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101 Oesophageal cancers: a surgeon uses radiotherapy

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One hundred and one consecutive patients with oesophageal cancer, cancer of the cardia and gastric cancer extending upwards from the stomach to the oesophagus were treated from 1979 to 1985 with a policy that included radiotherapy treatment for 58. This heterogeneous group, which was considered together as oesophageal cancer, was subdivided according to anatomical location, histology and pretreatment staging. Those patients who could be treated surgically by a resection and anastomosis performed below the diaphragm were excluded. Thirty-five had surgery which was either an oesophagogastrectomy or oesophagojejunostomy with an intrathoracic anastomosis, except for two who were non-resectable. Eight patients were too ill or refused treatment.

The role of radiotherapy was assessed in three groups:

i Operable squamous cell carcinoma of the oesophagus was treated by radical radiotherapy (22) with a 46% 1-year and 14% 5-year survival.

ii Inoperable squamous cell carcinoma of the oesophagus was given radical or palliative radiotherapy (25) with a 16% 1-year and 4% 5-year survival.

iii Non-resectable adenocarcinoma of the stomach or oesophagus was treated palliatively by radiotherapy to debulk the intraluminal tumour (11), all of whom had symptomatic relief of dysphagia.

The results of radical radiotherapy for operable squamous cell carcinoma of the oesophagus were similar to the best results achieved by surgical resection in other series in which there is comparable staging. Radiotherapy should be included in the treatment options for oesophageal cancer.

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There has been uncertainty about the effect of radiotherapy on squamous cell carcinoma of the oesophagus ever since Pearson published his results in 1967, obtaining a 44% 1-year and 22% 5-year survival (*1*). Critics have questioned his method of selection and forgotten the important fact that good results can be obtained with radiotherapy in favourable early stage disease. This study represents all the patients seen by the senior author at The London Hospital and in other clinics between mid-1979 and mid-1985, with a minimum follow-up of 2 years. In most papers on oesophageal cancer the original population is not truly epidemiologically based and usually represents selection to some degree. In this series also, there has been bias, but only by the referring doctor, since all the patients seen during the study period have been included and the series therefore has a much worse spectrum of disease than is usually reported. In most series of oesophageal cancer there is an undefined mixture of squamous cell and adenocarcinoma histology. Additionally there are three separate anatomical groups; (i) true oesophagus, (ii) cardia or gastro-oesophageal junction and (iii) stomach spreading upwards. Carcinoma of the true anatomical oesophagus is mainly squamous cell but a minority of between 3% and 15% are adenocarcinoma. Carcinoma of the cardia may be of either histological type and gastric cancer is almost always adenocarcinoma. At the upper end, post-cricoid carcinoma was excluded and, at the lower end, any operation for carcinoma of the stomach spreading to the cardia that could be removed surgically at laparotomy without thoracotomy was also excluded. Emphasis has been placed on the use of radiotherapy in an attempt to define its role in the treatment of oesophageal cancer. There has been no

Table I. Treatment plan for oesophageal cancer based on anatomical location, histology and operability

Anatomy	*Oesophagus* (*n* = 63)	*Cardia* (*n* = 24)	*Stomach* (*n* = 14)
Histology	Squamous (57) adeno (6)	Adeno (20) squamous (3) oat-cell (1)	Adeno (14)
Operability	Operable (35) inoperable (28)	Operable (22) inoperable (2)	Operable (7) inoperable (7)
Management	DXT (50) resection (5) nil (8)	Resection (20) DXT (2)	Resection (8) DXT (6)
Surgical resection (*n* = 33)	Oesophagogastrectomy adenocarcinoma (5)	Oesophagogastrectomy Ca cardia (20)	Oesophagogastrectomy or jejunal anastomosis—intrathoracic (8)
Radiotherapy (*n* = 58)	Group i (22) Operable sq. cell ca	Group ii (25) Inoperable sq. cell ca	Group iii (11) Non-resectable adenoca oesophagus cardia and stomach

attempt to compare radiotherapy with surgery and no surgical results are presented in detail.

Policy (Table I)

All patients were assessed with a barium swallow, endoscopy, biopsy, chest X-ray and usually a bronchoscopy. CT scanning was not easily available in the early years of the series, although now routinely performed for pre-treatment staging. It has therefore been excluded because the data are incomplete. In Table I will be seen the incidence of the tumour in the three main anatomical locations:

1 True oesophageal cancer divided into cervical, upper, middle and lower oesophagus.
2 Carcinoma of the cardia causing obstruction at the gastro-oesophageal junction.
3 Gastric cancer included only when the origin was below the cardia but the tumour extended upwards so that the surgical approach had to be thoracic as well as abdominal.

