

# CARCINOMA OF THE OESOPHAGUS AND GASTRIC CARDIA\*

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This paper has been stimulated by a controversy which has developed in surgical and radio-therapeutic clinics throughout the world, during the last decade. Before this time surgery for carcinoma of the oesophagus was seldom undertaken and carried such a high mortality that it was only the few pioneers in this field of surgery who persisted in this form of treatment. More recently the technical details have been perfected to a degree that operation even on aged patients has become relatively safe and in many instances the mortality is below 10%.

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All the European cases seen at the Johannesburg General Hospital during the last 5 years have been investigated and an analysis will be made of the form of treatment and the survival rate. Eighty such patients were admitted; of these many were treated throughout by myself, (Group II—Table IX) and others, admitted into general surgeons' wards, were oesophagoscoped by myself while the surgeon concerned carried out subsequent treatment (Group I—Table VIII); some have received both surgery and radio-therapy, others radio-therapy alone (Group III—Table X), while a proportion have had no treatment (Group IV—Table XI). Altogether

10 other surgeons, both thoracic and general, were concerned with the treatment of these cases and amongst them performed 20 operations (Group I)—all on hospital patients—, while 17 were done by myself (Group II). No attempt has been made to ascertain the number of patients that were attended privately, but they were probably very few.

### ETIOLOGY

**Heredity.** Clarke and McConnell<sup>1</sup> of Liverpool have recorded 6 cases occurring in one family in 2 generations. It is significant that 5 of these cases were females and that they developed their cancer at a younger age than is the usual average (the youngest was 29 and the oldest 57). Only 2 of the 6 were tested for blood grouping, one being A and the other B. (A statistically significant association has recently been observed between blood-group A and carcinoma of the stomach—Aird *et al.*<sup>2</sup>) Stranahan *et al.*<sup>10</sup> found that in their series of 64 cases 30% had a positive family-history of carcinoma elsewhere. Wu *et al.*<sup>3</sup> found 22.1% of his patients had a family history of carcinoma (as opposed to 5.5% in a random group of 200 patients admitted for other causes).

**Diet.** Wu *et al.*<sup>3</sup> investigated 172 cases and found carcinoma commoner in the north-eastern provinces of China, where the populace eat maize, millet and kaoliang, which are rougher than rice, which is eaten more commonly in the south. Kaoliang is thought to have carcinogenic properties. He found 50% of the patients were habitual drinkers of pai-can, a beverage containing 60% to 85% alcohol distilled from kaoliang. In Japan the high incidence of oesophageal carcinoma in males is ascribed to the fact that they receive the first and hottest portion of rice, and drink saki. Of Nightingale's 413 cases,<sup>4</sup> only 4 indulged excessively in hot drinks and 65 drank alcohol excessively; 48 were heavy smokers. Of Stranahan's 64 cases,<sup>10</sup> 20 were moderately heavy drinkers.

In this present series records are deficient in many respects and the history of alcohol or smoking has not been recorded; 5 were known to be heavy drinkers and one habitually chewed tobacco.

**Benign Lesions.** Carcinoma does not commonly occur in benign lesions. There were less than 50 such cases reported up to 1943 (quoted by Nightingale<sup>4</sup>).

There are numerous instances of the growth occurring in association with caustic strictures. Kiviranta<sup>5</sup> of Finland found 9 in 381 cases of corrosion, while Nightingale<sup>4</sup> found 30 references to this association.

**Syphilis and Leucoplakia.** These have long been considered pre-cancerous conditions in the mouth and throat but there is no reference to any positive association with them in the modern literature on carcinoma of the oesophagus.

**Occupation.** A high incidence of cases has been reported amongst barmen and commercial travellers. Stranahan *et al.*<sup>10</sup> had 3 bartenders in their series of 64 cases. The hospital records of the present series in respect of occupation are defective. The number of farmers in the group is worthy of note, but there is no indication of how long the patient had been farming.

**Economic Status.** The vast majority of cases occur

amongst the lower-income group. Parker *et al.*,<sup>7</sup> reporting from the Roper Hospital, South Carolina, found 163 (96%) of 170 cases were in hospital-type patients, although the proportion of hospital to private patients in this institution was 1 to 2.

**Sex.** Throughout the world generally males are more prone to develop this disease than females. Table I

TABLE I

Author	Year	Cases	Males %	Females %
Nightingale <sup>4</sup> .. .. *	1954	341	82.7	17.3
USA (official figures) ..	1941-50	32,922	79.7	20.3
England .. .. .	—	—	61.8	38.2
Parker <sup>7</sup> (S. Carolina) ..	1952	*	±50	±50
Wu <sup>3</sup> (China) .. .. .	—	—	92.3	7.7
Garlock <sup>25</sup> .. .. .	1954	457	66.7	33.3
Nylander <sup>17</sup> (Helsinki) ..	1952	—	48.4	51.6
Elfskind <sup>37</sup> (Oslo) .. ..	—	44	82	18
Stranahan <sup>10</sup> .. .. .	1950	64	85.9	14.1
Fuller .. .. .	1955	80	85	15

\* 14% White, 86% Coloured.

gives the relative proportion from a number of sources. In the present series of 80, 85% were males and 15% females.

**Age.** In Garlock's series<sup>25</sup> 67% of cases of oesophageal carcinoma were between 50 and 70 years of age. With adenocarcinoma of the cardia 20% of the cases were between 30 and 50. Oesophageal carcinoma has been reported in infants of 2 years, and it is common in patients over 80.

