Introduction of Colorectal Cancer

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1.1 Introduction

Colorectal cancer, also called bowel cancer, is the third most common cancer in both males (14% of the male total) and females (11%) in the UK. In 2011, there were 41,581 new cases of bowel cancer in the UK. It is the second most common cause of cancer death in the UK, accounting for 10% of all deaths from cancer. The overall predicted 5-year survival rate is 59% for patients diagnosed with bowel cancer during

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2010–2011 in England and Wales. Worldwide, it is also the third most common cancer, with more than 1,360,000 new cases diagnosed in 2012 (10% of the total) [1].

Bowel cancer mortality rates have decreased overall in the UK and Europe since the 1970s, likely owing to the earlier detection and improved treatment. Over the last decade, European age-standardised mortality rates have decreased by 15% in males and 12% in females with colorectal cancer. Nonetheless, the burden of the disease and mortality is still high, and further improvement in diagnostic accuracy including tumour-node-metastasis (TNM) staging and tumour biology characterisation remains essential for a better selection of treatment approaches by an experienced multidisciplinary expert team. In addition to conventional morphological imaging modalities such as CT, ultrasound and MRI, ^{18}FDG-PET/CT plays instrumental roles in several areas critical for the optimal management of colorectal cancer.

1.2 Epidemiology

Highest incidence in North America, Australia, New Zealand and Western Europe

- Lowest incidence in Africa, Asia and South America
- Third most common malignancy in the Western world
- Second most common cause of cancer death in the Western world
- Male to female odds ratio for colon cancer 1.2:1
- Male to female odds ratio for rectal cancer 1.4:1
- Peak incidence age 60–70 years
- Lifetime risk 3–5%

Anatomic site

- Distribution: rectum 30% and colon 70%
- Distribution within the colon: caecum 16%, ascending colon 16%, hepatic flexure 7%, transverse colon 8%, splenic flexure 5%, descending colon 6% and sigmoid 42%
- Increasing incidence of right-sided cancers (less accessible for endoscopy, more flat lesions)
- Synchronous lesions: 4–5% [1, 2]

1.3 Causes/Risk Factors

- 95% sporadic, 5% familial/hereditary: familial adenomatous polyposis (FAP), Gardner syndrome, Peutz-Jeghers disease and hereditary nonpolyposis colorectal cancer (HNPCC)
- Alcohol and nicotine abuse
- Obesity
- 'Western' diet
- Age > 50 years

– Previous adenomas
– Previous colorectal malignancy
– Family history: 2–3 times increased risk if affected first-degree relative
– Inflammatory bowel disease (Crohn's disease, ulcerative colitis) [3, 4]

1.4 Clinical Presentation/Signs and Symptoms

About 30% of colorectal cancer is detected by screening of asymptomatic individuals. The majority of symptomatic patients presents with chronic symptoms. Emergent presentation occurs in about 16% of patients with colon cancer who present with mainly obstructive symptoms that warrant urgent surgery.

Most common chronic signs and symptoms are the following:

– Haematochezia or melena
– Abdominal pain
– Iron deficiency anaemia
– Change in bowel habit

Clinical manifestations correlate with the site of tumour location. Right-sided tumours rarely present as an obstructive emergency, as the right colon is relatively wide and faeces is still quite liquid in the proximal colon. Haematochezia is more common with distal tumours, while iron deficiency anaemia without haematochezia is more common with right-sided tumours. Abdominal pain is not typically associated with a specific tumour site within the colon or rectum. Abdominal pain might be a result of (partial) obstruction, ingrowth in surrounding organs or perforation with peritonitis. Rectal cancer can cause symptoms of tenesmus or rectal pain [3, 4].

1.5 Diagnosis

There are several modalities used in screening of colorectal cancer [5]:

– Faecal blood testing
– X-ray with barium enema
– Flexible sigmoidoscopy
– Colonoscopy
– CT colonography

Investigation for a (suspected) colorectal cancer should be appropriately measured to the patient's comorbidities and fitness. If a patient is too frail to undergo surgery or even (palliative) chemotherapy, the clinician should consider not to investigate any further at all [6]. Colonoscopy carries a risk of bleeding in 1.64/1000 and perforation in 0.85/1000, while CT has risks associated with the use of contrast agents and radiation [7, 8].

