological assessment. No more so is this apparent, in our view, than in GI cancer specimens.

“We firmly believe that only surgical resection margins should be painted.

“We advocate the intelligent, thoughtful (and restricted) use of paint on such surgical specimens.”

Ludeman & Shepherd, 2005
Good old coloured gelatin....
COLORECTAL CANCER AND THE PERITONEAL SURFACE
The relationship of the peritoneum to the rectum
A. Retroperitoneal (posterior) surface

B. "Bare" area

C. Peritoneal reflection

Serosal surface

Sigmoid mesentery
Macrosopic 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><strong>Quality standard</strong></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
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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
(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.
**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 waisting 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
Standardise descriptions and block-taking

A right hemicolecction 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.

NOT 200mm of bowel............

- standardised block-taking can abrogate the need for block keys (eg appendix, gall bladder, standard cancer resections)
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 and boundaries of staff roles, effect on medical trainees

• further measures taken by the Institute for Biomedical Sciences and RCPPath 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, SG 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, trials e.g Foxtrot
  - 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
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 (not biopsies)
- 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
Case study

• 42F. Right oophorectomy for endometriotic cystic mass. Difficult surgery with adhesions

• ’well’ post-op but complained of abdominal pain with vomiting on day 3

• clinical diagnosis of bowel injury/bowel obstruction. Conservative treatment

• day 4 – severe abdominal pain, pyrexia, abdominal distension and vomiting. Mild diffuse abdominal tenderness with rebound and reduced bowel sounds.

• day 5 - guarding in the left iliac fossa with diffuse abdominal pain.

• day 5: laparotomy - sero-sanguinuous fluid in the pelvis, no contamination of the abdominal cavity with faeces or with small bowel content. No adherent bowel. Small and large bowel intact.
Case study

Abdominal X-ray at day 3
Case study

• day 6: more unwell with deteriorating respiratory function. Admitted to ICU, intubated and ventilated. Signs of systemic sepsis

• abdominal US: colon fluid-filled & dilated (caecum 8.5cms in diameter)

• day 11: - free subdiaphragmatic air. Laparotomy: free gas with faecal contamination through a perforation of the ascending colon

• right hemicolecctomy
Coloproctological surgical & gynaecological experts for plaintiff

- unequivocal bowel injury during initial gynaecological surgery
- negligent failure to detect bowel injury and its effects and to treat early
- major and long term problems for plaintiff because of these failures
Macroscopic pathology

- marked dilatation of colon (TC 110mm & AC 130mm)
- three longitudinal ulcer tracks in TC along taeniae
- extensive dark granular area in AC and caecum with discontinuous ulcers, mainly on lateral aspects
- ulcers in the caecum and on ICV
- perforated ulcers in caecum and AC (lateral wall)
Case study

Ischaemic changes extending away from sites of perforations with attenuated bowel wall throughout proximal colon: not suggestive of direct bowel injury
Ogilvie’s syndrome

• classically in pregnancy or after Caesarean section
• malignancy especially multiple myeloma, small cell carcinoma, lymphoma and leukaemia
• after abdominal operations including simpler operations like hernias
• after orthopaedic operations, especially on the hip
• drugs
• treatment – neostigmine but surgery required if perforation is likely (depends on caecal diameter). Decompression caecostomy is another surgical option.
• colonic pseudo-obstruction with dilatation, ‘obstructive colitis’, caecal and AC ischaemic change, ulceration and perforation
Case study: learning points

• this case demanded accurate correlation of macroscopic and microscopic pathological findings with clinical data, radiology and findings at the time of the second surgery

• it showed the classical pathological features of Ogilvie’s syndrome/pseudo-obstruction with classical pathology

• this is not so very uncommon

• plaintiff’s QC and solicitors dropped case after ‘expert’ pathological review
Post-operative resections

• it’s easy to jump to the wrong conclusions in post-operative cases
• poor pathological assessment may corroborate those wrong conclusions
• post-surgical/ischaemic pathology may seem tedious and uninteresting but it may be of supreme interest to Trust lawyers, Finance Directors, Queen’s Counsels and judges
• give it the macroscopic, microscopic and clinical correlative attention it deserves
Intestinal resections for ischaemia

• for the same reasons, please take these seriously
• our job is 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 and two of these 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. They will return to bite you later if poorly done…………
More take home messages

- clean, tidy, standardised assessment
- good macroscopic description showing anatomical and surgical knowledge
- economy of blocks: blocks mean money.....
- accurate measurement in millimetres with no terminal digit preference
- sensible use of gelatin rather than paint
- photography is cheap and easy
- BMS cut-up where appropriate and when appropriately trained
- no amount of sophisticated microscopy can undo a poorly performed and executed macroscopic assessment, dissection and description
- smile and sing!!
Further reading

Datasets and guidelines

Colorectal cancer, v3
July 2014

at:

www.rcpath.org
Acknowledgements

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THANK YOU FOR YOUR ATTENTION
ANY QUESTIONS?