**Incidence.** In the USA from 1946 to 1950 oesophageal carcinoma accounted for 1.8% of all neoplasms (Nightingale<sup>4</sup>). Palmer<sup>6</sup> quotes figures, based largely on German sources, showing that oesophageal carcinoma accounted for 7.1% of 37,377 necropsies performed for malignant diseases. Of 636 cases of intrathoracic malignancy reviewed by D. Adler (personal communication) in Johannesburg, 12% were primarily oesophageal. Of all cancer cases at the New York Memorial Hospital since 1940, 3% were oesophageal in origin (Watson *et al.*<sup>9</sup>). In the Roper Hospital from January 1940 to January 1951 there were 155 admissions for carcinoma of the oesophagus, 146 of the stomach and 130 of the colon and rectum (Parker *et al.*<sup>7</sup>). According to Sweet,<sup>8</sup> 2,700 persons die yearly of carcinoma of the oesophagus in the USA and this form of cancer is the fourth in frequency. In various other statistics 4-10% of all cancer deaths are due to oesophageal cancer.

There appears to have been an increase in the incidence of this disease; much of the apparent increase may be due to the greater interest in the lesion and better diagnostic facilities. In 1934 there were in the USA 2,243 deaths from oesophageal carcinoma, whereas there were 3,953 in 1949; the intervening years showed a progressive increase while the number of deaths from neoplasms of stomach, intestine, rectum and anus remained much the same.

The annual death rate from cancer of the oesophagus per 100,000 population (based on death registration) was as follows: in the USA 1.0 (1915), 1.7 (1932); in England and Wales 5.9; in Scotland 3.5.

## SURGICAL ANATOMY

The oesophagus is 25-27 cm. in length, measured from the cricopharyngeus muscle to the gastric cardia. It is however, generally measured from the upper incisors, which are 15 cm. above the cricopharyngeus. It is narrowed at 4 points—at its commencement, at the level of the aortic arch (20 cm.), at the left main bronchus (22 cm.) and at the cardia. Disease is commonest at these levels. It is lined by stratified squamous epithelium and has two muscular coats—an inner circular and an outer longitudinal. There is no serous covering, the organ lying throughout its length in a loose areolar network, consisting of nerve fibres, blood vessels, and lymphatic channels which communicate with the rich submucosal lymphatic system.

*These lymphatics* drain into 4 sets of lymph nodes. In the upper region (cervical and superior mediastinal) the drainage is mainly to the deep cervical groups of glands. In the middle portion drainage is to the pulmonary hilar groups of glands and to posterior mediastinal glands lying alongside the oesophagus in the inferior pulmonary ligaments. From these regions the drainage is up to the cervical region or down to the coeliac group of glands and the glands around the cardia. Drainage from the lowest portion of the oesophagus is to the glands alongside the gastric cardia and the lesser curvature, and to the coeliac group of glands. The lymphatic drainage of the gastric cardia is to the glands along the lesser curvature and to the coeliac glands. Drainage also occurs along the course of the vasa brevia to the spleen and thence to the lymphatic nodes along the course of the splenic vein.

According to the surgical approach the oesophagus can be divided into 3 regions:

(a) The cervical region, where treatment need be only local, not necessitating a transthoracic approach.

(b) Upper thoracic (3/4ths of the thoracic oesophagus), extending from the thoracic inlet to 2 inches above the diaphragm. Resection at this level demands a supra-aortic or even a cervical anastomosis.

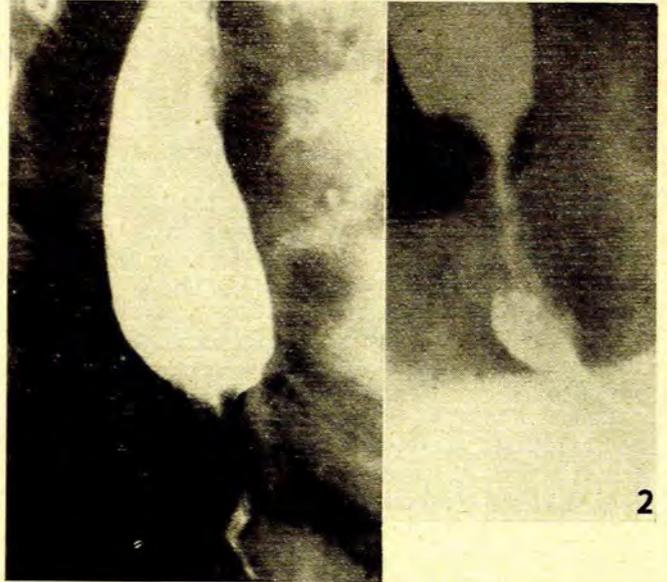
(c) Lower thoracic and abdominal. Here infra-aortic anastomosis will suffice.

(d) Carcinoma of the gastric cardia is generally grouped with lower oesophageal carcinoma and its approach is therefore included here. An infra-aortic anastomosis is generally adequate, but total gastrectomy is necessary for a radical cure, when continuity is effected by oesophago-jejunostomy or by using a colon graft. Retention of the pyloric antrum and anastomosis with this is justifiable if the growth is well localized to the cardia.

## PATHOLOGY

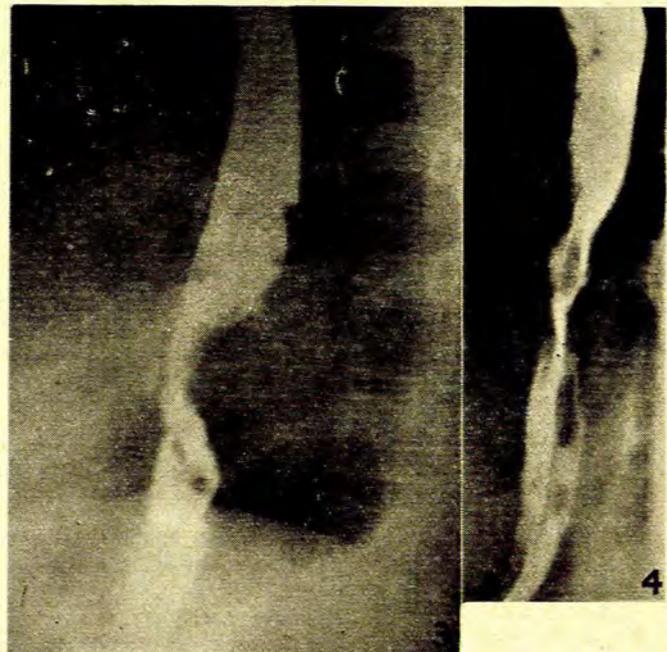
Carcinoma of the oesophagus is generally of the squamous (epidermoid) type. Adenocarcinoma has been described, possibly arising in mucous glands or in areas of ectopic gastric mucosa. Parker *et al.*<sup>7</sup> were unable to trace any case of primary adenocarcinoma from 170 cases seen during the previous 11½ years. Adenocarcinoma arising in the gastric cardia may infiltrate for considerable distances up the oesophagus (Fig. 1).

