The role of the surgeon in cancer care

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Abstract

The surgeon's role in modern cancer management has evolved beyond that of technician with a scalpel and now encompasses a wide ranging role in diagnosis, counselling, screening, prevention, resource management and palliative care as well as the traditional role of surgical excision. Many surgeons also have an active academic interest at teaching hospitals, conducting cancer research and teaching in associated medical schools. The UK has three established cancer screening programmes for breast, cervical and colorectal cancer, where surgeons are required to perform clinical assessment, diagnostic biopsies and plan surgical treatments. In addition to this there is also a screening programme in place for the early detection and treatment of abdominal aortic aneurysms. The multidisciplinary team (MDT) remains the cornerstone of cancer treatment in the UK and each oncological subspeciality has regular meetings to discuss tailored cancer treatment for each individual. Alongside oncologists, radiologists, specialist nurses and pathologists, the surgeon is a key member of this team and in the decision making process. There are many different surgical techniques available for surgical treatment of cancer, many of which allow a minimally invasive approach including laparoscopic, endoscopic and robotic surgery. The progress of medical genetics and gene profiling now allows identification of 'at-risk' individuals for specific types of cancer where prophylactic or risk reducing surgery may be of benefit. Cancer treatment may result in disfigurement and loss of function, so reconstructive surgery is now an integral part of cancer management. Patients with advanced disease can often be helped by surgery to relieve symptoms and improve the quality of their remaining life and so the surgeon may play a key role in end-of-life care.

Keywords Cancer; diagnosis; palliation; prevention; reconstruction; screening; staging; surgery

Introduction

Cancer continues to be a leading cause of mortality in the UK and worldwide, with 14.1 million new cases and 8.2 million deaths per annum globally. Although traditionally thought of as a disease of Western society, the incidence of cancer continues to grow worldwide with 57% of new cancer cases and 65% of all cancer deaths occurring in less developed countries. In the UK cancer incidence rates have increased from 560 per 100,000 in 1995 to 604 per 100,000 in 2015.[1]

Breast, prostate, lung and colorectal cancer account for just over half (53%) of all new diagnoses in the UK in 2015 as shown in Table 1.

Cancer remains a disease of an ageing population. Cancer occurring in the young is largely rare, with those aged 0–24 accounting for just 1.1% of new cancer diagnoses, whereas those aged 65 and over accounted for 65.2% of new diagnoses.[1]

In the 21st century, surgeons continue to play an important role in the management of cancer patients. The scope of the surgeon has expanded to include involvement in screening programmes, diagnosis and staging, curative resection, risk reducing surgery, reconstruction and symptom control in palliation.

Treatment of all patients with cancer in the UK is now coordinated via multidisciplinary teams (MDT), where patient management is discussed and decided by a group of experts including surgeons, radiologists, pathologists, oncologists and specialist nurses. Regular meetings of these teams have been shown not only to improve consistency in the quality of treatment plans but to provide tailored treatment appropriate to each patient rather than the disease, often across different surgical disciplines.[2] The MDT approach has a proven impact on improving patient morbidity and survival.[3] Additionally, sub-specialization and centralization of services for certain cancer subtypes is well developed within UK practice, with proven improvements in patient care and outcomes.[4]

Diagnosis

Cancer diagnosis can be challenging and requires a combination of clinical and family history, physical examination, radiological imaging and histological assessment. As part of this process, surgeons play an important role not only in initial patient assessment, but also in the process of obtaining a tissue biopsy for histological diagnosis. Many centres now offer a 'one stop' service where patients referred into clinic by GPs, are seen by a surgeon, undergo appropriate imaging and have tissue sampling on the same day if necessary. This has a positive impact on the patient's experience and improves efficiency by reducing waiting times for cancer and costs.

Some examples of tissue sampling techniques utilized are:

Fine needle aspiration (FNA): a needle on a syringe is inserted into the area of interest either by palpation or under ultrasound guidance to aspirate fluid and cells for analysis.

Worldwide and UK incidences of cancer[1]

Incidence	Worldwide (2012) (millions)	UK (2015)
New cases	14.1	300,000
Deaths	8.2	163,500
Lung	1.82 (13%)	37,600 (12.5%)
Breast	1.68 (11.9%)	46,000 (15.3%)
Colorectal	1.35 (9.7%)	34,700 (11.6%)
Prostate	1.1 (7.8%)	40,300 (13.4%)

Table 1

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FNA has limitations such as lack of tissue architecture for a definite diagnosis, high false negative and false positive rates in certain cancer subtypes. However, it remains valuable in the initial investigation of thyroid lumps.

Core biopsy: biopsies are obtained using an automated spring-loaded firing device. The device is inserted into the area of interest after infiltration with local anaesthetic and excises a small cylinder of tissue within the needle channel. This method retrieves tissue for analysis, maintaining the tissue architecture for histological diagnosis (c.f. FNA). Core biopsies can be taken clinically for palpable lesions or may be performed under image guidance (ultrasound, CT, MRI, or stereotactic mammography).