Each of these three categories was subdivided according to histology. The patients were then grouped into operable or inoperable on the basis of preoperative staging of the tumour alone, excluding the general condition and age of the patient. Consequently several infirm and unfit elderly patients who would not normally have been treated surgically because of their general condition were included in the operable group. TNM staging was used with evidence of spread being obtained from barium swallow, chest X-ray and bronchoscopy. This method may underestimate the extent of the disease and can not reliably be equated with staging after surgery. The policy described here differed from the usual routine in this country in that:

i Radical radiotherapy rather than surgery was offered to all patients with operable squamous cell carcinoma of the oesophagus.
ii Inoperable squamous cell tumours were treated with radiotherapy instead of surgical resection, bypass or intubation.
iii Non-resectable cancer of the stomach was also given radiotherapy to debulk the intraluminal tumour rather than treated by surgical bypass or intubation.

Surgery was offered to (a) all operable patients with adenocarcinoma of the true oesophagus; (b) operable carcinoma of the cardia whatever the histology and (c) all operable cancer of the stomach. Intubation as a primary treatment procedure was never used, although a few patients were seen who had been intubated elsewhere.

Patients

The age distribution is shown in Fig. 1, compared with the overall incidence in England and Wales. As expected, there is a bias to younger age groups in this hospital series which can be seen most easily in a histogram. Of the 101, 18 were aged 76 years or older, whereas on a epidemiological basis over 40% are in this age group.

The amount of dysphagia (Fig. 2) and duration of symptoms (Fig. 3) confirm that patients wait far too long before diagnosis. The mean weight loss was 9.4 kg. Fourteen had a hiatus hernia, five had a true oesophageal carcinoma in a columnar-cell lined Barrett's oesophagus. Two were overweight at 160 and 127 kg. Seventeen smoked 50 cigarettes or more each day. Sixteen drank one-half to two bottles of spirits each day and three drank more than 10 pints of beer each day. These factors and

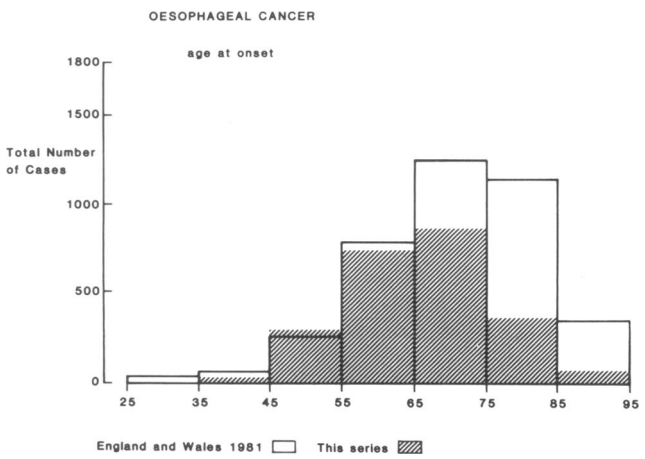

Figure 1. Histogram of the age distribution in this series compared with that of all oesophageal cancer cases in England and Wales, 1981.

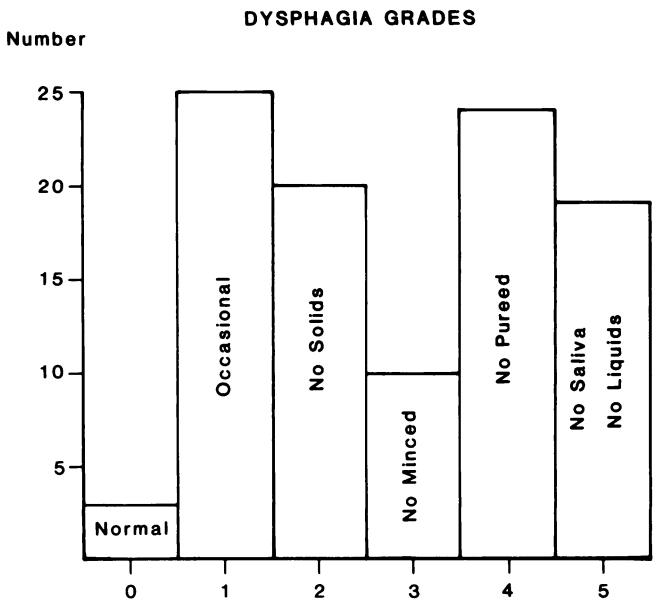

Figure 2. Dysphagia grades at the time of presentation.

excessive alcohol consumption were not used to assess operability but are certainly important predictive risk factors as to whether patients are fit or unfit for major surgery.

