Surgical Treatment of Carcinoma of the Esophagus

CHAPTER 20

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GENERAL PRINCIPLES

In the early days, surgery was concerned with amputations, relief of mechanical obstructions, and letting out pus. At the turn of the twentieth century, Halsted developed the concept of curing cancer by radical surgery, excising both the tumor and its local lymph nodes en bloc. Any successful outcome was presumed to be due to surgical removal of the entire tumor. This radical principle reached its zenith in the 1950s with Wangensteen’s excision of the internal mammary chain of lymph nodes for breast surgery and his second-look laparotomies to clear recurrences for primary gastrointestinal tumors. In breast cancer, the evidence that radical surgery could not eliminate all the cancer if locoregional lymph nodes were involved was already available. Data showed that 50 percent of patients with axillary nodes had supraclavicular nodes that were not removed in a radical mastectomy. Currently, there is much more acceptance by surgeons that when lymph nodes are involved in a cancer, the disease should be considered as having systemic spread and is not curable by surgery alone; it needs adjuvant systemic therapy as well.

The comparison of the principles of esophageal cancer surgery with those of breast surgery is very important so that the aims, tendencies, and fashions can be followed. Technically, the first success was to open the chest, excise the tumor, and join the ends without 100 percent mortality [32]. As the mortality decreased to 10 percent, surgeons tried experimenting with even more radical surgical treatments or with more minimal surgery. It is difficult to perform radical surgical repair of esophageal cancer because the mediastinum is not suitable for wide excision of the aorta, heart, or lungs. The absence of a mechanical barrier such as peritoneum or pleura means that lateral spread involves tissues and organs that cannot easily be resected. Large en bloc excisions may appear reasonable but are difficult to achieve anatomically. Invasive attempts to excise the tumor and the surrounding tissue without using direct vision are, in the author’s (controversial) opinion, unsound procedures and are likely to achieve incomplete removal of the cancer. “Blind” techniques include the transhiatal surgical approach to midesophageal cancers without opening the chest and the experimental laparoscopic esophagectomies now being advocated. Anyone who has performed esophageal cancer surgical procedures knows how difficult it can be to excise a tumor under direct vision. Why make it more difficult, and at the same time, incomplete?

This leads to another important scientific consideration in this chapter. No statement is 100 percent true or accurate. Each statement is presented as the best available knowledge on the basis that Hayek has suggested for science in general. These bricks of scientific knowledge are necessary for building the next layer of the total edifice, but each must be capable of being taken out and re-examined. When I consider that there is still real doubt about a “fact” being presented, such as a surgical procedure that has been a surgeon’s life work but that the surgeon considers improved, the word controversial will appear in parenthesis.

The length of recent books [35, 61] confirms that there is a vast amount of knowledge that requires simplification. The aim of esophageal cancer surgery is to perform a curative resection. Whether a true cure for esophageal cancer can be achieved is debatable. The term curative resection usually is defined as implying that the surgeon and his or her assistant believe there is no macroscopic tumor left behind. Palliative resection implies that there is visible tumor remaining, and bypass procedure should be used only when the tumor has been left behind deliberately.

Operable means that either a curative or palliative resection can be performed. The term inoperable is used either when no operation is advised or when, after thoracotomy has been performed, it is decided either to proceed with a bypass or not to resect. Nonresectable is almost synonymous with inoperable, but obviously the threshold for such a statement depends not only on the surgeon’s technical ability to resect an advanced tumor but also on his or her philosophy as to whether it is worthwhile. Whether to resect the primary tumor in the presence of distant metastases in the liver or lungs is controversial. Such resections obviously are palliative, even though a curative resection for the local tumor has been performed.

Curative or palliative resections usually are designated on the basis of what the naked eye sees and, though acceptable definitions, they should always have microscopic confirmation. In a large series of esophagogastrectomy specimens, 25 percent were incomplete because of residual tumor in the cut ends, and 50 percent were incomplete laterally because there was tumor at the edge of the specimen. In general terms, longitudinal spread can be dealt with by the surgeon excising more, but lateral spread cannot be removed by excising more widely. All resections should be correctly staged with posttreatment (pathologically based) staging. The number of truly curative resections will thereby decrease.

Should the term cure actually be used, and is there really a chance of cure in cancer of the esophagus? There are undoubtedly some long-term 10-year survivors after esophageal resection and a few patients who die after 5 years with
no evidence of recurrent tumor. One subdivision of patients is guaranteed to die with no evidence of further spread—that is, the patient with a $T_1$ or $T_2/N_0/M_0$ tumor who dies immediately after a “successful” resection. This macabre statement is made to emphasize the importance of staging tumors both before and after treatment and defining what the word cure actually means.

The Japanese Society for Oesophageal Diseases has the best data base in the world for esophageal cancer patients, based on detailed pathology, surgical technique, and follow-up. Its publication contains the facts that the 5-year survival for a $T_1/N_0$ tumor is 61 percent. Does this mean that early tumors can or cannot be cured? It would be wiser to talk of survival rates rather than cure rates.

HISTORIC ASPECTS

Resection and restoration of continuity through a thoracotomy were first achieved by Ohsawa in 1933 [52]. This major advance was achievable because of the introduction of endotracheal anesthesia [44], which made a thoracotomy possible. Prior attempts were confined to resection of a cervical esophageal cancer [18] or a lower esophageal tumor [72], without opening the chest and without joining the ends.

Transpleural resection was first done successfully by Torek [71] in 1913 in the United States without endotracheal intubation. The patient survived because of previous old adhesions that prevented the lung from collapsing. In the United Kingdom in 1909, Evans [26] had performed the first excision of a cervical esophageal carcinoma using a pharyngolaryngectomy and restored continuity to a gastrostomy with a rubber tube. The patient, Miss Alice Thomas, lived for 24 years until 1932. She was the aunt of Tudor Edwards [24], who performed the first successful transpleural resection of the Torek type in the United Kingdom at the Westminster Hospital in 1935. Grey Turner had reconstructed an extrathoracic gullet in 1933 after excising a thoracic esophageal carcinoma without opening the chest [30]. All these isolated cases used techniques other than resection and anastomosis through thoracotomy, as Ohsawa has done. The first such resection in the United States was done in 1938 [2] and in the United Kingdom in 1945 [68]. The technique was developed into a routine by Sweet in the 1940s.