Vacuum-assisted biopsy devices (VAD): this technique has been used in the setting of breast cancer and is used for diagnostic and occasionally therapeutic purposes. Although relatively costly compared to other techniques, VAD allows larger and multiple samples to be obtained with a single insertion thus reducing the sampling error and can completely remove the lesion under real-time ultrasonic or x-ray guidance.

Excisional and incisional biopsy: an incisional biopsy aims to remove only a section of the tumour and is usually performed when other methods of sampling have failed to reach a definite diagnosis. Punch biopsies may be used to diagnose skin lesions such as suspected melanomas or skin metastasis. Excisional biopsies are used in cases where diagnostic uncertainty exists and it is possible to remove the entire tumour with minimal risk to the patient. This can commonly be the case with melanoma and also with small breast cancers where other methods of sampling have failed to provide an accurate pathological diagnosis. If a diagnosis of cancer is made after an excisional biopsy, further surgery may be required to re-excise the margins of the tumour bed to allow for adequate oncological clearance. Surgeons may be called upon by haematologists to perform excision biopsy of lymph node so that the pathologist is given enough tissue for specific diagnosis and characterization of lymphomas.

Endoscopic biopsy: biopsies can be obtained during endoscopic procedures, using either rigid or flexible scopes. Instruments can be passed down the centre of an endoscope to obtain tissue. This is the routine method of tissue diagnosis in colorectal, bladder, gastric/duodenal and ENT cancers. Tissue can be taken with standard biopsy forceps or, in the case of polyps, with a snare for larger polypoid lesions such as colorectal polyps. This will often be attached to diathermy to reduce post biopsy bleeding. Endoscopic biopsies are the gold standard for cancers affecting luminal structures since the cancers can be directly visualized, photographed, biopsied and, in the case of colorectal cancers, tattooed in order to improve identification at subsequent operations.

Many of these biopsies are now routinely carried out under radiological guidance usually by CT or USS. This is safer as it reduces the chances of iatrogenic injury to surrounding structures and increases the likelihood that the lesion of interest will be targeted successfully by biopsy.

Staging

After a tissue biopsy confirms the diagnosis of cancer, staging of the disease helps to predict the prognosis of the disease and plan treatment in the form of surgical resection, with or without adjuvant therapy in the form of chemotherapy and radiotherapy. Although a vast amount of staging is based upon radiological assessment with cross sectional imaging, there are some circumstances in which surgeons are involved.

Sentinel lymph node biopsy (SLNB)

This technique is now used commonly in the management of breast cancer, melanoma and to a lesser extent in the management of other cancers such as gastric, oesophageal, head and neck, penile, vulval and anal cancers. A combination of radio-isotope (often technetium99) and patent blue dye are injected at the site of the tumour in order to help identify the first (sentinel) lymph node receiving lymphatic drainage from the tumour, which can then be excised and sent for histological examination. The identification of a positive sentinel lymph node (lymph node containing cancer cells) gives important prognostic information on more advanced disease and identifies those patients that will need further treatment such as lymph node clearance or adjuvant chemotherapy or targeted radiotherapy. Similarly, the finding of a negative sentinel lymph node in the setting of breast cancer indicates a 95% chance of the remainder of the lymph nodes within that lymph node basin being free of tumour and it subsequently eliminates the need for further invasive therapy and its associated morbidity.

Diagnostic and staging laparoscopy

These minimally invasive techniques are now used routinely for diagnosis, staging and treatment for cancers that are intraperitoneal and intrathoracic. Laparoscopy can provide a route to biopsy a lesion which is otherwise inaccessible (such as intra-abdominal lymph nodes), where the diagnosis of cancer is uncertain or the staging of a cancer is in question.

In the context of intra-abdominal malignancies, there are circumstances where staging with radiological techniques such as ultrasound, CT and MRI have their limitations. This can sometimes make it difficult to identify patients suitable for curative resection from those with inoperable disease. In these situations a diagnostic laparoscopy offers a valuable method of assessing the stage of the disease. This is often the case with upper gastrointestinal (GI) malignancies, such as gastric, pancreatic and cholangiocarcinomas. In these cases laparoscopy is sometimes the only way to assess the local spread or determine the presence of intraperitoneal disease. Resection of these cancers can lead to extensive morbidity so it is important to ensure that these patients do not have an inappropriate operation for inoperable disease (e.g. pancreatic cancer) or that they get appropriate neoadjuvant chemotherapy where appropriate.

Laparoscopic ultrasound is used in liver surgery if resection of colorectal liver metastases is proposed, as intraoperative ultrasound can give much more information regarding the size, number, location and local involvement of liver metastases, than cross sectional imaging alone.

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