The anatomical location of the 101 tumours is shown in Fig. 4. Sixty-three were true oesophageal cancers, 24 cardia and 14 gastric cancers spreading upwards. Of the total 101, 64 were operable and 37 inoperable. Details of subdivisions and treatment given are in Table I.

Histologically, 60 had squamous cell, 40 adeno and one oat-cell carcinoma. All the 14 gastric cancers were adenocarcinomas, 20 out of 24 cardia cancers were adenocarcinomas and 57 of the 63 oesophageal cancers were squamous cell.

Forty-seven patients with squamous cell carcinoma of the oesophagus were divided into operable (22) and

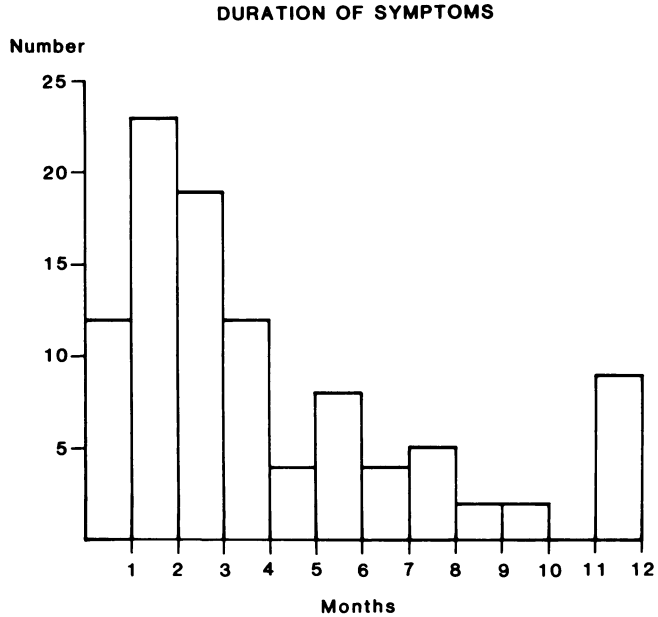

Figure 3. Histogram of the duration of symptoms in 101 oesophageal cancer patients.

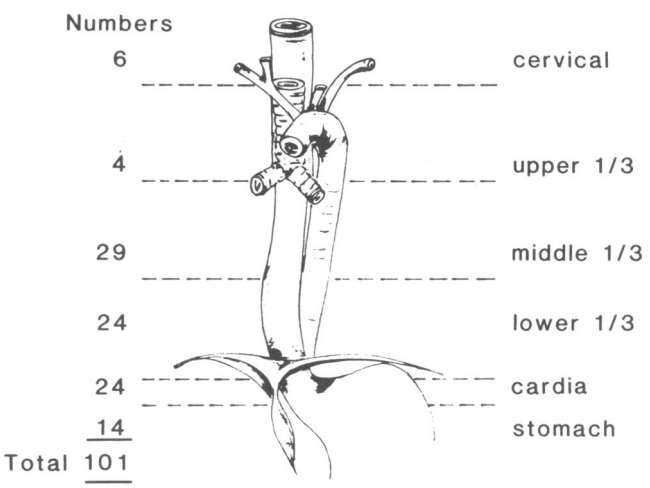

Figure 4. Diagram of the anatomical distribution in this series.

inoperable (25) groups on the basis of TNM staging. In the operable group (22) there were no patients with a T_0 tumour which was not circumferential. The remainder were judged on the basis of the preoperative investigations to be either T_1 or T_2 with no spread into the surrounding structures but clearly this is a clinical not a pathological assessment. The node involvement also could not be accurately gauged and it was presumed, probably incorrectly, that they were all negative. Eight had tumours 4 cm or less, four between 5 and 6 cm, and 10 between 7 and 10 cm. The mean length was 5.9 cm. Three were located in the cervical oesophagus, 13 in the mid-oesophagus and six in the lower part. There were no stage 0 or I tumours and all were grouped as Stage II.

In the inoperable group (25) all patients had tumours which were invading the mediastinum—T_3 or T_4. Five had regional lymph node metastases and two distant metastases. The mean length of the tumours was 8.5 cm and none was less than 6 cm long. Three were located in the cervical oesophagus, three upper, 12 mid and seven lower. Eighteen were Stage III and 7 were Stage IV.

Treatment

A. Radiotherapy

Fifty-eight patients had radiotherapy and these were divided into three different groups:

i Radical radiotherapy for operable squamous cell carcinoma of the oesophagus (22);
ii Palliative radiotherapy for inoperable squamous cell carcinoma of the oesophagus (25);
iii Palliative radiotherapy for non-resectable carcinoma of the stomach spreading up into the oesophagus, and adenocarcinoma or oat-cell carcinoma of the oesophagus (11).

