Colorectal cancer is the third most common cancer worldwide (World Cancer Research Fund, 2007); in the UK nearly 40,000 new cases are diagnosed each year, equating to more than 100 people being diagnosed each day (Cancer Research UK, 2011). This article reviews the prevalence and aetiology of the disease and its diagnosis, treatment and management. Care is overseen by a multidisciplinary team, which has the colorectal surgeon, pathologist, radiologist, oncologist and specialist nurse as core members.

**Prevalence and incidence**

Prevalence of colorectal cancer is higher in men than women, with an 1.1:1 ratio, and varies according to site as follows:

- Rectum: 35%.
- Sigmoid: 20%.
- Ascending colon: 20-25%.
- Transverse colon: 5-10%.

- Descending colon: 5% (CRCUK, 2011).

Adenocarcinoma is the most common type of bowel cancer and is the focus of this article; leiomyosarcoma, lymphoma, melanoma and neuroendocrine tumours are more rare.

Primarily a disease occurring in developed countries with a western culture, the incidence of colorectal cancer may be stabilising in some parts of the world. However, in others, such as Japan, it is rapidly increasing (Haggar and Boushey, 2009) – this is likely to be associated with the “westernisation” of the Japanese diet, which saw a tenfold increase in the consumption of meat and dairy products between the 1950s and 1990s (Marchand, 1999).

**Aetiology**

A high intake of meat and dietary fat can increase the risk of colorectal cancer. Other modifiable risk factors include smoking, high alcohol consumption, lack of physical activity and a high body mass index. Increasing evidence shows that lifestyle changes such as quitting smoking and losing excess weight can reduce the risk of developing the disease (WCRF, 2007).

Some risk factors for colorectal cancer, however, cannot be modified; these include age and hereditary factors. Colorectal cancer is strongly linked to advancing age – 86% of cases arise in people aged 60 years or more (CRCUK, 2011). Three-quarters of cancers occur by chance so, although its high prevalence means many people will have a family member who is affected, only 5-10% of cases are a result of recognised hereditary conditions.

Examples of germline mutations include hereditary non-polyposis colorectal cancer (HNPCC), which accounts for 5% of all colorectal cancer, also called colon cancer or large bowel cancer, includes cancerous growths in the colon, rectum and appendix.
colorectal cancers, and familial adenomatous polyposis (FAP), which accounts for 1% (Burgess, 2005). Individuals diagnosed with a previous colorectal cancer or with longstanding ulcerative colitis are also at increased risk of developing the disease and need endoscopic surveillance (Triantafillidis et al, 2009).

**Genetic risk factors**

A multistep pathway of genetic events is involved in the development of most colorectal cancers. The classic polyp-cancer sequence (Vogelstein et al, 1988) details how alterations in a number of identified genes, such as the APC and p53, cause a small polyp in the bowel to progress over many years into a cancer. It is the accumulation of several gene errors that appears critical in this process.

More recently, a second molecular pathway has been identified called the microsatellite instability pathway, in which only a short segment of the chromosome becomes unstable and resulting deficiencies in the DNA cause an accumulation of changes in the cells of the mucosal lining of the bowel. This pathway accounts for 15% of colorectal cancers, is associated with HNPPC and can be recognised by right-sided colon cancers that are poorly differentiated or mucinous (Bellizzi and Frankel, 2009).

In most cases of FAP, the responsible gene mutation (or fault) is identified to be the APC tumour suppressor gene. This genetic condition leads to the development of more than 100 adenomatous polyps in the colon which, if left untreated, will develop into colorectal cancer (Lal and Gallinger, 2000). If a patient’s family history of colorectal cancer appears significant, advice should be sought from a genetic counsellor, who can take a family history to establish individual risk. Significant criteria are:

- Early onset of colorectal cancer (under 50 years) in a first-degree relative;
- Three or more relatives diagnosed with an associated cancer (colorectal cancer, or cancer of the endometrium, small intestine, ureter or renal pelvis); and
- A diagnosis of colorectal cancer in two or more successive generations.