The gross lesion may be one of 3 varieties. (1) The scirrhus type (Fig. 2) produces a circumferential constriction and early symptoms from dysphagia. It



Figs. 1 and 2

infiltrates the submucous and muscle layers but metastasizes relatively late. It is the best variety for resection. (2) The proliferating or cauliflower type (Fig. 3) causes obstruction by virtue of its bulk. It bleeds easily and spreads to lymphatic glands early. Being frequently anaplastic it is the least satisfactory to treat. (3) The



Figs. 3 and 4.

ulcerating variety (Fig. 4) forms shallow superficial ulcers which cause less dysphagia. There is often pain associated with this type and local spread through the full thickness of the oesophageal wall causes early adherence to adjacent structures and perforation.

Of primary oesophageal carcinomas, 10% occur in the cervical region, 20% in the region immediately above and below the diaphragm, and 70% in the remainder of the oesophagus.

*Carcinoma in the cervical oesophagus*—hypopharyngeal or post-cricoid—occurs in a greater proportion of females. Many of these lesions may be indistinguishable from those arising in the posterior larynx which have spread to the oesophagus. Growths here spread to adjacent structures and to the deep cervical group of lymph-glands. The swelling of the enlarged glands in the neck may be the first sign of a small primary lesion, although a prior difficulty in swallowing or odynophagia (a fullness, oppression or sticking sensation) has frequently been labelled 'neurosis'. The association of post-cricoid carcinoma with Plummer-Vinson syndrome is well known.

Because of local oedema of the larynx and trachea as well as involvement of the recurrent laryngeal nerves, hoarseness is a common symptom. With increasing difficulty in swallowing, a spill-over into the larynx and trachea leads to the development of an 'oesophageal lung' with broncho-pneumonia and lung abscess. In one of the cases in this series there was a lung abscess with a diameter of 7 cm. in the right upper lobe associated with a carcinoma of the cervical oesophagus.

*Carcinoma of the thoracic oesophagus* does not behave in any essential way differently from its counterpart in the cervical region. These growths spread in the submucous layer both proximally and distally for considerable lengths. Multiple oesophageal lesions occur. Such satellite growths probably represent submucosal spread rather than implantation growths. Nightingale<sup>4</sup> had 9 of 413 cases with dual growths and Walther<sup>41</sup> 8 out of 72. In one case in this series a mucosal nodule was seen on oesophagoscopy examination 10 cm. above the main growth.

Perforations into trachea, bronchus, mediastinum or aorta account for a large number of deaths. Cough or haemoptysis may be an indication of bronchial involvement, and in one case seen the first sign of any untoward happening was a severe choking attack and bout of coughing lasting 4 hours, following which there was an established broncho-oesophageal fistula. Commencing perforation of the aorta may be heralded by a small brisk haematemesis followed in a few hours or days by a torrential fatal haemorrhage. Because of the close proximity of the many structures at the pulmonary hila, carcinoma arising at this level early involves these structures and a greater number of inoperable cases will be encountered here, as well as at the thoracic inlet.

Secondary growths in the oesophagus are not common, occurring in decreasing frequency in bronchogenic carcinoma, thyroid and laryngeal carcinoma, and tumours of the adrenal.

There are no reports of carcinoma following scleroderma.

*Carcinoma of the gastric cardia* involves the lower oesophagus, sooner or later producing symptoms of dysphagia. Earlier symptoms are high epigastric pain and indigestion. Occult bleeding occurs and may produce a severe anaemia, while frank bleeding also occurs. This is less common in the ordinary squamous carcinoma of the oesophagus (except where the aorta is involved). Growths from the cardia may extend a considerable way up the oesophagus, while direct spread down the lesser curvature may extend right to the prepyloric region, resulting in a high recurrence rate if any portion of the stomach is used for anastomotic purposes. Secondary infiltration to the glands in the lesser sac and along the splenic vessels makes a wide removal and total gastrectomy desirable. Metastases in the liver occur earlier than they do from the squamous growths of the oesophagus.

*Metastasis.* Many of the earlier writers were well aware of the fact that carcinomas originating in the oesophageal mucosa were resectable, pathologically speaking, in a fairly large number of cases. Debaquey and Oschner<sup>11</sup> report that 40.7% of 1,025 collected cases showed no evidence of metastases at autopsy.

TABLE II

	Necropsies	% Free of Metastases
Debaquey <sup>11</sup> (New Orleans) .. .. .	1,025	40.7
Helsley <sup>13</sup> (Vienna, 1923) .. .. .	70	64
Raven <sup>44</sup> (St. Bart's Hospital, London, 1931)	41	21
Zuppinger <sup>43</sup> (Zurich, 1936) .. .. .	—	33
Watson <sup>9</sup> (New York, 1936) .. .. .	—	±50

Helsley,<sup>13</sup> in 1923, studied 70 fatal cases at the Franz Joseph Hospital in Vienna. He found 64% of the tumours purely local, with no metastases to the regional lymphatic nodes. Among 49 necropsies at the Cork County Hospital in Chicago 28.5% of the tumours had not metastasized (see Table II).