In group (i), 22 patients with squamous cell carcinoma of the oesophagus were treated with a radical course of radiotherapy which was by definition 5000 cGy to

6250 cGy in 20–31 fractions (*see* Fig. 6). Megavoltage irradiation was given by a 5.8 MeV linear accelerator unit or cobalt 60 using a three-field technique (*2*). Palliative radiotherapy was defined as any dose under 5000 cGy. In many cases the patient was too ill to complete the planned course and six died in hospital within 4 weeks. The usual dose of palliative radiotherapy for carcinoma of the stomach was 4000 cGy or less, but two had 4200 and 5300 cGy, respectively.

B. Surgery

Thirty-five patients had surgery, 33 had a resection and two were explored without resection. An oesophagogastrectomy was performed either by an Ivor-Lewis approach (laparotomy and right thoracotomy), or by a left thoracoabdominal approach, the latter mainly for cancer of the cardia.

C. No treatment

Ten patients had no treatment because they were either too ill, refused any definitive therapy with either radiotherapy or surgery, or had surgery but no resection.

Results (Figs. 5, 6)

Of the 101 patients, 28% survived for 1 year, 15% for 2 years and 5% for 5 years or more. In the whole group 18 died within 1 month of diagnosis; seven died after surgery, but the others were terminally ill. Five had no treatment because they were so weak and six died during palliative radiotherapy. Five patients survived for 5 years or more, four having had radiotherapy (one with an inoperable lesion with lymph nodes in the neck) and one having had surgery. Of the 60 squamous cell cancer patients, 28% survived for 1 year, 17% for 2 years and 7% for 5 years. Of the 41 adenocarcinoma patients, 27% survived for 1 year, 12% for 2 years and 2% more than 5 years.

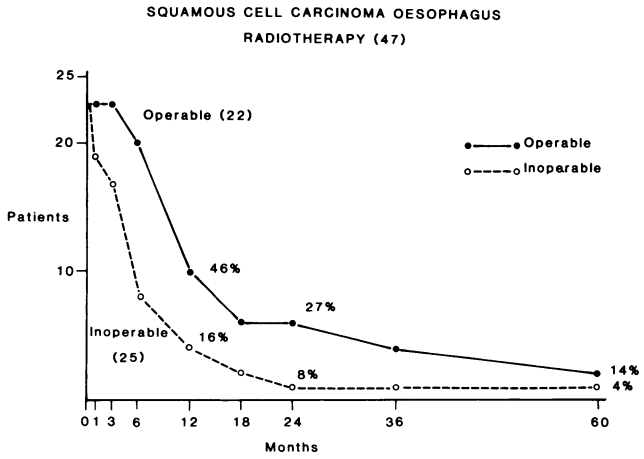

Figure 5. Survival following radiotherapy for operable (22) and inoperable (25) patients with squamous cell carcinoma of the oesophagus.

A. Radiotherapy (Table II) (Figs. 5, 6)

i Twenty-two patients had radiotherapy for operable squamous cell carcinoma of the oesophagus; 10 (46%) survived for 1 year, six (27%) for 2 years and three (14%) for 5 years.

ii Twenty-five patients had radiotherapy for inoperable squamous cell carcinoma. Four (16%) survived for 1 year, two (8%) for 2 years and one for 5 years (4%).

iii Radiotherapy for inoperable adenocarcinoma of the oesophagus, cardia or stomach achieved two long-term survivors at 19 months and 3 years. All the patients were relieved of their original dysphagia, being able to swallow solid food normally or with only occasional difficulty—grade 0 or 1.

Follow-up was incomplete in 15 patients who had radiotherapy so the conservative measurement of the date last seen alive was accepted as their estimated survival. Two were last seen 11 months after first diagnosis and three had operable tumours, given radical radiotherapy, and had no problems, so more would be expected to live at least 12 months.

The mean survival for carcinoma of the oesophagus (63) was 13.8 months, for carcinoma of the cardia 13.7 months and for gastric cancer 5.3 months. The mean survival of the 58 patients who received radiotherapy was 14.8 months, the operable group 20.6 months but the inoperable only 10.2 months.

B. Surgery

Thirty-five patients had surgery either for a carcinoma of the cardia or a gastric cancer and the majority were adenocarcinomas. It is well known that the prognosis for these tumours is worse than with squamous cell carcinoma, so they can in no way be compared with the squamous cell carcinoma patients. The hospital post-operative mortality rate was 7 out of 35 (20%). The mean survival rate following surgery was 11.7 months (range 1–100 months). Cancer of the stomach had a much worse prognosis with a mean of 3.5 months (range 1–7 months) following surgical resection than cancer of the cardia with 16 months.