The standard esophageal resection is an Ivor-Lewis esophagogastrectomy, usually performed in two stages. The first is a laparotomy for the subdiaphragmatic mobilization of the stomach, and the second is a right thoracotomy with a retrosternal, or presternal—visible, and massageable approach to fill the resected gap (stomach, colon, jejunum); and (3) thoracic complications, especially those following an anastomotic leak, are avoided. This has been done by many established and experienced surgeons with good results. It is interesting, but ignored, that if clips are placed on the anastomosis done through the cervical incision, they appear to lie in the upper chest, but drainage upward may convert the thoracic infections into safer cervical ones. Most surgeons do not do surgical operations for the rare cervical cancers because a 10-cm margin is impossible to obtain with a cervical portion of the esophagus less than 10 cm long.

For those (frequently nonthoracic) surgeons who want to avoid the complications of a thoracotomy, the second stage of a McKeown operation can be avoided by a transhiatal approach [55]. The esophagus is deceptively short in some people and mobilization with small hands, long fingers, or retractors enables the esophagus and its tumor to be mobilized without opening the chest. Aikiyama [5], who uses the direct thoracotomy approach and a cervical anastomosis and who almost never has to give a blood transfusion during his esophagogastrectomies, considers that stripping of the esophagus is justifiable only when there is no intrathoracic tumor but rather a normal distal esophagus below a cervical or a postcricoid cancer. If you must do blind transhiatal surgery (controversial), have a good blood transfusion service.

Other necessary information to know about the various operations for esophageal cancer is: (1) the level of the anastomosis (alwavs mark with clips); (2) the organ used to fill the resected gap (stomach, colon, jejunum); and (3) the pathway of the reconstruction (mediastinal—normal, retrosternal, or prestenal—visible, and massageable).

As supplementary information about the operative procedure, apart from the correct nomenclature and coding of the operation, it is useful to know the time taken for the total operation and its component parts as well as the number of units of blood needed to replace those lost. Beware of curious statistics, such as the one I heard at an international meeting about an operation lasting 7 hours + SD 7
Table 20-1. ICD Codes for Cancer of the Esophagus and Related Alimentary Tract

<table>
<thead>
<tr>
<th>ICD eighth revision (1968–1978)</th>
<th>ICD ninth revision (1979–)</th>
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<tbody>
<tr>
<td>Hypopharynx</td>
<td>Esophagus</td>
</tr>
<tr>
<td>148</td>
<td>148.0 (includes postcricoid region)</td>
</tr>
<tr>
<td>150.0</td>
<td>150.0 Upper third</td>
</tr>
<tr>
<td>150.1</td>
<td>150.1 Middle third</td>
</tr>
<tr>
<td>150.2</td>
<td>150.2 Lower third gastroesophageal junction</td>
</tr>
<tr>
<td>150.9</td>
<td>150.9 Esophagus (no further details)</td>
</tr>
<tr>
<td>Stomach</td>
<td>Stomach</td>
</tr>
<tr>
<td>151</td>
<td>151.0 Includes cardia (cardia, orifice)</td>
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PATHOLOGIC FEATURES

Carcinoma of the esophagus should be simple to describe but, unfortunately, at the top end there is confusion with the postcricoid hypopharyngeal tumor (International Classification of Diseases [ICD] no. 148) and at the bottom end with carcinoma of the stomach (ICD 151). Anatomic subdivisions of the esophagus are so extremely controversial that the ninth edition ICD coding has included two parallel subdivisions: (1) cervical, thoracic, abdominal and (2) upper third, middle third, and lower third (any of which can be chosen) (Table 20-1). The figures are totally unreliable, however, for the simple reason that esophagus unspecified ICD 150.9 exists, and into this category the ever-efficient but unconcerned medical profession places more than 60 percent of its cases, thus making this source of data totally unreliable [20].

Microscopy must be obtained for each esophageal tumor that is usually squamous cell in origin, and the differentiation must be graded I to IV (Table 20-2):

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tr>
<td>I</td>
<td>Well-differentiated, differentiated</td>
</tr>
<tr>
<td>II</td>
<td>Moderately, moderately well differentiated</td>
</tr>
<tr>
<td>III</td>
<td>Poorly differentiated</td>
</tr>
<tr>
<td>IV</td>
<td>Undifferentiated, anaplastic</td>
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The phrases "not determined," "not stated," or "not applicable" are not used.

Adenocarcinoma of the true anatomic esophagus does occur, arising in the columnar cell–lined esophagus [11]. Its incidence is rare at 3–5 percent (controversial, with some giving higher figures) [65]. Biopsies of an esophageal cancer must always be obtained prior to surgical procedures but may be incorrect in up to 10 percent of cases, with the results being negative, of the wrong degree of differentiation, or of incorrect tissue origin with regard to squamous carcinoma or adenocarcinoma. If in doubt, always repeat negative biopsies and always check the subsequent pathologic findings of the resected specimen, which will be more reliable.

A tumor of the body of the esophagus is usually proliferative and intraluminal. It obviously arises at one part of the circumference and then spreads around before progressing to longitudinal spread as well as laterally into the mediastinum. The Chinese have divided the more advanced stages into medullary, fungating, ulcerative, scirrhous, and intraluminal [33]. Although the macroscopic appearances are indeed varied as are size and length, it would appear
that the histologic grading is more important for prognosis than any description of the macroscopic appearances.

In the large bowel, the rule of thumb is that tumors grow around the circumference at the rate of one quadrant every 6 months, but esophageal tumors probably grow faster than this. Esophageal cancers, in general terms, tend to cause obstruction by proliferation into the lumen. The main exception is carcinoma of the cardia, which is usually a cicatricial lesion with minimal proliferation. Debulking a large intraluminal tumor with external beam radiation or intraluminal laser therapy is a therapeutic possibility for intraluminal proliferative tumors but clearly, a short cicatricial carcinoma of the cardia presents clinically as a mechanical obstruction that requires relief by surgical excision.

**PRETREATMENT INVESTIGATIONS**

Ideally, all patients with esophageal cancer should have a minimal data set collected prior to treatment, with preoperative provisional staging of the tumor, general clinical condition with World Health Organization (WHO) performance status (Table 20-3), and grading of dysphagia (Table 20-4). Radiology is essential in every case. This enables an accurate localization of the tumor and planning of the correct surgical approach. Although considerable work has been done on the radiologic appearances and their significance, the only reliable sign of an advanced (and possibly inoperable) tumor is a change in the esophageal longitudinal axis above and below the obstruction [7]. Computerized tomographic (CT) scanning is essential to exclude lung and liver metastases and for the accurate localization of the tumor (Table 20-5) [49, 58]. Cuts should be made from sternal notch to umbilicus. The cost is easily justified, as this avoids unnecessary surgical explorations.