Death results from perforation into an adjacent vital structure, 'spill-over' lung-abscess and broncho-pneumonia, or starvation. Generally the higher the lesion the sooner will inhalation lung-abscess occur. In lesions at or above the pulmonary hila, fistulous communications with the trachea or bronchi cause coughing and choking during swallowing and the early development of inhalation infection of the lungs.

Carcinoma infiltrating the vertebrae will cause pain, often with segmental radiation. However, pain itself is not necessarily an indication of spread to neighbouring structures, and many writers have found operable growths in cases in whom pain had been a dominant symptom. In these cases malignant ulceration with secondary infection may engender a muscular spasm which is the cause of the pain. Possibly also involvement of the autonomic nerves may result in reflex pain.

## SYMPTOMS

Cancer of the oesophagus may develop very insidiously and reference to Tables VII, IX, X and XI will indicate how variable is the interval between onset of symptoms and admission to hospital. A number of patients admit

to only a few weeks symptoms although when first seen the local growth is well advanced. On the other hand careful questioning will in many instances reveal the fact that a mild disturbance in the swallowing mechanism or pain on swallowing has long been present.

*Dysphagia* is the commonest symptom and sooner or later will present in all cases. It is generally first noticed when swallowing bulky foods such as meat or bread-crusts. There is a sense of the food being held up, the site of which is often accurately localized by the patient. After a while he may feel the food passing, or a drink of water may be necessary to help it through. Frequently, however, the food is returned, the 'vomit' containing no digested material and no gastric acid. Ultimately the patient learns to avoid the offending articles of food and may be content to continue on his new restricted diet until the constricted oesophageal lumen becomes completely obstructed by some food particle or he has to resort to living on a liquid diet.

In cervical and upper oesophageal growths a sense of oppression in the throat or behind the upper sternum and a feeling of something 'sticking' (odynophagia) leads to persistent swallowing. Spill-over to the larynx causes coughing on swallowing.

*Pain.* At first there may be a burning pain on swallowing, particularly with lower lesions, when a high epigastric pain is felt, frequently diagnosed as indigestion. Pain does not necessarily mean that the growth is inoperable. It was present in 6 out of 7 cases in whom Meredith Brown<sup>26</sup> was able to do a radical resection.

*The vomiting* is not true vomiting, but a regurgitation of oesophageal contents (see above).

*Hoarseness* occurs in lesions above the aortic arch and is due to involvement of the larynx, or of the recurrent laryngeal nerves.

*Loss of weight* is almost invariable, although adequate nourishment can often be taken until complete obstruction suddenly supervenes. Loss of weight therefore may have been noticed over many months or only for a few days, during which time little or no nourishment may have been taken. It is due to starvation and dehydration and rarely at first to malignant cachexia.

*Halitosis* is a common symptom due either to tissue break-down and secondary infection in a cervical oesophageal carcinoma or to putrefaction in the stagnant oesophageal contents.

*Haemorrhage.* Occult bleeding leads to an iron-deficiency anaemia. Fresh haematemesis are often an indication of impending doom; they may indicate commencing perforation of the aorta. When this occurs there are often a few small 'pilot' bleeds before the sudden massive fatal haemorrhage. Haemoptysis may indicate involvement of the trachea or bronchus.

*Cough* is common and is caused by fullness of the proximal oesophagus, when further attempts at swallowing cause spill-over into the larynx and down the trachea. High oesophageal carcinoma may also alter the normally smooth swallowing mechanism and produce a neuromuscular incoordination. Oesophago-bronchial or oesophago-tracheal fistulae result in coughing whenever any food is swallowed. An inhalation bronchopneumonia develops, with subsequent abscess formation.

Fulminating pulmonary infection is a common cause of death in the debilitated or those not adequately protected by antibiotics.

*A lump in the neck* produced by enlarged cervical glands may be the first manifestation of a primary oesophageal carcinoma.

*Swelling of the abdomen and legs* is due to a nutritional oedema resulting from inadequate intake of proteins over a long period, and later to liver infiltration and failure.

*Uraemia* is a pre-terminal condition resulting from dehydration and prolonged vomiting and often precipitated by the old age of the patients.

#### INVESTIGATION

*The history and clinical findings* will often suffice to enable the surgeon to make a confident diagnosis.

*Barium swallow and X-ray* will confirm his suspicions. It must be emphasized that a small lesion may be missed on screening. In one of our cases no lesion was seen on X-ray examination, but the physician was convinced on clinical evidence that a lesion was present and within a few days a carcinoma was demonstrated by further studies. Carcinoma of the gastric cardia is notoriously difficult to visualize radiologically.

*Oesophagoscopy.* This is the most important single investigation and should be employed in all cases of dysphagia where no clear-cut radiological or clinical diagnosis can be made. In early or doubtful cases oesophagoscopy may show a growth before a lesion can be demonstrated radiologically. Garlock<sup>25</sup> had reported oesophagoscopy to have been positive in 208 of 214 cases. In the series under review a positive histological diagnosis was obtained in all but 4 of the cases that were examined.