C. No treatment

Most of the patients too ill for treatment died within 1 month, but one who refused all treatment survived 7 months.

Dilatation and intubation

Eighty dilatations were performed in 42 patients; 35 followed radiotherapy, four were after surgery and three were for symptom relief when no definitive treatment was given.

Twenty-six intubations were performed; 21 Souttar tubes were inserted by the senior author, and three

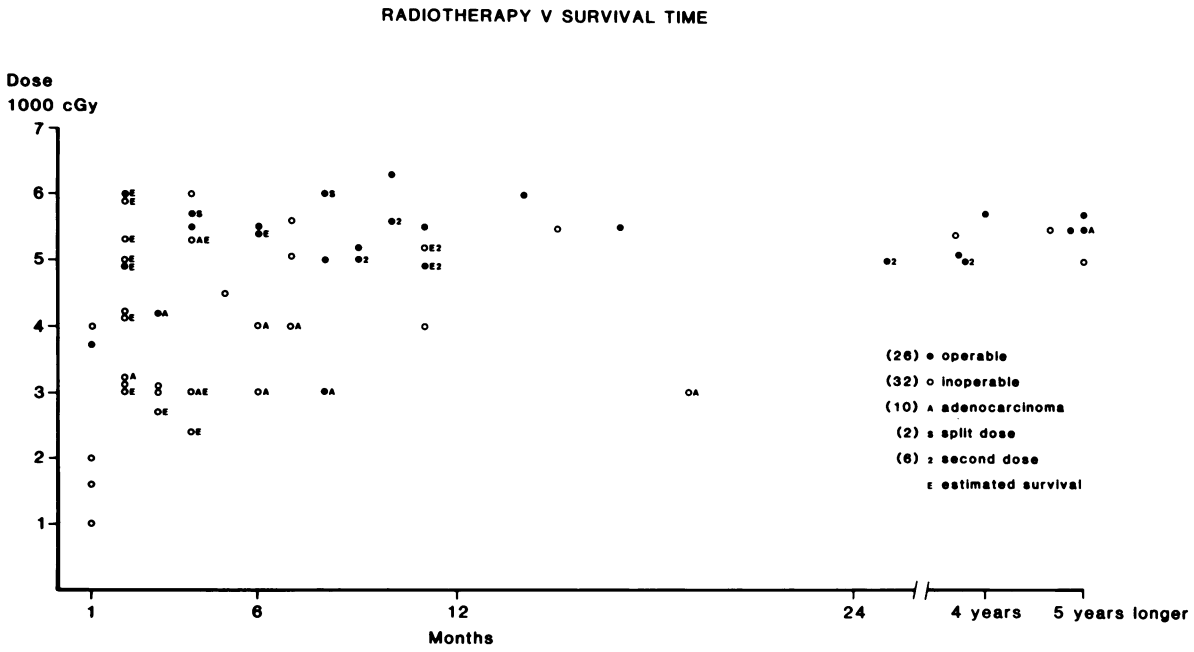

Figure 6. Survival time in 58 patients receiving radiotherapy according to the total dose given with symbols to show operability, histology, split dose and second dose.

Table II. Oesophageal cancer treatment results

		Literature		*Jap Res Soc Esoph Dis (8)*						*Radiotherapy*			
	Epidemiology England and Wales (9)	*Surgery (4)*	*Radiotherapy (5)*	*Surgical treatment according to stage*						*Pearson (1)*	*Earlam/Johnson*		
				Total	T_0T_1	T_2	T_3	N_0	N_1		*Total*	*Inoperable*	*Operable*
Population	49×10^6	83 000	8500	1490	345	792	294	402	822	1640	101	25	22
Operable %		58								19	64	0	100
Resected %		39		100	100	100	100	100	100	0		0	0
Inoperable %		42	51							81	37	100	0
Adenocarcinoma %				4						0	41	0	0
Squamous carcinoma %				90						69	60	100	100
T_0T_1 %				24	100							0	0
T_2 %				55		100				50			
T_3 %				21			100					100	
N_0 %				33				100				0	0
N_4 %				66					100			100	100
Hospital 30 day mortality %		29		8	8	8	8	7	7	0	18	24	0
Mean survival (months)												10.2	20.6
1-year survival %	18	18	18	55	63	57	43	71	48	44	28	16	46
2-year survival %		9	8	34	43	37	20	54	26	27	15	8	27
5-year survival %	5	4	6	22	27	25	10	40	14	22	5	4	14

Celestin and two Nottingham tubes were inserted by other doctors before referral because of complications. One Nottingham and one Celestin tube passed spontaneously per rectum after radiotherapy had debulked the intraluminal tumour. Of the 21 Souttar tubes inserted, two were before radiotherapy and two were during treatment, but this would not nowadays be done. Souttar tubes were inserted in 17 of the 58 patients after radiotherapy with a range of 1–31 months and a mean of 7 months. Seven patients had a fistula; two were traumatic following dilatation, both of which were treated conservatively. Five occurred after radiotherapy, of which two had positive biopsies, and all were intubated with Souttar tubes.