Operability cannot definitely be decided by CT scans. This especially applies to aortic fixation, which is demonstrated by the loss of an easily visible circumference. Magnetic resonance imaging (MRI) probably is no more useful than CT scanning [63]. Intraoperative ultrasound staging has been used for assessing both lateral spread and enlarged lymph nodes [69, 70] but is unlikely to replace CT scanning. The operation should be correctly described according to protocols and coded accurately. The pathologic findings should be recorded and combined with the preoperative investigations to give a posttreatment definitive staging, possibly confirmed by a tumor panel.

Armed with this information, meaningful data can be given to the cancer registries and follow-up performed to give reliable survival statistics. Although certain individuals may collect such data, attempts on a national scale to raise standards are extremely rare with the exceptions of Finland [9] and Japan [37]. Necessary information should include any new treatments performed empirically by individual consultants, such as intraluminal brachytherapy, laser destruction of tumor, or chemotherapy. The data needed to decide what treatment is best are usually obtained by clinical trials, yet the majority of patients pass through the UK National Health Service without adequate data collection and the majority do not enter any trial. Some diseases are so common (e.g., breast cancer) that large trials can be performed. Some are so rare that they are treated in one or two centers (e.g., osteosarcoma). Esophageal cancer is
cared for by many individuals, and only a handful of surgeons look after more than 25 cases per year. Adequate data collection for meaningful analysis is impossible currently.

CLASSIFICATION AND STAGING
There has been disagreement about the staging of esophageal cancer in the past. The controversy has been settled recently, mainly due to the incredibly detailed data base gathered by the Japanese Society for Esophageal Diseases (JSED) [37]. Thanks must be given to all their members, but of special note is the work of the Japanese Committee for Registration of Esophageal Carcinoma and its chairman, Dr. Iizuka [34, 36]. Their success has come from the desire to turn a paper exercise for epidemiologists, classifiers, coders, statisticians, and pathologists into a practical system for clinicians, patients, and relatives who want to know the best treatment and outcome for any given esophageal cancer. The problem has been to gather only data that are practical and essential in a format that is compatible with ICD coding (see Table 20-2), the TNM system (tumor size, regional nodal status, and distant metastases) from the International Union Against Cancer (Table 20-6), and previous attempts to agree on an international staging system for use in providing subsets of survival groups (Table 20-7). Many of the data previously believed to be essential have been eliminated, and we are now much closer to a minimal data base that should be uniformly standard so that we can make international comparisons of outcome and search for the best treatment. Examples of the discarded information are: (1) assessing the level of the tumor by the number of thoracic vertebrae (impractical and impossible to assign a number correctly); (2) the length of the tumor (survival is proportional to less than 2 cm or longer than 10 cm, but anywhere between 2 and 7 cm shows no difference); (3) circumference of the tumor (useless); and (4) depth of penetration (controversial).

ANATOMIC REGIONS AND SITES
There is general agreement that esophageal cancer must exclude postcricoid cancer in the hypopharynx and that there must be a clear definition of cancer of the stomach and cardia. This leaves the necessity of having a clear idea of the correct anatomic subdivisions to be used from those available in the ICD ninth revision. The eighth and ninth revisions are given in Table 20-1. The anatomic division into four, with its suggested coding, is added. Unfortunately, the clear disagreement in the ninth edition led to two parallel subdivisions of ICD 150, and the tenth edition has not yet caught up with the general agreement by clinicians unified by the work of the International Society for Diseases of the Esophagus [36].

The new classification dividing the esophagus into four is as follows:

1. **Cervical esophagus** commences at the lower border of the cricoid cartilage and ends at the thoracic inlet or supraventricular notch, approximately 18 cm from the upper incisor teeth.
2. **Intrathoracic esophagus** divided into three:
   a. **Upper thoracic** portion extends from the thoracic inlet to the level of the tracheal bifurcation, approximately 24 cm from the upper incisor teeth, which can be seen on a straight chest roentgenogram.

<table>
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<th>Table 20-6. TNM Classification</th>
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<tr>
<td>T PRIMARY TUMOR</td>
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<td>T₀</td>
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<td>T₁₅</td>
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<tr>
<td>T₁</td>
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<tr>
<td>T₂</td>
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<tr>
<td>T₃</td>
</tr>
<tr>
<td>T₄</td>
</tr>
<tr>
<td>N LOCOREGIONAL LYMPH NODES</td>
</tr>
<tr>
<td>Cervical esophagus</td>
</tr>
<tr>
<td>Thoracic esophagus</td>
</tr>
<tr>
<td>N₀</td>
</tr>
<tr>
<td>N₁</td>
</tr>
<tr>
<td>M DISTANT METASTASES</td>
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<td>M₀</td>
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<tr>
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<td>M₁ Lyn</td>
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<table>
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<tr>
<th>Table 20-7. Cancer Staging and Survival</th>
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<tbody>
<tr>
<td>Stage</td>
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<tr>
<td>-------</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1Ⅰa</td>
</tr>
<tr>
<td>1Ⅰb</td>
</tr>
<tr>
<td>1Ⅱ</td>
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<tr>
<td>1Ⅲ</td>
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<td>1Ⅳ</td>
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*Probably unreliable 5-yr survival percentage; not enough data.
b. Midthoracic portion is the proximal half of the esophagus between the tracheal bifurcation and the gastroesophageal junction, the lower level of which is approximately 32 cm from the upper incisor teeth.

c. Lower esophagus, including the abdominal esophagus, which is 8 cm in length, is the distal half. Its lower end is approximately 40 cm from the upper incisor teeth.

I accept this division into four but would disagree with the introduction of centimeters from the incisor teeth as an accurate measurement of anything because most esophageal cancer patients have no teeth, there is considerable variation in measurements made by gastroenterologists, and I have not yet seen a patient of standard height with a standard esophageal length. Dropping the vertebral body measurement was a good idea, but to retain measurement of length is unnecessary and inaccurate (controversial). Acceptance of the sternal notch and the lower level of the tracheal bifurcation as anatomic landmarks is an advance, but accurate location of the abdominal esophagus is mythical.