#### TREATMENT

The available methods of treatment are surgery and radiotherapy. The results of both are disappointing but, on the evidence, surgery at present appears to offer the better chance of cure. Recorded five-year cures are few, partly because much of the work in this field has only developed in recent years. However, the period of survival of the cases dying after surgery gives cause for a measure of optimism. By the same token, radio-

TABLE III

Author	Year of Report	Number of Cases	Operative Mortality Deaths in Hospital
H. D. Adams <sup>12</sup> .. .. .	1941	68	50%
Wu <sup>3</sup> .. .. .	1943	120	35.8%
Garlock <sup>20</sup> .. .. .	1944	60	48%
W. E. Adams <sup>21</sup> .. .. .	1947	60	30%
Sweet <sup>5</sup> .. .. .	1948	189	15.9%
Wu <sup>3</sup> .. .. .	1949-50	39	5%
Fuller .. .. .	1955	17	11.7%

therapeutic technique has changed in recent years and it is probable that better results will be obtained in cases subjected to this form of treatment latterly. The mortality from surgery must be weighed against the

possible benefits, but with suitable selection and preparation of the patient, surgery in the hands of those who have had adequate experience has become a relatively safe procedure, with mortality figures no greater than for many other major surgical procedures (Table III).

No distinction is made in Table III between high-level and low-level lesions. The mortality rate in low-level carcinoma is less than in that at the aortic arch or above, although some recent writers have been able to produce results from the higher lesions comparable with those from lower down. In some instances carcinoma of the gastric cardia is included in the series, as it is in mine.

In my series one patient died during the operation. In another patient, in whom the growth was found to be infiltrating the left main bronchus and an old pulmonary tuberculosis had produced extensive dense pleural adhesions, the stripping of which resulted in much lung damage, a supra-aortic oesophago-gastrostomy was performed without removal of the tumour. He died on the 8th post-operative day from an oesophageal leak at the site of the tumour, and empyema. In the remainder of the cases radical resection was performed.

In most of the reported series the commonest cause of death is leakage at the site of anastomosis and resultant empyema. Other common causes of death are post-operative atelectasis and pulmonary infections, coronary thrombosis (common in many series), and pulmonary embolus. Hepato-renal failure also occurs.

#### *Survival after Surgery.*

This depends upon whether there was lymph-node involvement at the time of operation. The published series do not generally classify their patients into those in whom there was such involvement and those in whom there was not. Sweet<sup>28</sup> however, in a masterly review, has attempted to draw a distinction between those in whom a 'curative' resection was done and those which had lymph-node involvement, in whom a 5-year cure could not be anticipated. His over-all 5-year survival-rate out of 120 resected cases in the middle third of the oesophagus was 4%, but of 31 'curative' resections there was a 50% 3-year survival and so far a 14% 5-year survival, although many who have lived 3-years were not operated upon long enough ago for a 5-year appraisal. In growths of the lower third of the oesophagus he has a 17% 5-year survival out of 82 cases. From 67 growths of the gastric cardia in whom 'curative' resection was carried out there was a 44% 3-year survival and 34% 5-year survival; the over-all 5-year survival rate for growths at this level is 5%.

In view of the large numbers of cases found at autopsy in whom no lymph-nodes have been found to be involved (28% to 60%) carcinoma of the oesophagus would appear to be unusually amenable to eradication by surgery or radiotherapy. However, lesions under the aortic arch or adjacent to the left main bronchus produce fatal results by perforation of these structures. It should be within the scope of surgeons versed in these techniques to excise portions of the aorta and replace them with arterial or plastic grafts. Removal of a section of

trachea within the thorax may also be feasible, although few of the reported attempts to replace defects of the trachea by grafts have been successful. The cervical trachea, however, can readily be removed along with the larynx and cervical oesophagus.

Table IV gives an indication of the mortality rates and survival rates with lesions at various levels. The division of the oesophagus into upper, middle and lower thirds is rather arbitrary and many carcinomas of the upper third are really hypopharyngeal growths or may have originated in the larynx. For these the Wookey operation has been performed. For carcinoma below the

TABLE IV. MORTALITY RATES

Author	Total Cases	Death	Mortality
<i>Upper Third</i>			
Chauncey <sup>29</sup> .. ..	7	2	28.6%
Garlock <sup>25</sup> (1954) .. ..	16 <sup>1</sup>	10	60%
Sweet <sup>16</sup> (1952) .. ..	17 <sup>2</sup>	0	0%
Grimes <sup>27</sup> (1952) .. ..	17 <sup>2</sup>	2	12%
<i>Middle Third (supra-aortic anastomosis)</i>			
Garlock <sup>25</sup> (1954) .. ..	43	14	24%
Sweet <sup>33</sup> (1954) .. ..	120	30	25%
	31 <sup>3</sup>	6	20%
Sellers <sup>17</sup> (1952) .. ..	60	16	26%
Nakayama <sup>16</sup> (1954) .. ..	84 <sup>4</sup>	11	13.1%
	14 <sup>5</sup>	0	0%
Wu <sup>3</sup> (1951) .. ..	55	—	24.4%
Watson <sup>9</sup> (1954) .. ..	45 <sup>6</sup>	11	24.4%
<i>Lower Third (infra-aortic anastomosis)</i>			
Garlock <sup>25</sup> (1954) .. ..	32	11	34%
Sweet <sup>33</sup> (1954) .. ..	82 <sup>7</sup>	—	7%
Sellers <sup>17</sup> (1952) .. ..	27	6	22%
Nakayama <sup>16</sup> (1954) .. ..	224 <sup>7</sup>	6	2.5%
Wu <sup>3</sup> (1951) .. ..	33	—	18.5%
Elfskind <sup>37</sup> (1952) .. ..	24	4	16.7%
<i>Carcinoma of the Gastric Cardia</i>			
Garlock <sup>25</sup> (1954) .. ..	187	—	24.7%
Sweet <sup>33</sup> (1954) .. ..	85	—	14%
	67 <sup>3</sup>	—	7%
Clagett <sup>35</sup> (1946) .. ..	33	—	13%
Wu <sup>3</sup> (1951) .. ..	38	—	12.5%
Chauncey <sup>29</sup> .. ..	23	5	21%

1. Thorek operation. 2. Wookey operation. 3. 'Curative'. 4. Anterior extrathoracic anastomosis. 2. Right thoraco-abdominal approach. 3. Right approach. 7. Including carcinoma of the cardia.

post-cricoid level continuity can be established by pharyngo-gastrostomy. It matters little whether an anastomosis is performed in the chest above the aortic arch or in the neck. In fact a higher-level anastomosis can certainly be performed at less risk of its breaking down, and if need be can be completed at a later stage. It is generally accepted though that post-cricoid carcinoma of the oesophagus is best treated by radiotherapy.

