Management of bowel cancer & screening for bowel cancer

Ian Botterill
Lead Clinician Colorectal Surgery, LTHT
What is bowel cancer?

• Malignant growth arising from the innermost lining of the large bowel

• Arises from polyps (typically ‘adenomas’)

• Takes 6-10 years to develop (from normal bowel)

• Preventable

• Curable

• Increasing
How common is colorectal cancer?

- 1 million cases worldwide p.a.
- ~38,000 cases in UK p.a.
- ~1:30 of UK population will develop colorectal cancer
- 4th most common cancer worldwide
- 3rd most common cause of cancer related death
Odds of developing colorectal cancer

Colon Cancer: GLOBAL KILLER
144,000 Americans will be diagnosed with colon cancer this year

6 of 10 colorectal cancer deaths could be prevented, if all men and women age 50 and older were screened routinely

Removal of precancerous polyps reduces your chance of getting colon cancer by 70 percent.

Cleveland Clinic
Bowel cancer sufferers
Late presentation of bowel cancer
Symptoms of Colorectal cancer

- Bleeding
- Loose stool
- Cramps / incomplete defaecation
- Anaemia
- Abdominal or ano-rectal pain
Distribution of bowel cancer in the large bowel
Bowel cancer survival

**Graph:**
- Survival Distribution Function vs. Months
- Curves for different stages: I, IIa, IIb, IIIa, IIIb, IIIc, IV

**Table:**
<table>
<thead>
<tr>
<th>Stage</th>
<th>0 mo</th>
<th>30 mo</th>
<th>60 mo</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Survival, %</td>
<td>No.</td>
<td>Survival, %</td>
</tr>
<tr>
<td>I</td>
<td>100</td>
<td>14500</td>
<td>96.1</td>
</tr>
<tr>
<td>IIa</td>
<td>100</td>
<td>28535</td>
<td>91.0</td>
</tr>
<tr>
<td>IIb</td>
<td>100</td>
<td>5826</td>
<td>80.2</td>
</tr>
<tr>
<td>IIIa</td>
<td>100</td>
<td>1989</td>
<td>91.4</td>
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<tr>
<td>IIIb</td>
<td>100</td>
<td>15946</td>
<td>77.3</td>
</tr>
<tr>
<td>IIIc</td>
<td>100</td>
<td>8600</td>
<td>59.1</td>
</tr>
<tr>
<td>IV</td>
<td>100</td>
<td>20802</td>
<td>17.3</td>
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</tbody>
</table>
Curative treatment of bowel cancer

Diagnosis
Staging
Surgery
 +/- chemotherapy
 +/- radiotherapy

Follow up
Symptom awareness campaigns

Look out for the early signs of bowel cancer.

The longer you leave it, the bigger the problem.
Symptom awareness campaigns
Risk factors
-age & sex

- Age: 90% cases >50yrs old
  7x more common in 80-90s than in 50-60s
  ↑common in younger age groups

- Male >female (1.5:1)
Risk factors
- race

- 1\textsuperscript{st} world $>>$ 3\textsuperscript{rd} world

- Higher risk in Ashkenazi Jews

- Higher in Afro-Caribbean Americans
Risk factors - diet

- Red meat
- Dietary fat
- Fruit & vegetables
- Fibre

-all studies are conflicting and there are so many variables it is hard to be certain of any effect
Risk
- obesity/lifestyle/smoking

• Obesity: increases risk by ~x2
• Physical activity: reduces risk
• Smoking: increases risk
Risk factors
-drugs/alcohol

• Folic acid / folate
  – may be beneficial

• Heavy alcohol intake
  – likely to increase risk

• Aspirin
  -evidence it reduces adenoma formation
  -no evidence it reduces cancer formation
  -risks of aspirin: ulcers/bleeds
Risk
-inflammatoty bowel disease

- Risk of CRC:
  - 2% @10yrs
  - 8% @20yrs
  - 16-18% @30yrs
Risk

-family history

• Single 1\textsuperscript{st} degree relative > risk doubles
• Two 1\textsuperscript{st} degree relatives > risk quadruples
• 1\textsuperscript{st} degree relative (<45yrs old) > risk quadruples
• 1\textsuperscript{st} degree relative with adenomas > risk doubles
Family
-strong predisposition to CRC

• FAP: autosomal dominant gene>affects 50% of all family members.
  -cancer by ~30yrs

• HNPCC: autosomal dominant
  -CRC develops ~40-50yrs
  -CRC usually affects the more proximal colon
  -associated with uterine & ovarian ca

• Amsterdam criteria for HNPCC
  -3 family members, 2 generations, 1 first degree relative
Polyposis coli
Screening for CRC

- Population screening ie everyone
- Selected ‘high’ risk individual screening
How does bowel cancer develop?
- ‘polyp cancer sequence’
Progression / staging of bowel cancer
Polyp cancer sequence
Population screening - options