TNM CLASSIFICATION

Pretreatment diagnosis can be made by biopsy, and pretreatment staging can be provisionally estimated by investigation, but the accurate posttreatment staging necessary for prognosis can be done only after resection. The original TNM classification was proposed in 1968 and revised in 1974, 1978, and 1987. A slightly altered TNM system (see Table 20-6) has now been accepted by clinicians and will likely be included in the next edition. It must be emphasized that the purpose of these changes has been to identify subsets of histopathologic staging that have relevance for 5-year survival figures and to eliminate unimportant variables such as length of the tumor. The new TNM classification now bears a much closer relationship to prognosis.

The new T classification is divided into four groups. T0 means invasion into, but not beyond, the submucosa. T1 invades into, but not beyond, the muscularis propria (i.e., the two muscle layers). T2 invades through muscle into the adventitia, but not beyond, and T3 invades adjacent structures. To these four must be added the extremely rare T4 for carcinoma in situ and T0, meaning no evidence of primary tumor. This latter category may seem eccentric, but it represents either the very rare tumor that only presents with a secondary lymph node or the increasingly frequent scenario in which an esophagogastrectomy has been done routinely after preoperative radiotherapy or chemotherapy, leaving no evidence of any primary tumor despite a previous positive biopsy. T2 includes the term muscularis propria, which is not actually a layer identified in Gray's Anatomy and is certainly not the muscularis mucosa. Muscularis propria is actually a composite of the two muscle layers of inner longitudinal and outer circular fibers. Clear English is essential for understanding, and Latin serves only to confuse.

The N classification has been altered in two ways. For the cervical esophagus, locoregional lymph nodes include both cervical and supraclavicular nodes. For the three subdivisions of the thoracic esophagus, locoregional nodes include mediastinal and perigastric nodes. It has always been recognized that for a lower-third esophageal cancer, the presence of invaded celiac lymph nodes below the diaphragm worsened the prognosis. The detailed work of the Japanese has demonstrated that this is no worse than the presence of mediastinal nodes when they are merely perigastric. The lymph nodes are now subdivided into N0, with no regional lymph nodes, and N1, with the locoregional lymph nodes. N2 of the old classification referred to fixed regional lymph nodes. In 1978, the Japanese suggested that N1 should refer to abdominal nodes other than perigastric but including celiac, and N2 should be further distant lymph nodes. It is now clear to them that their former N1 and N2, which included celiac lymph nodes, carried such a bad prognosis that they should be removed from the category of distant metastases. All of this is logical and based on good data. The M category remains the same, including all distant metastases, but with the addition of these two subcategories of lymph nodes: abdominal lymph nodes other than perigastric but including celiac (formerly coded as N3), further distant lymph nodes.

Modern staging now follows the new TNM classification and must be accepted as replacing all previous staging mechanisms. Staging and 5-year survival are given in Table 20-7. For more accurate assessment of the effect of adding extensive locoregional spread to the distant metastases (M) group, the two have been separated for survival data into M (lymph nodes) and M (distant metastases).

No tumor classification or staging is complete without additional correct histologic grading and differentiation, although the survival rates for these subsets of the original TNM classification have not been reliably studied. The American College of Pathologists has made the suggestion that the fifth digit for a behavior code and a sixth-digit code for histologic grading and differentiation should be added to the ICD four-figure coding (see Table 20-2). This would seem a sensible addition to the minimum data base (see Tables 20-1 through 20-7).

DECISIONS

Not every patient with esophageal cancer is fit for a major operation, nor is it always appropriate. Of the 4000 cases diagnosed each year in England and Wales, 1000 patients will have a curative or palliative resection (25 percent), 1000 will have radiotherapy (25 percent) with a curative or palliative intent, and 2000 will have no definitive treatment for the tumor and will be offered intubation, dilatation, or laser therapy for the relief of their main symptom of dysphagia, or terminal care. The reason for this small percentage offered active treatment is that 40 percent of patients are older than 75 years [20] and, for some unknown reason, the British present with later-stage tumors and widespread disease, having lost 7 kg in weight, and...
having dyspepsia or other symptoms for more than 6 months. This must be rectified by education because there is no evidence that it is due to delay in diagnosis by the doctor in the National Health Service.

The decision to operate is made only after correct and complete pretreatment staging. In general terms, only patients in stage I and stage II should be offered resectional surgical procedures. Patients with stage III or IV disease account for more than 75 percent. Many of those with early stage disease are not advised surgical treatment because of their age or because of cardiovascular or respiratory disease. The main etiologic factors in esophageal cancer are smoking and drinking. Of my patients, 16 percent drank one-half to two bottles of whiskey each day, which turns the tissues into wet blotting paper and makes operating dangerous [19]. Many of the patients are unacceptable operative risks. It must be considered whether the patient has a 90 percent chance of leaving the hospital alive after the operation. The statement, “The operation was a success but the patient died,” is totally unacceptable.

INCISIONS
Once the decision for surgical treatment has been made, the operation must be planned and executed as a routine and not with a different technique each time. There is no room for experimentation on patients by a new generation of surgeons, and the techniques of the previous experts must be handed on. Most surgeons doing esophagectomies improve after the first few years and, with experience, reach a steady state. There is no doubt that the results of those treating fewer than 5 cases yearly are worse than those doing more [47], but there are fewer than 10 surgeons in Europe treating more than 50 each year. It is unclear why surgeons are happy to treat 1 or 2 cases yearly with worse results than the more experienced professionals, but the twin market forces of patient knowledge and the legal profession will soon sort out that problem.

Because most surgeons perform only a few such procedures, I will describe the usually acceptable Ivor-Lewis approach (Fig. 20-1B) [43]. Although I am well aware that excellent results are being obtained by other professionals using different techniques (Fig. 20-1A) [4-6, 25, 29, 74]. Usually, it is the technician who is more important than the technique, so one's surgeon should be carefully selected.

OPERATIONS
In the Ivor-Lewis approach (Figs. 20-2, 20-3), the laparotomy to mobilize the stomach is always done first through an upper midline incision. This enables the subdiaphragmatic staging of the disease to be done. The involvement of the stomach, especially at the cardia, should be noted as well as feeling the liver. Even if normal in size, a celiac axis node biopsy should always be obtained because it has such prognostic importance. I do not advise a pyloroplasty (controversial) or a splenectomy (controversial).