Genetic testing may be undertaken using a blood sample from an affected family member to identify whether they carry known mutated genes such as MLH1, MSH2 or MSH6.

**Early detection and diagnosis**

As most cases of colorectal cancer develop slowly from adenomas or benign polyps, there is a good chance of detecting and treating them before they become malignant. Polyps are known to bleed so the National Bowel Screening Programme involves a faecal occult blood test designed to screen for blood in the bowel motions. A positive result does not diagnose cancer but will determine whether a colonoscopy is required. Screening is offered every two years to all men and women aged 60-75 years; those aged over 75 can request a testing kit.

The overwhelming majority of patients with symptoms associated with colorectal cancer present initially to their GP. Those with highly suspicious and persistent symptoms can be referred to a hospital specialist urgently under the two-week wait referral system.

Two symptoms shown to have a high predictive value for cancer when they present together are rectal bleeding and change in bowel habit – towards increased looseness or increased stool frequency – particularly if they persist over six weeks (Hamilton and Sharp, 2004). However, the two-week referral system has a poor cancer detection rate (under 10%) as the symptoms suggestive of colorectal cancer are diverse (Table 1) and few are unique; for example, rectal bleeding may be caused by haemorrhoids (Rai and Kelly, 2007).

Establishing a diagnosis involves taking a full medical history and conducting a physical examination including anorectal assessment, which may include a sigmoidoscopy (if the suspected position of the cancer is within 60cm of the anus so it can be visualised) and blood tests. Further examination of the bowel may involve a colonoscopy (or virtual colonoscopy with a computerised tomography (CT) scanner), or more rarely, a barium enema; tissue biopsies are usually taken from any polyps seen.

Histological confirmation of the diagnosis is generally sought before the patient is informed. Receiving a cancer diagnosis is generally distressing and life-changing (Taylor, 2001), and should be communicated sensitively (Department of Health, Social Services and Public Safety, 2003). Support and information are essential and should be offered throughout the patient’s journey.

**Staging and survival**

Two systems are used to convey the anatomical extent of a colorectal cancer: Dukes’ classification (Dukes and Bussey, 1958) and the tumor, node, metastasis (TNM) clinical classification (Sobin et al, 2009).

Dukes’ staging uses A-D classification:

- A – excellent chance of the cancer not recurring and no further treatment;
- B and C – further treatment required;
- D – the disease is advanced and metastatic disease has been found.

The TNM system is more widely used and offers a detailed classification of cancers, the three letters representing tumour, nodes and metastases to assess the extent of the tumour’s local spread, involvement in regional lymph nodes and presence of any metastases to distant organs. Fig 1 shows how the tumour is classified in the TNM system.

Accurate staging of colorectal cancer allows an appropriate treatment plan to be made. The multidisciplinary team must establish whether there is any local and distant spread when deciding whether treatment can be curative or should be palliative.

Radiological diagnostic techniques are used for both local and distant staging; the most common are endo-anal ultrasound, CT, magnetic resonance imaging and positron emission tomography scans. The nodal status of a tumour may be indicated before treatment but will be verified after surgical resection and histological examination of the lymph nodes; 20-30% of patients will have metastatic disease at time of presentation, with liver, peritoneal and lung metastases being the main sites (Mella et al, 1997).

Local staging of a rectal cancer is particularly important; this determines its circumferential location, height from the anal verge, whether any resection margins

**TABLE 1. SYMPTOMS ASSOCIATED WITH COLORECTAL CANCER**

<table>
<thead>
<tr>
<th>Site of cancer</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right side</td>
<td>● Anaemia</td>
</tr>
<tr>
<td>Transverse colon</td>
<td>There may be a mix of left and right symptoms</td>
</tr>
<tr>
<td>Left side</td>
<td>● Alteration in bowel habit</td>
</tr>
<tr>
<td>Rectal</td>
<td>● Bleeding</td>
</tr>
</tbody>
</table>
Survival in colorectal cancer depends largely on the stage of disease at diagnosis, and typically ranges from a 90% five-year survival rate for people with cancers detected at the localised stage to 10% for those diagnosed with distant metastatic cancer; overall this equates to 53% of those diagnosed with colorectal cancer living for five years or more (CRUK, 2011). Survival rates in the UK are increasing but do not match those of many European countries (Hayne et al, 2001).