1.6 Faecal Occult Blood Testing (FOBT)

- Uses guaiac-based products or immunochemistry to test for microscopic blood in faeces
- Designed to be used at home
- Low sensitivity detection rate
- Low compliance rates of 60%
- Cost-effective

1.7 X-Ray with Barium Enema

- Low detection rate even for lesions >10 mm
- Impaired patient tolerance
- Grossly abandoned for screening for colorectal cancer, replaced by more accurate screening tools like colonoscopy and CT colonography

1.8 Flexible Sigmoidoscopy

- Covers the most common site of colorectal cancer (70% arise in the left colon)
- No sedation required
- No extensive bowel preparation needed
- Allows biopsies and polypectomies

1.9 Colonoscopy

- Visualises the complete colon up to the caecum
- Requires sedation in most cases
- Requires bowel preparation

Colonoscopy is regarded as the gold standard for diagnosing colorectal lesions. Colonoscopy visualises the complete colon and enables exclusion of polyps and other abnormalities. During colonoscopy, biopsies can be taken for histopathological confirmation of the diagnosis, and the lesion can be marked with tattoo, which enables identification of the site on a later stage during laparoscopic surgery. However, in certain cases colonoscopy might be incomplete. Patients might be intolerant to the procedure or might not be able to complete the mandatory bowel preparation or in case of obstruction colonoscopy might not be completed. In these cases CT colonography should be considered as an alternative [8, 9].

1.10 CT Colonography

CT colonography has a high sensitivity of 96%, equivalent to colonoscopy for lesions ≥10 mm. The disadvantage of this purely imaging tool is that it lacks the opportunity of taking biopsies or performing polypectomies. In up to 30% of cases, CT colonography will detect a lesion that demands a subsequent colonoscopy [10–14].

Table 1.1 Prognostic features of colorectal carcinoma

Good prognosis	Poor prognosis
T1 T2 T3a–b	T3c-d, T4
N0	N1–2
M0	M1
EMVI negative	EMVI positive
CRM negative	CRM involved

CT colonoscopy lacks accuracy in identifying lesions smaller than 5 mm. Therefore, CT colonography is less suitable for those patients with a high risk for carcinoma or adenoma as it might miss small lesions. However, CT colonography would be the preferred screening tool in elderly or frail patients who would not be able to undergo the consequences of complications of a colonoscopy such as perforation or bleeding that would need reintervention or surgery [10–14].

1.11 Staging Procedures/Investigations

Staging aims to stratify colorectal cancers into good and poor prognosis tumours. Poor prognosis tumours carry a high risk of local recurrence and distant metastases and might benefit from (neo)adjuvant treatment and more extensive surgery. Preoperative staging involves defining prognostic features of the tumour itself as well as detection of (distant) metastases (Table 1.1).

The approach of colon and rectal carcinoma involves different imaging modalities.

1.12 Staging of Colon Carcinoma

CT is recommended for staging of colon tumours. CT is used to identify patients with poor prognosis tumours based on T3 substage. These patients may benefit from neoadjuvant treatment, although up to date this is still only used in clinical trials. In regard to detection of distant metastases, CT has a high accuracy of 95%. In contrast to this, CT is not capable of identifying nodal disease. Nodal size measurements on CT have shown to be unreliable as a predictor for malignancy [7, 15, 16].

Key Points

- Colorectal cancer is the third most common cancer with more than 1,360,000 new cases diagnosed in 2012.
- The highest incidence is in North America, Australia, New Zealand and Western Europe.
- The lowest incidence is in Africa, Asia and South America.
- Anatomic site distribution: rectum 30%, colon 70%.

- Distribution within the colon: caecum 16%, ascending colon 16%, hepatic flexure 7%, transverse colon 8%, splenic flexure 5%, descending colon 6% and sigmoid 42%.
- About 30% of colorectal cancer is detected by screening of asymptomatic individuals.
- Most common chronic signs and symptoms include haematochezia or melena, abdominal pain, iron deficiency anaemia and change in bowel habit.
- There are several modalities used in screening of colorectal cancer: faecal blood testing, X-ray with barium enema, flexible sigmoidoscopy, colonoscopy and CT colonography.
- Investigation for a (suspected) colorectal cancer should be appropriately measured to the patient's comorbidities and fitness.
- Colonoscopy is regarded as the gold standard for diagnosing colorectal lesions. Colonoscopy visualises the complete colon and enables exclusion of polyps and other abnormalities.
- CT colonography has a high sensitivity of 96%, equivalent to colonoscopy for lesions $\geq$10 mm.
- CT colonoscopy lacks accuracy in identifying lesions smaller than 5 mm. Therefore, CT colonography is less suitable for those patients with a high risk for carcinoma or adenoma as it might miss small lesions.
- CT is recommended for staging of colon tumours. CT is used to identify patients with poor prognosis tumours based on T3 substage.

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