The preservation of the blood supply along the greater curvature with an intact arcade is absolutely essential (Fig. 20-4). The short gastric vessels should be meticulously divided and tied individually to avoid a subsequent venous bleed. The left gastric artery should be doubly ligated with a similar intent. When the stomach has been completely freed from all connections, the hiatus should be further mobilized to the whole length of the index finger. It is usually unnecessary to do a Kocher's maneuver to mobilize the pylorus. The stomach, in most instances, will stretch to the neck, whatever the pathway (Fig. 20-5). The formation of gastric tubes (Fig. 20-6) of an iso- or retroperistaltic form [28, 32, 75] is a doubtful necessity (controversial).

If the spleen has not been removed, there is no dead space to be filled up with hematoma. If the bowel has not been opened, there is no risk of infection. For both of these reasons, I do not usually put in a subdiaphragmatic drain (controversial). Beware, however, if there is extensive intra-abdominal tumor. It is not usually advised that the omentum be removed but, if involved, it should be removed and debulked. Similarly, if there is tumor extending to the celiac axis, pancreas, or spleen, there will be extensive dissection. An additional risk factor is adhesions due to a previous abdominal operation. In these three instances, drains may be needed. This part of the operation should have been completed within 1 hour. Speed is not an absolute essential, and fast surgery is not always the safest, but if the technique is practiced there is usually less tissue damage, and the saving of traumatic time is a bonus to the patient.

The patient is then moved from lying on his or her back to a full right thoracotomy position (see Figs. 20-2, 20-3). It is not essential to have had the anesthetist put a double-lumen tube down so that the right lung can be collapsed, but it is useful to have this already in place if there is trouble either technically from the surgical point of view or anesthetically when a high ventilation pressure is needed to maintain O₂ pressures. The chest should be left open for as short a time as possible, and the right lung should be kept up for as long as possible.

A right thoracotomy through an intercostal space without resecting a rib is performed. All assistants ask which space is to be entered. That depends on (1) the location of the tumor and the planned level of the anastomosis and (2) the form of the chest and the level at which the hiatus lies in relation to the xiphisternum. Always be too high rather...
20. SURGICAL TREATMENT OF CARCINOMA OF THE ESOPHAGUS

Fig. 20-2. Esophagogastrrectomy. (1) Laparotomy: Assess liver; ascites; omentum; subdiaphragmatic tumor; mobility of tumor if present; local lymph nodes. (2) Mobilize greater curvature to the hiatus, preserving gastroepiploic arterial arcade and tying short gastric vessels individually. (3) Assess mobility and celiac axis through the lesser sac. (4) Place a rubber sling around the hiatus. (5) Mobilize the lesser curve, tying the left gastric vessels. (6) Further mobilization of the hiatus to the full extent of the index finger. (7) Check that the stomach is free with a good blood supply and mobile enough. Possibly perform a Kocher maneuver. Usually do not do a pyloroplasty. (8) Try to preserve the spleen. Splenectomy is essential if damaged or involved by tumor. Closure usually without drainage. (9) Thoracotomy: Assess tumor, its location, and mobility. (10) Use rubber sling around distal esophagus after establishing contact with subdiaphragmatic dissection. (11) Use rubber sling around proximal esophagus. (12) Divide vena azygos if indicated, but use pressure if an adequate margin can be obtained below. (13) Mobilize the tumor, tie branches of the aorta, and deliver stomach into the chest without twisting. (14) Perform distal resection (see Fig. 20-4). (15) Close stomach in two layers (see Fig. 20-3C). (16) Do proximal resection (without cutting the nasogastric tube). (17) Perform diathermy to create a new opening in the fundus of the stomach and anastomose (see Fig. 20-3A, B). (18) Add a nonabsorbable second layer covering the anastomosis and fix the stomach to the pleura (see Fig. 20-3C). Effect closure using large pleural drain.

Fig. 20-3. (A) Esophagogastic anastomosis with the stomach lying in the bed of the esophagus below the vena azygos. (B) Interrupted mattress sutures. (C) Second layer (serosa to pleura) covering the anastomosis and fixing the stomach. Note: See Fig. 20-2 for explanation of numerals. (19) Effect closure using large pleural drain.

than too low. Beware of the short barrel chest where the anteroposterior diameter is greater than the lateral measurement. It certainly is possible to approach the esophagus from the left, and many carcinomas of the cardia can be dealt with through a left thoracotomy alone [46]. It is equally feasible to do the whole operation through a right thoracotomy alone [12].

The diaphragm can easily be divided to mobilize the stomach, and there is usually room below the arch of the aorta to make an anastomosis but, sooner or later with these approaches, there will be difficulties that can be solved only by: (1) converting to a thoracoabdominal incision, (2) mobilizing the arch of the aorta to anastomose above it, or (3) giving up and opening the right chest to get
VII. NEOPLASIA OF THE ESOPHAGUS

Fig. 20-4. Mobilize the greater curve, preserving the gastroepiploic artery (2a) and tying the short gastric vessels (2b). The line of resection is near the gastroesophageal junction in high esophageal tumors or includes the lesser curve and perigastric glands (14) extending to the origin of the left gastric artery (5).

Fig. 20-5. The path of the stomach can be in its normal mediastinal position retrosternally (A) and, rarely, subcutaneously in front of the sternum (B).

high enough. For these reasons, the right approach is safest (controversial), and the anastomosis can be made either below the azygos vein using the overlying pleura for extra-strong suturing or above it, almost into the neck. The decision to divide the vena azygos has to be made early after having identified the level of the tumor. Ten cm above and below is essential for resection margins, but it is unwise to mobilize more than is necessary, and it is essential to preserve the overlying pleura for a second layer of pleural sutures over the anastomosis.

Mobilize the tumor, sacrificing the vagal nerves, but preserve the recurrent laryngeal nerve if dissection is high enough. Tie off all the aortic branches and try not to go into the left chest or inadvertently divide the thoracic duct.

Details of the steps of the technique are listed sequentially in Figures 20-2 and 20-3 and are discussed later, where relevant, in relation to complications. One textbook is particularly complete on all the possible surgical variations [61].

In practice, the majority of curative resections are performed either by the two-stage operation based on the Ivor-Lewis operation (midline and right thoracotomy) or the three-stage McKeown (midline, thoracotomy, and cervical). Akiyama [4] uses the three-stage approach but does the thoracotomy first to free the tumor, then the laparotomy to mobilize the stomach and, finally, the anastomosis through the cervical incision.