**Tissue layers**

- Mucosa
- Muscularis mucosa
- Submucosa
- Muscularis propria
- Subserosa
- Serosa

*Fig 1. How 'T' in TNM relates to local spread through bowel wall*

**Treatment and nursing care**

Surgery remains the mainstay treatment for colorectal cancer, encompassing a range of procedures including local excision, radical dissection, bypass operations, laparoscopic procedures and liver resections. If there is no metastatic disease, surgery will be performed with curative intent and according to oncological principles. The aim is to cleanly remove the cancer with an adequate margin of tissue around it (en-bloc resection), while minimising collateral damage.

Colon cancer surgery principally involves a segmental colonic resection; for example, for a cancer in the cecum or ascending colon this will be a right hemicolectomy. Surgical procedures for rectal cancer include:

- Anterior resection of the rectum;
- Total mesorectal excision (TME), that is, lower anterior resection; or
- Abdominoperineal excision – excision of the rectum and anal canal with formation of a permanent stoma – for cancers very low in the rectum.

Early-stage rectal cancers can be managed by a specialist surgical team, but those that are locally advanced require consideration by the multidisciplinary team; optimal treatment is likely to involve radiotherapy with or without chemotherapy before surgery, to increase the likelihood of cure (Hassan and Cima, 2007). The combination of preoperative radiotherapy and TME surgery has cut the risk of a rectal cancer recurring locally from 30% to less than 10% (Sebag-Montefiore et al, 2009).

Increasingly, patients having multimodal treatment will have a temporary stoma formed to rest the bowel until treatment is completed, which can take several months. Patients who may need formation of a stoma must be referred to a specialist stoma care nurse, who advise and can offer practical support.

Complication rates depend on the extent of disease, treatment required, skill of the surgeon and the health of the individual. Emergency patients have more postoperative complications and a higher risk of perioperative death (10-20%) than elective patients (5%) because of their less robust health (Leung et al, 2001). Approximately 15% of diagnosed cases of colorectal cancer present as an emergency, principally with an obstruction or a bowel perforation (John et al, 2011).

Nurses have an important role in preparing patients for surgery, with particular emphasis on providing information about what the treatment involves, its risks and benefits, and whether there are alternatives (Association of Coloproctology of Great Britain and Ireland, 2007). In many centres, nurses run pre-assessment clinics and manage patients’ expectations of their rehabilitation if they enter an enhanced recovery programme. These programmes include surgical and rehabilitative modifications to traditional practice, and are designed to reduce surgical trauma and limit the stress response. Early re-establishment of oral nutrition and hydration, and mobilisation on the day of surgery have been shown to hasten recovery, typically enabling hospital discharge within five days of surgery (King et al, 2006).

**Radiotherapy**

Radiotherapy is used to treat rectal cancer, primarily to reduce the incidence of local recurrence, and is delivered as a course of treatment over a week (short course) or, more commonly, over five weeks (long course), with or without chemotherapy. It is most likely to be given before surgery, although it can be given afterwards if histological examination of the resected bowel indicates a high risk of local recurrence, for example if there is evidence of a tumour at the circumferential resection margin.

The side-effects of radiotherapy include sore skin, altered bowel and bladder function and impaired sexual function. Fatigue is common during treatment and for some weeks afterwards. Patients should be prepared to expect all of these side-effects in the short term and be offered specialist help if the effects persist.

**Chemotherapy**

Chemotherapy is used to reduce the likelihood of metastasis, shrink tumour size or slow tumour growth. It can be used after surgery (adjuvant), before surgery (neoadjuvant), or as the primary therapy (palliative).