The excellent 3- and 5-year survival rates in Sweet's 'curative' series and Garlock's series are astonishing in view of the age of many of these patients, who must

TABLE V. SURVIVAL RATES

Author	Total cases	Situation	Survival Rates				Years
			2	3	4	5	
Chauncey <sup>29</sup>	7	Upper third	—	—	—	16.6	
Garlock <sup>25</sup>	43	Middle third	—	—	—	10	
Sweet <sup>33</sup>	120	Middle third	—	—	20	4	
	31 <sup>1</sup>	Middle third	—	—	50	14	
Nakayama <sup>16</sup>	14 <sup>2</sup>	Middle third	—	18	—	—	
Garlock <sup>25</sup>	32	Lower third	—	—	—	41.6	
Sweet <sup>33</sup>	82	Lower third and cardia	—	—	—	17	
Nakayama <sup>16</sup>	244	Lower third and cardia	—	—	25	—	
Sweet <sup>33</sup>	85	Cardia	—	5	—	3%	
	67 <sup>1</sup>	Cardia	—	44	—	34	
Clagett <sup>35</sup>	33	Cardia	27	12	9	3	

1. 'Curative', 2. Right thoraco-abdominal approach.

TABLE VI. RESECTABILITY RATES

Author	Total Cases	Situation	Resectability
Sweet <sup>28</sup>	17	Upper third	58%
Sweet <sup>28</sup>	120	Middle third	69%
Wu <sup>3</sup>	55	Middle third	50.9%
Sweet <sup>28</sup>	82	Lower third and Cardia	85%
Wu <sup>3</sup>	33	Lower third	81.8%
Garlock <sup>25</sup>	187	Cardia	45.4%
Wu <sup>3</sup>	38	Cardia	63.2%
Chauncey <sup>29</sup>	23	Cardia	82%

surely fall by the wayside through unrelated disease and illness. Garlock selects his cases carefully. A 5-year survival rate of 41.6% for lower third carcinoma cannot be matched by those of us who do not discriminate as he does (see Tables V & VI).

#### Assessment and Pre-operative Preparation

Apart from the routine assessment and preparation of any surgical case there are certain features which require special attention.

1. *Blood Chemistry.* Where there has been dysphagia of moderate or severe degree, nutrition is seriously affected. Blood proteins are deficient and serum and tissue electrolytes may be disturbed. There is often anaemia. Serum-protein estimations must always be made and operation deferred if there is diminution of the total serum-proteins or a disturbance of the normal albumin/globulin ratio. Where possible a high-protein diet of 2,500–3,000 calories daily should be given, with egg flips, meat and cheese and one of the common powdered protein foods, such as 'Procasenol'. Vitamins B and C must be given by mouth or by injection. Pre-operative blood transfusion should be administered even if the blood count is normal; the count may be misleading in the presence of haemoconcentration associated with dehydration, and also it has been shown that a condition of 'chronic shock' may exist in these patients, which is best combated by blood transfusion. Gastrostomy or jejunostomy may be necessary as a preliminary in order to facilitate the feeding of these cases. Often, however, oral feeds augmented by daily intravenous dextrose-water and amino-acid infusion for several days before operation will suffice.

2. *Local Toilet to the Oesophagus.* This is important should there be much retained material in the oesophagus which stagnates and putrefies, producing foul-smelling

eructation. The oesophagus should be carefully washed out for 2–3 days beforehand and oral antibiotics in the form of penicillin lozenges or streptomycin water given. These measures are necessary in order to minimize the chance of infection in the mediastinum and chest if the oesophagus has to be opened, and to lessen the oesophagitis which often exists as a result of the putrefaction within its lumen.

3. *Attention to the Lungs.* Breathing exercises and general limb exercises are very important; posturing may drain suppuration in the lungs. The sputum should be cultured and sensitivity tests done on the organisms so that an appropriate antibiotic can be prescribed. Post-operative cough is often very troublesome, exhausting to the patient and causing atelectasis of the lung if secretions accumulate. All these complications add to the length of convalescence and may leave permanent after-effects.

4. *The Anaesthetic.* This must be left to a competent anaesthetist. Many oesophageal surgical procedures are lengthy and many of the post-operative pulmonary and other complications can be avoided by a good anaesthetist.

#### SURGERY FOR CARCINOMA OF THE OESOPHAGUS AND GASTRIC CARDIA

In 1913 Torek<sup>14</sup> reported the first successful resection of carcinoma of the thoracic oesophagus. He used a right-sided approach and the patient died 12 years later from pneumonia at the age of 80. By 1937 no other 5-year survivals had been recorded. In 1933 Ohsawa<sup>39</sup> reported 8 cases, performing the first successful endothoracic oesophagogastric anastomosis.

In 1938 Adams and Phemister<sup>15</sup> reported the first successful resection of the lower oesophagus by oesophago-gastrostomy outside of Japan. In 1943 Garlock accomplished the first successful resection with oesophago-gastrostomy for carcinoma of the middle third of the oesophagus. In 1944 Sweet succeeded in performing a supra-aortic anastomosis.