As with all cancer surgery, there is a school that believes that removal of a larger mass of tissue en bloc will give better results [62]. Others like doing the clearance relatively blindly by blunt transhiatal dissection [55]. Finally, there are the experimentalists who wish to try new techniques and perform the thoracic dissection by the thorascopic-endoscopic approach without opening the chest [17].

ORGAN REPLACEMENT

It is curious that most surgeons can actually mobilize the stomach sufficiently to bring it up into the neck without lengthening procedures, such as in the Gavriliu or Heimlich techniques (see Fig. 20-6). The stomach actually is used for replacement by most surgeons. The colon (right, left, or transverse) (Fig. 20-7) can be used peristaltically or retroperistaltically and was first tried in 1911 [38, 73]. The small bowel is used either preferentially or as a necessity when the stomach has been removed (Fig. 20-8). Roux [59] first described the esophagojejunal anastomosis in 1907. It is feasible to have free arterial grafts of loops of jejunum attached in the neck, done by a Russian in 1956 [8]. Palliative use of jejunum in the subcutaneous or retrosternal route (see Fig. 20-5) was used first by Kirschner in 1920 [41] and recently advocated by Ong [54]. Skin tubes are fraught with complications [61], and artificial tubes of humanmade materials are not practical.

COMPLICATIONS

Patients must realize that every surgical procedure has its complications (morbidity) as well as mortality risks. Wise surgeons very rarely vary their techniques, which have been developed over the years to minimize these recognized complications. It is naive for the surgeon, the patient, or the relatives to think that a major procedure such as an
esophagogastrectomy will be devoid of surprises. This does not mean that the technique should be changed but that the events should be monitored. In this section, complications will be discussed in relation to techniques developed to minimalize them.

CHEST INFECTIONS

Any operation involving opening the chest of an elderly patient with esophageal cancer is liable to be followed by infection. Routine chest physiotherapy is essential, and a good dedicated physiotherapist is worth his or her weight in gold. In my opinion, antibiotics should be given with the premedication and continued for 6–7 days until the chest drain is taken out. A good anesthetist is also essential and, without any objective evidence, my impression over the
years is that some anesthetists deliver fewer chest complications than others involving factors that are not related just to operating time or opening the chest. The fact that most postoperative pneumonias are in the left lower lobe when the right chest is opened suggests something to do with ventilation rate, volume, and pressure. Aspiration into the lungs is to be avoided. The nasogastric tube is essential, and it must be correctly aspirated and sewn to the nostril (cruel but essential) because replacement through an anastomosis is almost impossible.

Adequate pain relief without doping is necessary. The mixture of opiates with nonsteroidal anti-inflammatory drugs has been an advance, but probably the greatest pain relief control has come from spinal anesthesia with mar- caine or opiates and blocks of the intercostal nerves with either local anesthesia or cryosurgery to the nerves (2–3) on either side of the thoracotomy.

I am a firm believer in the overnight ventilation of patients (controversial); a longer period of time makes it difficult to wean the patient from assisted ventilation. The stabilization of respiratory and cardiovascular systems, together with adequate pain relief, blood and fluid replacement, reheating, and avoidance of hypothermia during this period means that the patient returns to the ward relatively rested for his or her first postoperative day. Additionally, it avoids problems with lung expansion if there have been pleural adhesions and with a difficult dissection leading to air leakage that cannot be dealt with by putting the chest drains onto suction. Despite all these precautions, chest infections will be the most frequent postoperative problem; if they suddenly become worse a day or so after initial improvement, beware of an anastomotic leak.

**THROMBOSES AND EMBOLI**

Myocardial infarctions and pulmonary emboli occur frequently, so the usual precautions have to be taken. I do not always give full doses of heparin but very often rely merely on the multiple use of heparin flushes to keep the intravenous lines open after use. Always ask the elderly patient...
Fig. 20-8. Procedures to use after a total gastrectomy: (A) The original Roux-en-Y procedure followed a partial gastrectomy with a gastrojejunostomy (1897). (B) The Roux-en-Y anastomosis can be done after a total gastrectomy with the esophagojejunal anastomosis above or below the diaphragm. (C) The Roux loop (1907) is different from a Roux-en-Y anastomosis and consists of a loop of jejunum completing normal continuity after a total gastrectomy. (D) The Braun anastomosis (1893) is another method used to divert bile from the lower esophagus but is less efficient than a Roux-en-Y anastomosis, taking bile 25 cm away from the esophagus.

whether he or she has been taking regular aspirin. Calf pumps and leg support stockings can be used. There is no doubt that these two complications occur more frequently if other things go wrong. This applies especially to chest infections.

ANASTOMOTIC LEAKAGE

Anastomotic leakage is the main and most dangerous complication, leading to an uncontrollable mediastinitis and sepsis, which are the leading causes of death. Its incidence varies and, to a great extent, is dependent on the surgeon and his or her technique. The nature of the suture material and the method of suturing are of relatively minor importance. It is absolutely clear that there is no single technique for doing the anastomosis (controversial), but a few pertinent comments follow.

The anastomosis must be made without tension. The stomach can be brought up into the neck; there is never any need to stretch it. The esophagus should be cut cleanly across and allowed to retract, with a controlling nonabsorbable suture to keep it from disappearing. No cross-clamp should be applied. Preservation of a good blood supply is essential. Using this technique, there is no tension and all bleeding points can be easily seen and tied. The use of different materials for suturing, the question of whether the suture is continuous or interrupted, or how many layers should be used is as varied as the number of surgeons doing the anastomosis.

Generally, absorbable sutures are not advisable, and it does not matter if the knots of the nonabsorbable suture remain in the lumen. Staples [14, 15] can be used, but in the United Kingdom they cost as much as the government pays the surgeon for performing the whole operation and their use does not necessarily reduce the chances of a leak. The circular staple machines usually insert 10–20 staples, inverting the mucosa into the lumen. It would appear that a similar number of sutures (simple or mattress) and an inversion technique achieve the same degree of safety. A stapled anastomosis is more likely to lead to a subsequent anastomotic stricture.

I am in favor of a second layer of nonabsorbable sutures, hitching the stomach up over the anastomosis and attaching it to the pleura or to the vena azygos to act as a second safe layer. Before this layer is begun, the anastomosis must be inspected along its whole circumference to make sure that there are no defects. There is not enough room for a second layer of the anastomosis if each original suture goes through both mucosa and the full layer of muscle, but this pleural suture is essential to make the anastomosis watertight and to relieve tension. It must not be completely encircling as an abscess can develop locally.