Chemotherapeutic drugs have side-effects and are given in treatment cycles to cause maximum cancer cell death while minimising adverse effects. Common side-effects include sore mouth (mucositis), nausea and vomiting, diarrhoea, hair thinning and neutropenia. Additional side-effects are specific to particular drugs; for example hand-foot syndrome is associated with capecitabine and numbness or tingling in the hands or feet (peripheral neuropathy) with oxaliplatin. Individual reactions differ but tend to be cumulative so it is important that these symptoms are monitored.

**Liver treatments**

A small percentage of patients with metastatic liver disease are offered combinations of therapy; this involves chemotherapy followed by bowel and liver surgery and are offered with the hope of achieving cure.

Those who undergo a curative resection of liver metastases now have a greater than 50% chance of surviving five years (Simmonds et al, 2006). An expanding range of other modalities can also be used instead of, or in conjunction with, surgery; these include radio frequency ablation, cryoablation and chemoembolisation.

** Palliative treatments**

Patients diagnosed with advanced disease need to know not only that the appropriate support is available but also that their cancer is potentially treatable. Surgery, radiotherapy and chemotherapy are generally offered in the palliative setting to those...
who are fit and willing, to improve their quality of life. However, these treatments are likely to involve side-effects and a balance must often be struck between cancer control and maintenance of quality of life.

Nurses may act as patient advocates, helping to clarify goals of treatment and establish patients’ future priorities and preferences. There should be regular assessment of individual patients’ needs, provision of information and support, symptom control and liaison between the relevant agencies such as the oncology multidisciplinary team, the specialist palliative care team, district nurses, the GP and social services, as appropriate.

Role of the specialist nurse
Clinical nurse specialists play a vital role in delivering a high-quality continuous care to patients from the point of diagnosis, through to and beyond treatment (National Cancer Action Team, 2010). Patients see cancer specialists as their primary source of information (Sahay, 2000); a CNS with specific expertise in colorectal cancer and excellent communication skills should be available to fulfil this role. CNSs act as key workers, often becoming the main point of contact not only for patients but also between multidisciplinary team members to promote the transfer of up-to-date and comprehensive patient information.

Specialist nurses are also well placed to provide the individualised post-treatment care that promotes cancer survival. Many run follow-up clinics and regularly assess patients’ holistic care needs, establish their end-of-treatment care plans and planning future care. Follow-up also involves coordinating appropriate surveillance for patients who have curative treatment as well as monitoring for any signs of disease recurrence or any late treatment effects (National Cancer Survivorship Initiative, 2011; Knowles et al, 2007).

Future developments
Minimally invasive techniques with laparoscopic and robotic technologies may further advance surgical procedures for colorectal cancer and minimise the trauma associated with treatments for this condition. There are also many new cancer therapies in development, particularly biological agents, which may play an increasing role alongside chemotherapy in future.

Treatment regimens are likely to become increasingly sophisticated as personalised medicine is developed to enable treatment to be tailored according to the phenotype of an individual’s cancer. Personalised approaches have the potential to improve treatment outcomes while sparing patients the toxicity and cost associated with approaches that prove ineffective against their particular cancer type. There is also the promise of chemoprevention for colorectal cancer, preventing the development of benign or malignant tumours, which may be targeted at intermediate risk populations (Cooper et al, 2010).

Conclusion
Colorectal cancer is one of the most common cancers in the UK and the second leading cause of cancer mortality. In the last two decades major advances have occurred in its treatment. By enhancing and also often integrating surgical, radiotherapy and chemotheraphy treatments, we are successfully addressing two distinct problems of this disease: local recurrence and risk of metastases.

Colorectal cancer nurses may be required to provide: emotional support at time of diagnosis; information and support through treatment decision making; preparation for treatment; ongoing assessment and care during and after treatment; and survivorship care for those living beyond treatment. Many different health professionals will be involved in an individual’s care; nurses play a vital part in helping to coordinate care and keep the patient central to decision making.

References


National Cancer Survivorship Initiative (2011) Consequences of Cancer Treatment. tinyurl.com/NCIS-consequences


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