In the earlier operations open anaesthesia was used without controlled respiration. The oesophagus was removed by transthoracic approach but continuity was established by designing a presternal skin or rubber tube and joining this proximally with the cervical oesophagus and distally with the stomach, or jejunal graft anastomosed to the stomach, as practised by Grey Turner and Torek. Later the stomach was used to bridge the gap by bringing it up to the neck through a subcutaneous tunnel. It is interesting to note that Radford<sup>18</sup> performed the first successful oesophageal resection without establishing continuity in South Africa in 1937. Since then the right transpleural approach (Ivor Lewis) has been popularized by Franklin and a left thoraco-abdominal approach carried out by others. Each has its advantages. All however are agreed that for carcinoma of the lower third of the oesophagus and gastric cardia a left thoraco-abdominal one-stage procedure should be employed, with the use of either a greater-curvature stomach tube to bridge the gap, or a jejunal graft or Roux-en-Y jejunal loop. For

carcinoma of the gastric cardia, where the lymphatic drainage runs along the fundal as well as the coeliac vessels, and drains to the lymph nodes along the splenic vessels to above the body of the pancreas, a large block-dissection should be effected with total gastrectomy and removal of the spleen and tail of the pancreas as well as the lymph nodes along the left gastric artery. Where the carcinoma is localized to the cardia it may be permissible to retain the pyloric antrum and use this for anastomatic purposes.

Nakayama<sup>16</sup> (Japan) advocates the right thoraco-abdominal approach for carcinoma of the middle and upper third of the oesophagus. Watson<sup>9</sup>, of the New York Memorial Hospital, also advocates a one-stage right thoraco-abdominal approach with one or two teams. Others, such as Sellors<sup>17</sup> and MacManus<sup>34</sup> recommend a two-stage procedure, the first a laparotomy with mobilization of the stomach, followed by a right-sided thoracotomy performed in the face-down position.

Up to the present I have used a left thoraco-abdominal approach in all cases. The aortic arch, however, is a source of technical difficulty, particularly if the carcinoma is situated under the arch, where mobilization may be difficult. This could be overcome by ligation of the upper intercostal vessels and mobilizing of the aortic arch. Approach from the right side only necessitates division of the azygos vein to provide access to a lesion at this site. If one were to contemplate the need to resect a segment of the aorta along with the growth the approach would have to be through the left chest. For mid-thoracic or upper thoracic oesophageal resection Conerly<sup>30</sup> makes an abdominal and anterior thoracic attack through the third space, with the patient lying supine, the right shoulder being slightly raised. Two teams can work simultaneously and the approach has the advantage that a cervical anastomosis can be carried out without turning the patient; also the diaphragm does not have to be incised.

#### RADIOTHERAPY

This is administered to cases of squamous-celled carcinoma of the oesophagus. Adenocarcinoma of the cardia rarely, if ever, responds to radiation; yet we have used it in some cases post-operatively. In assessing the value of the radiotherapy a variety of factors require consideration.

##### 1. Radiation Techniques.

Detailed discussion of this is beyond the scope of this paper, but as I see it there are 4 technical or anatomical approaches that are employed. The object in each is to provide a tumour-lethal dose at the site of the lesion as well as to include as much of the field of lymphatic drainage as possible. The difficulties are the great depth from the surface of most carcinomas of the oesophagus, with consequent extensive irradiation of the skin and all tissues in the path of radiation.

(a) *Teleradiation.* This is the form of therapy which has been most used, a dose of approximately 6,000 r being delivered to the tumour. In order to do this, multiple portals of entry have to be employed—4-8 fields, all converging on the tumour. In this way exten-

sive skin-necrosis is avoided. In Sweden the 'rotation' method has been used in recent years. In this the patient is rotated through 360 degrees. At the Johannesburg General Hospital during the last 2 or 3 years the grid system has been used. With this method 12,000 r skin-dose can be given to each of the 2 fields without severe skin-damage.

(b) *Intra-cavitary radiation* provides a high local dose without producing the severe constitutional disturbances that one often sees following teleradiation. For this, radio-active cobalt in a suitable container, or radium needles in a Levine tube or Souttars tube have been used here. The method of Zuppinger of intra-cavitary radiation plus teleradiation to the lymphatic field is a method we choose to use in those suitable cases in which surgery is contra-indicated and yet a long-term result is attempted. Intra-cavitary radiation generally succeeds in destroying the primary lesion. For this, a tumour dose of 6,000 r at 1 cm. is aimed at. Generally we use 4 x 5-mg. radium needles, left in position for 70-120 hours. The tumour disappears after this treatment, often leaving a circumferential fibrous cicatrix which may require frequent bouginage. The radiations, however, have no value in arresting the progression of metastatic lesions in the adjacent mediastinum. In very debilitated patients, or those already exhibiting evidence of distant spread of cancer, intra-cavitary radiation alone is employed. This improves the swallowing and enables the patient to live out his remaining days in greater comfort.

(c) *Radon seeds or radium needles* can be inserted into the tumour. This method has not been practised here, and because of the difficulty of access to the distal end of the carcinomatous stricture it is unlikely to be of much use. However for small local growths there may be a place for this form of therapy.

(d) *High-Voltage Radiation.* This is delivered through machines producing a voltage of one million and more. The practical and theoretical considerations do not differ much from those that obtain for teleradiation with the more commonplace apparatus, and in published series the results have not been any better.

##### 2. Palliative or Curative

While it may be true that frequently the radiotherapist is confronted largely with patients that have been considered unsuitable for surgery, this can only apply to cases of oesophageal carcinoma seen within the last decade; little surgery was undertaken for the radical cure of this lesion before that time. There has therefore been ample time in which to follow up the possible benefits to otherwise operable patients who were treated before the advent of the modern surgical techniques. Comparisons between the results of surgery and radiotherapy administered in recent years, unless in parallel series of cases, may be invidious. The figures to be presented later in this paper for survival rates in patients who received only radiotherapy were so disappointing that surgical attack on this cancer had become long overdue. Now that the operative mortality has been reduced to 10% and less, and because of the high percentage of resectable cases, radiation given alone as a

'curative' measure must take second place to surgery, unless and until better results from radiotherapy are achieved.