The following were indications for dilatation:

1 Early, during radiotherapy in order to establish liquid feeding through a clinifeed or nasogastric tube if it was impossible to pass them otherwise. With experience an angiogram catheter can usually be passed under radiological control as a guidewire.
2 To debulk an intraluminal tumour which had not decreased in size during radiotherapy.
3 An early radiation-induced fibrotic stricture.
4 Rarely, late fibrosis.
5 A late recurrence, which would then be followed by subsequent intubation or a second course of radiotherapy.

Intubation was originally used during radiotherapy but discarded when experience had been gained with dilatation alone. Tubes were only inserted after assessing the effect of dilatation, with the exception that a fistula always had to be closed-off by a tube. Tubes were never inserted to bridge the gastro-oesophageal junction because this is technically difficult and gives results very much inferior to palliative radiotherapy. The presence of a tube was no contraindication to radiotherapy, but was considered unnecessary and usually resulted in the subsequent spontaneous passage of the tube. A Nottingham tube in the body of the oesophagus always presented difficulty with removal and was never used. Tumour growth above the 10 mm rim of the Souttar tube was not seen after radiotherapy, so the longer and wider rims of the Celestin and Nottingham tubes were deemed unnecessary. Intubation was never used as a primary procedure instead of radiotherapy, so uncontrolled tumour growth above the rim, or obstructing the distal opening, was never seen.

The usual diameters of the 1 mm thick stainless steel Souttar tubes were 10 or 12 mm outside diameter (OD) with internal diameters (ID) of 8 or 10 mm, which is sufficiently large to swallow well-chewed solid food to give a dysphagia grading of 0 or 1. The larger diameter tube of 14 mm OD (12 mm ID) was inserted only when there was a large lumen combined with a fistula. In the absence of a fistula, dilatation to this diameter is sufficient to relieve dysphagia without intubation. As experience was gained with the results of radiotherapy, intubation was used less. In the presence of fibrosis or tumour recurrence, intubation was unnecessary if a diameter of 10 mm could be obtained and maintained by dilatation. Four out of 35 patients needed dilatation after surgery, but none were intubated. Of the 58 patients who had radiotherapy, 35 needed dilatation, 16 only once. Seventeen eventually needed a Souttar tube either to avoid repeated dilatations (4), because of tumour recurrence (8), or a fistula (5). In the favourable operable group with radical radiotherapy, intubation was used in 11 out of 22 and in the inoperable group, who lived for a shorter time, in 6 out of 25. In the eight patients with tumour recurrence, seven were in the operable group and one in the inoperable group. In no instance after a course of radiotherapy did local recurrence present a problem that could not be managed conservatively by radiotherapy (4) or a second intubation (4). Intraluminal recurrence was never treated by surgical excision of the oesophagus, because this was considered inappropriate after radiotherapy.

Lessons to be learned from radiotherapy

The use of radiotherapy brings with it specific complications which have to be treated, just like those which follow an oesophagogastrectomy. Dilatation and intubation must be used to relieve dysphagia in a manner similar to the treatment of a benign stricture. There are other lessons to be learned and close cooperation with the radiotherapist is essential.

Preoperative histology and staging

The original histology was subsequently changed in five patients. This was the reason for treating adenocarcinoma of the oesophagus with radiotherapy in two instances, albeit successfully. The other three were negative biopsies of a carcinoma. Dysphagia, presumed to be due to a benign stricture, that recurs within 1 month of dilatation must be considered a carcinoma, in spite of a negative biopsy. CT scans were not used for staging, but preoperative assessment was based on a general examination, barium swallow, oesophagoscopy, bronchoscopy and chest X-ray. All patients treated surgically in this series were 'downstaged' at the time of the operation. With experience gained later in the series using CT scanning, it is now recommended that a scan from sternal notch to umbilicus is essential for pretreatment staging of the tumour itself, as well as assessing lymph glands, pulmonary and hepatic metastases. However, there are limitations to this technique; operability can not always be assessed and staging can be different after surgery.

Assessment of preoperative surgical risks

The tumours in this study were considered operable or inoperable on the basis of the tumour itself rather than the general condition of the patient. Eighteen were over 76 years of age, which is normally considered a high risk factor. Many smoked over 50 cigarettes a day predisposing them to chest infections but, more ominously, 16

drank ½–2 bottles of spirits (which was usually whisky) a day. These preoperative predictive risks should be assessed in greater detail for surgery. In spite of this, 64% were considered operable compared with many surgical series with 80–90% operability, which confirms that in this study there were more seriously ill patients with late disease than in most surgical series.