- Faecal occult blood testing (‘FOB’)
- Flexible sigmoidoscopy
- FOB & flexible sigmoidoscopy
- Colonoscopy
Population screening
- need to balance pros and cons

- Colonoscopy: best test, likely poor uptake, highest risk & expensive

- CTC colon: safe for most (misses small lesions) & any positive test mandates colonoscopy

- Flexi sig: only assesses left half of colon, quite expensive, if positive mandates colonoscopy

- FOB: cheap, false positives common, not terribly appealing to patients
FOB Bowel cancer screening
FOB

- Annual or biannual testing reduces mortality from CRC
- Poor compliance (38-60%)
  - Dietary compliance required
- Rehydration increases false positives
- Need to avoid aspirin, NSAIDs, red meat, beetroot, melon, turnips, salmon, sardines
- Positive FOB > colonoscopy
Bowel cancer screening (FOB)

- 58% uptake
- 2% FOB positive
- 1.6 cancers/1000 screened

- Positive test: 10% cancer
  38% adenoma
  52% other/nil

- Of cancers found: 48% earliest stage
  1% metastatic
Flexible sigmoidoscopy screening

- Relies on finding polyps in the lower colon
- Age performed ~55yrs, if positive > colonoscopy
- ~30% of positive flexi sigs yield a polyp / cancer in the proximal colon
- Bowel cancer mortality reduced by 43%
- 87 tests to find a cancer, 115 tests to save a life
- But initial study was 18yrs ago (pre awareness campaigns), current evidence suggests may not be cost effective
Tests for symptomatic bowel cancer

- Blood count
- Faecal occult blood
- Colonoscopy
- CT colonoscopy/colonography
- Flexible sigmoidoscopy
Colonoscopy

<table>
<thead>
<tr>
<th>Location</th>
<th>Price</th>
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<tr>
<td>Denver, CO Average</td>
<td>$3081</td>
</tr>
<tr>
<td>St. Louis, MO Average</td>
<td>$2450</td>
</tr>
<tr>
<td>National Average</td>
<td>$2400</td>
</tr>
<tr>
<td>CMC Spot Price</td>
<td>$950*</td>
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</table>

*CMC Spot Price - Individual day price may vary
colonoscopy

~£1000

Invasive

Allows biopsy & polyp removal

‘Best test’

Requires skilled practitioner
Malignant polyp
CT colonoscopy
Focussed screening - personal & family history

- Previous cancer / adenomatous polyps require surveillance
- 10yrs prior to the age of a 1st degree relative with CRC
- Other FHx combinations
How to treat early colorectal cancer

• Polypectomy ie @ colonoscopy

• Trans-anal endoscopic surgery
  - allows avoidance of rectal resection
  - preserves bowel control

• Prognostic features determine whether ‘local’ treatment is sufficient
Trans-anal endoscopic microsurgery
Trans-anal endoscopic microsurgery
Poor prognostic features in polyp cancers

- Cancer at polyp resection margin
- Poor differentiation
- Lymphatic invasion
- Blood vessel invasion
- Flat polyps
Standard care of most cases of bowel cancer

• Stage disease
  - CT for colorectal cancer
  - MRI for rectal cancer
  - +/- PET scan
  - +/- liver MRI scan

• Assess patient’s fitness for operation

• operate
Staging

- CT
  - predicts bowel wall stage \( \sim 70-80\% \)
  - predicts lymph node stage \( \sim 50-70\% \)
  - predicts metastatic disease \( \sim 80-90\% \)

- MRI
  - predicts bowel wall staging \( \sim 80-90\% \)
  - predicts lymph node stage \( \sim 70\% \)
  - predicts resection margin \( \sim 90-95\% \)
MRI of rectal cancer
Standard care for colon cancer

- Stage
- Resect
- Assess pathology of resected specimen
- Determine if chemotherapy required
Why is surgery for colorectal cancer so high risk?

- Average age ~70yrs
  - MI / PE / chest infection
  - Surgical complications: peritonitis / bleed
Colon v rectal cancer surgery

• Rectal cancer surgery is technically harder
  - males narrow pelvis
  - fixed bony pelvis

• Blood supply to the right & transverse colon is good

• Blood supply to the left colon in the elderly is less good > worse perfusion
to bowel that is anastomosed
Assessment of fitness for surgery
-CPEX testing
Surgery

- Remove bowel & associated lymph glands
- Rejoin where possible (to avoid a stoma)
- Major surgery

- Mortality of surgery for colorectal cancer
  - ~0.5% for a healthy 40 year old
  - ~10-20% for an average 80 year old
What are the aims of surgery?