The nasogastric tube is always passed through the anastomosis under direct vision before the final anterior sutures are placed. Postoperative decompression of the distal stomach, removing both air and fluid, is essential by intermittent aspiration, continuous drainage, or both methods. Patients (and this includes the most sensible) frequently pull out the nasal tube, so it is my practice to suture it in situ since its presence is so important. Replacement is difficult and must be done under radiologic control to avoid damage to the anastomosis. Because decompression becomes even more important when there is an anastomotic leak, the usual custom is to leave the nasogastric tube in place until a Gastrografin swallow (meglumine diatrizoate) on the sixth day confirms no leak. Some surgeons, however, are confident enough to feed their patients on the third day.
Finally, all anastomoses should have one, two, or three clips placed on the pleura nearby to identify them either for easy localization in case of a leak or for later possible treatment by radiotherapy or intubation.

**SUBDIAPHRAGMATIC COLLECTIONS**

Collections of blood lead to collections of pus so, although most complications will be intrathoracic, subphrenic abscesses and hematomas exist under the diaphragm and will have complementary changes above the diaphragm. In my opinion, the complications of splenectomy far outweigh the alleged disadvantages of incomplete en bloc resection that can follow splenic preservation. If the spleen, pancreas and, above all, the celiac axis lymph nodes are enlarged with tumor, the procedure is palliative anyway. Preservation of the spleen retains its platelet and immune functions and avoids the dead space that always fills up with blood, which can become infected.

In regard to a pyloroplasty, it would appear that half the surgeons perform one and half do not, thus confirming that surgery is an art and not a science. If a pyloroplasty is not performed, a second operative procedure may have to be done in the first few months postoperatively. I have had to do this once. The knowledge that there is no anastomosis under the diaphragm that can leak is reassuring in the postoperative phase. This is another reason why I favor using the stomach for replacing the missing segment of esophagus rather than using the colon or jejunum. With the colon (feasible but unnecessary) there is a colonic anastomosis that could leak below the diaphragm and a segment of colon prone to infarction. When a total gastrectomy has to be done because of extensive gastric spread, the usual anastomosis is an end-to-side esophagojunostomy [59] brought up into the chest, but a Roux-en-Y anastomosis of 20–25 cm (the length is controversial) has to be done before closing the abdomen (see Fig. 20-8). Complications of leakage or obstruction at any of these sites can occur. An end-to-side anastomosis is advised because there will be less danger of infarction or poor blood supply. Similarly, when an esophagogastrostomy is made, the usual advice is to close the stomach completely and then choose a new and safe area for the anastomosis in the fundus of the stomach where the blood supply is visibly adequate [6]. Care must be taken to maximize the length of the stomach by pinching the walls between the fingers to assess where the apex is before gradually stretching the stomach, being careful not to rotate it incorrectly.

**THORACIC DUCT FISTULA**

The thoracic duct runs anterior to the vertebrae on the right side of the aorta and may be damaged when tumors are difficult to resect and when they are attached firmly by local strictures. Most surgeons have very little experience with this complication (which is associated with a 50 percent mortality) because their technique avoids the thoracic duct without actually identifying it. One colleague with experience with more than 600 cases has seen it on only three occasions. If it occurs more frequently, the duct should be formally identified and routinely ligated. Ligation after a thoracic duct leak has been identified is probably best done subdiaphragmatically, but often the patients are so ill that it should be delayed as long as possible. This has the additional advantage that it may close spontaneously, which is what the majority luckily do. Because the patients are starved in the early postoperative days, the fluid from the fistula is originally clear rather than cloudy, so most must go unrecognized and heal quickly by themselves.

**MORTALITY**

Any one or a combination of these complications can lead to death. The postoperative mortality following an esophagogastrectomy is probably the highest of any routinely performed, scheduled, nonemergency operation. It should be fewer than 10 percent of all patients operated. In 1980, an analysis of the world literature on more than 80,000 patients indicated that the range of postoperative mortality varied between 1 percent [6] and 69 percent [anonymous] with a mean of 29 + 16 (mean + 1 SD) [22]. This must not be interpreted as the true expected incidence because a subsequent analysis in 1990 demonstrated that the mortality had decreased to less than 10 percent [51]. The aim today must be a postoperative mortality of less than 10 percent. It is unrealistic in the Western world, with an aged population suffering from the effects of long-term alcohol and cigarette consumption and presenting relatively late in the disease process, to achieve the 1–3 percent mortality that some authors cite. This figure can be reduced by converting it to a 30-day in-hospital mortality figure, but as most clever junior doctors can keep patients alive much more efficiently now, and because any early death after this operation cannot be judged a success, the more truthful and only acceptable way of measuring postoperative mortality is to state the percentage of all hospital deaths following the operative procedure. Even this will underestimate the true figure because some patients leave the hospital on the fourteenth day and have their fatal pulmonary embolus on the twenty-first day at home. The decision of whether to operate depends on obtaining a correct figure for the postoperative mortality and then putting the correct weighting on its importance for that particular patient.

**OUTCOME AND SURVIVAL**

It is extremely difficult to obtain reliable figures for survival because the data collected are either incomplete or manipulated. There is no protection for the consumer granted by the Trades Description Act, so it is necessary to have some idea of the tricks used in presenting the data. Information given by the Office of Population, Censuses and Surveys in the United Kingdom indicates that the 1-year survival is 18 percent and the 5-year survival is 4 percent [22]. These are actual figures unadjusted by staging or different treatments.
and certainly not age-adjusted, which can always improve survival. The average age at death is 68.0 in men and 72.4 in women compared with an average expectation of life of 70.2 and 76.3, respectively. Thirty-nine percent of the total patients are age 75 or older at presentation.

Most cancers are neither staged nor do they have accurate histology in the cancer registries of the United Kingdom. Data on survival for these pretreatment subsets as well as for treatment, therefore, must be gleaned from the literature. The overall figure of 18 percent 1-year survival can be much improved if only surgical cases are considered, and then 31 percent of the total operated and 45 percent of those resected live 1 year. If the percentage is expressed as the number of those who have been resected, survived (excluding operative mortality), and returned home, the percentage increases to 70 percent. When the resection has been successful with no microscopical evidence of tumor in the longitudinal or lateral margins of the specimen, then 75 percent live 1 year. For 5 years, the mean survival is 4 percent of the original total, 9 percent of those operated on, 12 percent of those resected, and 18 percent of those leaving the hospital after a resection. These figures are not the most modern, so a summary of what current goals should achieve after esophageal resection is (1) less than 10 percent operative mortality, (2) 50–75 percent 1-year survival, and (3) 15–20 percent 5-year survival.