Inappropriate radiotherapy

In restrospect, many of the patients should not have been treated at all or not treated for so long. When the mean palliative time achieved is less than 1 year, radiotherapy should not be allowed to last 6 weeks, and it is clear that excessively large doses and long treatment were given in vain. On the other hand, some patients with inoperable tumours survived longer than 1 year and some of these only had palliative radiotherapy. Only two patients had a planned split dose and this is not routinely recommended. In retrospect, very ill patients spent far too long in hospital for treatment and too much rather than too little radiotherapy was given. Ideally, operable favourable patients should be treated as outpatients. The patients who should be assessed more carefully for appropriate radiotherapy in the future are those who require hospital admission, because of general debilitation, inability to swallow and starvation. These patients should be given palliative radiotherapy with 3000 cGy in 2 weeks.

Optimum dosage

The survival times for patients treated with radiotherapy are shown in Fig. 6. There appears to be little correlation between total dosage and survival time and it is not clear what the optimum dose is. It shows that many inoperable patients can survive for a long time with adequate therapy, a few patients with adenocarcinoma survive for longer than 1 year with radiotherapy and that high doses, above 6000 cGy, do not necessarily bring better results. There are no previous dose-searching studies and this is not one either. For the future, dose-searching studies are essential, and the decision when to treat palliatively must be analysed in more detail.

Second dose

In no case was surgery advised for local recurrence after radiotherapy; dilatation with or without intubation was used and in six cases a second dose of radiotherapy was given (Fig. 6). No deduction about long-term survival after a second dose can be calculated from this small number, but patients obtained relief of symptoms and none died with dysphagia in spite of local intraluminal recurrence.

Remaining insoluble problems

Patients with the rare cervical or upper oesophageal cancer which recurs after radiotherapy have previously been advised to have surgical resection which would involve a pharyngolaryngectomy. Often these patients are old and refuse surgery. Dilatation can be done frequently at monthly intervals, which is an exception to the policy of replacing frequent dilatation with intubation because a tube cannot be tolerated or fixed with its rim only a few centimetres below the circopharyngeal sphincter. When a fistula appears at or above the thoracic inlet the authors know of no ideal treatment. Similarly, there is no satisfactory treatment for the irritative cough when recurrent tumour infiltrates at the carina with or without a fistula. The oesophagus can be intubated to prevent leakage but this does not prevent a cough due to irritation from intratracheal tumour. However, hoarseness, if it involves the recurrent laryngeal nerve and causes vocal cord paralysis, can be treated successfully by Teflon® injection into the cord.

The main lesson to be learned is that close cooperation between surgeon and radiotherapist is essential. The authors see the patient and a close relative at weekly intervals during the radiotherapy to help with nutritional advice and other problems. In many instances the radiation treatment causes as much distress as an oesophagogastrectomy so careful monitoring is essential. The use of CT has now extended to the actual planning of the treatment fields, which leads to greater accuracy and less damage to surrounding tissues. The authors, who accept that they are not trained radiotherapists, can see no theoretical grounds for extending treatment over more than 20 fractions in 4 weeks, during which time a minimum dose of 5000 to 5500 cGy can be given. They base this opinion on the practical facts that the patient should not spend too many of his remaining months visiting hospitals, and morale sinks very low after 4 weeks of treatment without any appreciable increase in survival or symptom relief being gained by lengthier courses of radiotherapy.

Discussion

The purpose of this study has been to analyse the place of radiotherapy in the treatment of carcinoma of the oesophagus. All the patients seen with these diseases have been included in this series and the radiotherapy used has been in radical or palliative doses for so called operable or inoperable tumours. The three instances where radiotherapy has been tested are:

i Operable squamous cell carcinoma of the oesophagus;
ii Inoperable squamous cell carcinoma of the oesophagus;
iii Inoperable non-resectable adenocarcinoma of the stomach and oesophagus.

It must be emphasised that squamous cell carcinoma of the oesophagus is only treated by resection in 25% of the total and that radical resection, on so-called curable lesions, occurs in less than 15%. Consequently, the treatment for oesophageal cancer in the majority of

patients is in fact palliative. It is just as important to find the optimum treatment for these patients as for the more favourable case.