• Remove all cancer (primary and lymph nodes)
• Re-join bowel
• Preserve good bowel function
• Minimal wounds ie laparoscopic
• Quick recovery / good recuperation
Laparoscopic surgery

• ‘keyhole’, developed in late 1990s

• Several early teething problems
  - bleeding
  - port site metastases
  - poor oncological specimens
  - long operations

• Technically more challenging than open surgery ie not for all surgeons

• Similar oncological outcomes to open surgery

• Smaller cuts > less pain/infections/hernias/LoS

• Now established (Leeds laparoscopic surgery rate ~65-70%)
Laparoscopic colorectal surgery
Laparoscopic surgery
Conventional surgery
Robotic rectal cancer surgery
Robotic surgery

- Early 2000s
- Evolving technology
- Advantages / disadvantages in relation to laparoscopic surgery
- Exact role in colorectal practice uncertain
- Substantial cost increase cf laparoscopic surgery
High dependency unit
Liver surgery

- Massive changes in attitudes to liver metastases
  - Leeds at the forefront of new approaches
- Surgery remains only curative option
- Liver regenerates post resection
- Increasing range of surgical / surgery and radiology + chemotherapy options
- ~40% of liver metastases are operable
- ~40% of patients with liver metastases are cured
Combined bowel resection & liver resection

- For patients with bowel cancer and liver spread at presentation

- More complex initial surgery but potentially avoids two separate stays and operations (ie can reduce cumulative morbidity and LoS)

- ~20 such cases per year in Leeds

- Estimated ~ 20% of what we might be able to do (referral patterns)
Liver metastases - operable
Pulmonary spread

- Typically slower to progress than liver disease
- Can be resected / ablated
- Lung does not regrow > less lung tissue can be sacrificed (compared to liver)
Lung resection for metastases

- Wedge Resection
- Segmental Resection
- Lobectomy
- Pneumonectomy
Radiotherapy

• Only used for rectal cancer
• Historically given post resection
  - problem: less effective & more toxic
• Now given pre-op (5/7 or 5/52) based on certain MRI indications
  - likely positive resection margin
  - evidence of lymphatic / vascular spread

• Reduces local recurrence & may improve survival

• Side effects:
  - fatigue
  - thrombo-embolic disease
  - sacral fractures & pain
  - can hinder pelvic anastomoses
Chemotherapy
Chemotherapy

- Dramatic increases in drug options
- Historically used post-op based on pathology or palliatively for metastases
- Now used pre-op to aid primary tumour shrinkage and operability (ongoing studies)
- Used in conjunction with radiotherapy for rectal cancer
- Used to aid operability of liver disease
Radiology

• Historically:
  - barium enema mainstay of diagnosis
  - staging with CXR & liver USS

• Now:
  - CT chest/abdo / pelvis for colon & rectal ca
  - MRI for rectal ca
  - MRI for liver metastases
  - PET/CT for assessment of uncertain lesions
5 year survival

• Stage I (confined to bowel wall): ~95%
• Stage II (through bowel wall): ~75%
• Stage III (lymph node spread): ~45%
• Stage IV (distant metastases): ~10-20%
Follow up after potentially curative surgery

- CEA blood tests
- CT at 1, 2, 3, 5 years (intensity set to be more stratified)
- Colonoscopy within 12/12 of resection then 3 years later
- Follow up for 5 years typically
Advanced (metastatic) bowel cancer

• Possibly curable still

• Options
  - palliative chemotherapy
  - palliative radiotherapy
  - symptom control
  - palliative surgery
  - stenting to prevent / treat obstruction
PET scan

PET Scan recurrent colon cancer

- lung
- heart
- liver
- blocked kidney
- recurrent colon cancer
- bladder
- kidney
Colonic stenting
Liver metastases - inoperable
National bowel cancer audit

- Unit/individual outcomes published

- Reports on:
  - death @90/7 post-elective operations
  - laparoscopic surgery rates
  - permanent stoma rates
  - completeness of work-up / preparation

- Doesn’t focus on primary care, emergency surgery, end of life care
Leeds & colorectal cancer

- Key research in:
  - family history / genetics of colorectal cancer
  - improving outcomes of rectal cancer surgery
  - improving quality of life after rectal cancer surgery
  - improving outcomes of liver resection of metastatic bowel cancer
  - improving quality of surgery for colon cancer
  - 1st Chair of the National Bowel Cancer Audit Programme
  - major centre for recurrent rectal cancer
  - lead centre for research into laparoscopic CRC
  - lead centre for research into robotic surgery for rectal cancer
How to improve survival from bowel cancer

• Prevent it developing
  - role of diet / obesity control / aspirin
• Early diagnosis
  - symptom awareness / screening
• Quality assurance of testing
• Quality assurance of surgeons (&MDTs)
• Follow up post surgery
• More aggressive liver surgery
• Improving chemotherapy / better tailored radiotherapy
Take home messages

• Don’t ignore symptoms
• Undergo screening
• Eat healthy
• Consider aspirin if at risk & no contraindications
• Surgeons vary
• Institutions vary
• Interpret surgeon outcome data with some caution