The only place where reliable data can be obtained to assess survival and outcome dependent on tumor staging is from the Japanese Research Society for Oesophageal Diseases [37], which is now a little out of date but nevertheless extremely important (see Table 20-7). Overall operative mortality in this data was 8 percent, 1-year survival 55 percent, and 5-year survival 22 percent. Stage 1 cancers with no nodes should occur at a maximum figure of 10 percent, but the 533 cases in the study represented 30 percent of the expected total, which improved their overall figures. However, the important facts are the 5-year survival figures of those with no local lymph nodes: T, N0 was 61 percent and N0 was 42 percent. With early diagnosis and well-above-average treatment, why was a higher (if not 100 percent) survival rate at 5 years not achieved? Is there a cure for esophageal cancer? This is why I prefer the more pessimistic (but more truthful) description of survival rates rather than cure rates. Can a good surgeon beat the pathologic process of the disease? If not, then do not let the surgeon be the executioner of the poor patient by performing inappropriate radical surgery with a high mortality.

Data have now become more reliable regarding the quantity of life remaining after treatment, with emphasis on operative mortality and survival. The quality of life also is extremely important, and this depends not only on the ability to swallow but also the capability to resume work, do housework, and enjoy leisure [16, 66]. Unfortunately, the health care economists have taken hold of the concept of QALYS to assess whether treatment is worth doing and paying for. It would seem more appropriate for clinicians to agree on measuring methods for assessing quality of life and be wise and humane in their choice of therapy, rather than to enter the field of cost benefits.

ADJUVANT THERAPY

RADIOTHERAPY

There has been no successful prospective randomized trial to compare the outcome of treatment by radical radiotherapy to that of surgical resection for operable esophageal cancer. Phase II data have demonstrated that radical radiotherapy in operable patients can achieve a 1-year survival of 45 percent and a 5-year survival of 14 percent, which is comparable to the overall results of curative surgical resection [23, 56]. In 1993, one can state only that there have been no trials to demonstrate the superiority of one treatment over another.

Radiotherapy has been proved to have an effect on squamous cell carcinoma of the esophagus, and it avoids both an operation and its mortality, but the treatment does last 4–6 weeks and has a morbidity. Radiotherapy is also effective on adenocarcinoma of both the stomach and the esophagus [31, 45]. Without proving it a superior alternative to surgery, should it be used in conjunction with radical resection either before as a preoperative treatment or afterward while considering the surgery merely a debulking procedure and treating the surgical bed postoperatively? Individual surgeons have tried such adjuvant therapy [42], but the added treatment and its morbidity have not provided any worthwhile improvement.

Radical radiotherapy currently is reserved for those with early stage tumors who are not fit for operation. Palliative radiotherapy is given to those with inoperable tumors or if there is a recurrence after a surgical procedure. The usual method of employing radiotherapy is by external beam radiation, but new and unproved techniques are intraoperative radiotherapy [1] and intracavitary irradiation with afterloading into an intraluminal tube [60]. Both of these new methods must be considered palliative only.

CHEMOTHERAPY

Chemotherapy is in a similar position. Tumors have been seen to disappear with chemotherapy and, when used in an adjuvant fashion preoperatively, surgeons have been surprised to find no tumor at operation and have histologic confirmation of this. Supported by the reported success of pre- or postadjuvant chemotherapy [39, 40], the Medical Research Council in the United Kingdom is conducting a prospective randomized trial using cisplatin and fluorouracil, which has been a failure [23, 56]. In 1993, one can state only that there have been no trials to demonstrate the superiority of one treatment over another.

The intergroup trial in North America is assessing cisplatin and fluorouracil, and the International Organization for Statistical Studies of Diseases of the Oesophagus (coordinator, R. Guil) is assessing cisplatin, vindesine, and bleomycin. Adjuvant chemotherapy is used rarely by surgeons and usually in a retroactive way rather than routinely in a proactive fashion. In the future, we are likely to see adjuvant treatment using radiotherapy or chemotherapy be-
cause it is clear that surgical resection has virtually reached its optimum effect and, in any case, only 25 percent or so of patients with esophageal cancer are fit for operation.

LASERS

There is really no evidence that laser therapy achieves anything more than diathermy, but it certainly is easier to use, although far more expensive. The tumor can be destroyed, but the low depth of penetration cannot be interpreted as adequate therapy for the treatment of cancer. A similar criticism can be applied to intracavitary irradiation where the depth of treatment probably is inadequate. However, the treatment of dysphagia by debulking the intraluminal tumor can be very effective, with some long-term survivors. Laser therapy has developed rapidly since it was first used in 1982 [27], and photodynamic sensitivity has been a further step forward [53].

RELIEF OF DYSPHAGIA

It is important to differentiate between the treatment of esophageal cancer and the relief of dysphagia. The basic principles of cancer treatment are achieved by surgical procedure (radical resection), radiotherapy (external beam/radical), and chemotherapy (systemic). The principle of the therapy is to eradicate or control the cancer cells, but the results are limited by the stage and spread of the disease. The treatment of dysphagia must be mechanical, which may or may not involve trying to kill cancer cells by physical waves of electricity, x-rays or light waves, atomic particles, heat, cold, or poisons. This does not imply that these methods cannot give adequate relief of the dysphagia and prolongation of life; it emphasizes that these are not acceptable as cancer therapy. Relief of dysphagia includes: palliative bypass; palliative radiotherapy to debulk the intraluminal tumor; destruction of the intraluminal tumor by diathermy, laser, photodynamic therapy or mechanical debulking by dilatation; intubation that combines debulking with an internal bypass; and intraluminal afterloading brachytherapy. This latter method of radiotherapy can deal successfully with intraluminal tumor but, with such a short field effect, it cannot deal with spread outside the muscle wall. There is a large choice of tubes for intubation [21], including the Souttar [64], Atkinson [10], Mousseau-Barbin [50], and Celestin [13] tubes. At present, there is a tendency to use them with adjuvant therapy.

All of these methods have their place and can be used in combination but do not affect the tumor growth. There is a case to be made for a policy of combining relief of dysphagia with conventional radiotherapy if the patient is likely to survive longer than 3–6 months because some of these tumors progress very slowly.

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