The most controversial group in this study are the 22 patients with an operable squamous cell carcinoma of the oesophagus who were treated by radical radiotherapy and had a 46% 1-year, 27% 2-year and 14% 5-year survival. Radiotherapy avoids an operation and avoids an operative mortality which should be 10% or less within 30 days, but when all deaths in hospital are included is usually higher *(3)*. If the mortality of surgery reaches 30%, which is a historical figure gleaned from the literature *(4)*, then both patient and surgeon should consider referral to a specialised unit. The figure of 46% 1-year survival in this study is a minimum figure because 15 patients were incompletely followed up. Two had been seen alive at 11 months and three had had a radical course of radiotherapy, so it would be expected that the figure of 10 1-year survivors out of 22 would have been increased to between 12 and 15 which is 54–68% if a full follow-up had been achieved. This represents a phase II study and cannot be used to show the superiority of radiotherapy over surgery for operable squamous cell carcinoma.

The 25 inoperable patients treated with radiotherapy represent another phase II study, in addition to Pearson's *(1)*, and demonstrate good results with radiotherapy but do not indicate its superiority over palliative surgery or intubation *(5)*. Similarly, in non-resectable carcinoma of the stomach causing dysphagia because of oesophageal spread, the previously accepted treatment has been to perform a palliative resection, a bypass or an intubation. Radiotherapy has not been advised previously in stomach cancer in spite of previous evidence *(6,7)* because there is a misconception that adenocarcinomas are not susceptible to radiotherapy. Once again in a phase II study the efficacy of radiotherapy in achieving symptom relief by debulking the intraluminal tumour has been demonstrated. The superiority of this approach over bypass or intubation has not been shown. The way forward is to a phase III prospective trial.

It is very difficult to compare this treatment with other series, some of which contain adenocarcinoma and most of which have no TNM staging. Some comparable figures have been analysed in Table II. By far the best study is the large, well-documented series from the Japanese Research Society for Esophageal Diseases *(8)* where the surgical results are correlated with staging after resection. T_0T_1 and N_0 cases are extremely rare even in Japan, so the true comparison should be with the T_2, T_3 and N_1 cases. If the N_1 cases are chosen for the true comparison on the basis that the majority of oesophageal cancer patients in the UK have locally involved lymph nodes, it will be clear from Pearson's figures *(1)* and the group of 22 operable squamous cell oesophageal cancers in this study that radiotherapy achieves remarkably similar results to that of surgery in Japan for N_1 cases, namely a 1-year survival of 48%, 2 years 26% and 5 years 14%. It is absolutely imperative that a prospective randomised clinical trial should be carried out.

The surgical authors would like to thank their radiotherapy colleagues, Dr Hopestone, Dr Hanham, Dr Mantell and Dr Mair for their close cooperation.

Addendum

A phase III prospective randomised trial was started by the Medical Research Council in 1987 to obtain an answer. Those who entered the trial to assess the results of radiotherapy were more highly selected than the 22 in this series because they had to be under 75 years and have had a CT scan to exclude distant metastases and tumour spread below the diaphragm. The expected survival for both treatment modalities was calculated on a 45% 1-year, 20% 2-year and 10% 5-year survival rate. Recruitment was very slow and the planned accrual rate of 100 per annum for 3–4 years could not be achieved. The trial was abandoned in December 1988.

References

1 Pearson JG. The radiotherapy of carcinoma of the oesophagus and post cricoid region in South East Scotland. *Clin Radiol* 1966;**17**:242–57.

2 Mantell BS. Intrathoracic tumours. In: Hopestone HF ed. *Radiotherapy in Clinical Practice.* London: Butterworths, 1986;145–76.

3 Matthews HR, Powell DJ, McConkey CC. Effect of surgical experience on the results of resection for oesophageal carcinoma. *Br J Surg* 1986;**73**:621–3.

4 Earlam RJ, Cunha-Melo JR. Oesophageal squamous cell carcinoma: I, A critical review of surgery. *Br J Surg* 1980;**67**:381–90.

5 Earlam RJ, Cunha-Melo JR. Oesophageal squamous cell carcinoma: II, A critical review of radiotherapy. *Br J Surg* 1980;**67**:457–61.

6 Priestman TJ. Gastrointestinal carcinomata. In: Hopestone HF ed. *Radiotherapy in Clinical Practice.* London: Butterworths, 1986:316–36.

7 Mantell BS. Radiotherapy for dysphagia due to gastric carcinoma. *Br J Surg* 1982;**69**:69–70.

8 Japanese Research Society for Esophageal Diseases, National Cancer Centre, Tokyo. The report of treatment results of esophageal carcinoma in Japan 1969–1973.

9 Earlam R, Cunha-Melo JR, Donnan SPB, Evans SJW. The epidemiology of oesophageal cancer with special reference to England and Wales. *Ital J Gastroenterol* 1982;**14**:244–9.

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