Radiotherapy as a palliative measure is invaluable. It will diminish the size of the growth, may destroy the primary lesion completely and reproduce a normal swallowing mechanism and remove all the distressing symptoms associated with the inability to swallow.

### 3. The Field Irradiated

Early spread of a mid-thoracic oesophageal carcinoma to the lymph-nodes at the gastric cardia and the coeliac axis has been demonstrated by many surgeons. In one of the cases in the series at present under review, where the primary growth was the smallest encountered, being no more than about 2 cm. in its longest diameter, and situated immediately below the aortic arch, and in whom there was only a 5-week history of symptoms, a malignant gland was removed at operation from the coeliac group of glands. In none of the cases I have encountered, which have received telerradiation to the mediastinum, was the epigastrium included in the fields. It would appear to me that if radiotherapy is to offer the same chance of cure as surgery, the whole of the mediastinum together with the epigastrium must be included in the field of effective radiation. This is a larger area than most radiotherapists are prepared to expose. I maintain also that if the combined results of surgery plus radiotherapy are to be improved, then this same large field must be given adequate irradiation. I am surprised at the few cases that I have found mentioned by a very large number of authors, in which Radiation was used as a supportive measure for surgery.

The results of radiotherapy have been appallingly bad (see Table VII).

Seventy per cent of oesophageal carcinomas occur in the upper 3/4ths of the thoracic oesophagus. For all of these lesions a supra-aortic or even cervical anastomosis should be performed. The mortality for this lengthier procedure is higher than for those lower down, and the early infiltration of the vital peri-oesophageal structures precludes the carrying out of radical resection in a greater proportion of cases. However, in those in whom no clinical spread outside the oesophageal wall can be found, the opportunity of surgical removal should be afforded the patient. Although intracavitary radium may sterilize the primary lesion, metastatic lymph-nodes respond less well to radiation. Good surgical dissection offers a better chance of removal of these lymph-nodes. For the remaining 20% that appear in the distal fourth of the oesophagus, and for all growths of the gastric cardia, surgery is without doubt the method of choice. Oesophageal carcinomata here, lying as they do in the loose areolar tissue of the mediastinum, invade vital structures much later. Their spread is proximally in the wall of the oesophagus and by lymphatic permeation to the glands surrounding the cardia, to those along the lesser curvature, and to the coeliac group of glands. Direct spread to the crura of the diaphragm is combated by excising the infiltrated portions *en masse* with the tumour. By performing a total gastrectomy the chance of recurrence in the gastric stump is obviated, although the use of a greater-curvature tube may at times be justified. Block removal of the lymphatic field is a relatively easy manoeuvre.

For adenocarcinoma of the gastric cardia radiotherapy is of little or no value, and a widespread block-removal of stomach, spleen, tail of pancreas and coeliac glands, together with an adequate amount of the distal oesophagus, offers the best chance of cure with the least operative mortality.

TABLE VII. RESULTS OF RADIOTHERAPY

Author	No. of Cases	Survival Rate (Years)			
		2	3	4	5
Watson <sup>19</sup>	68 (receiving 'most recent' advances in therapy)	2	—	—	—
Buschke <sup>22</sup>	19 treated curatively (supervoltage machine)	5	—	—	3 (15.8%)
Scheel <sup>24</sup>	228 (ordinary roentgentherapy)	13%	1.8%	—	1.7%
Gynnings <sup>31</sup>	88	—	6	4	2 (3%)
Kohler <sup>23</sup>	296	3%	—	—	0.66%
Krebs <sup>38</sup>	217 (rotation technique)	80% mortality after 12 months			
Nelsen <sup>12</sup>	174 (rotation technique)	75% mortality after 12 months			
Frimann-Dahl <sup>36</sup>	41 early and small lesions (rotation technique)	No survivors after 4 years			

### RADICAL SURGERY OR RADIOTHERAPY?

The location of the tumour and its histological nature should be guiding factors in deciding what form of therapy is indicated. Other considerations are the general physical state of the patient and the presence of distant metastases or other constitutional diseases.

1. *Site of the Tumour.* Less than 10% occur in the lower hypopharyngeal and cervical oesophageal region. Surgery at this level often necessitates removal of the larynx and is very mutilating. It is generally conceded that radiotherapy offers less morbidity and quite as good a chance of palliation, if not cure. No cases of carcinoma of the cervical oesophagus were subjected to surgery in the present series.

2. *Histology of the Tumour.* Surgery is the only effective weapon against adenocarcinoma of the cardia. This will apply also to the rare adenocarcinomas arising primarily in the oesophagus. Very anaplastic tumours metastasize early and results with both surgery and radiotherapy are disappointing. In many of these cases the symptoms have been of short duration. Conversely a long history in the presence of an operable growth is a good prognostic sign. Wu<sup>3</sup> found that most of the anaplastic growths occurred in the younger patients, and only 1 of 7 of his patients under the age of 40 was resectable, whereas his over-all resectability rate was 47.1%.

3. *Age of the Patient.* The vast majority of the patients are over the age of 50. The operative mortality in Sweet's cases was found to increase with age. It was 6% for patients under the age of 45 and 25% for those over the age of 65 years. Old age alone, however, is not an absolute contra-indication and many successful resections have been carried out in patients over the age of 70. In my series 4 cases over the age of 70 were resected without any operative mortality.

4. *Other Disabilities.* Because of the old age of so many reported cases cardiovascular diseases are common, and by far the greater number of post-operative deaths are due to coronary thrombosis, pulmonary embolus, respiratory infection and focal necrosis of the stomach due to thrombosis occurring in the arteriosclerotic gastric vessels. Five of my successfully resected patients had had other illnesses. Two had coronary thrombosis (one fibrillating at the time of operation), one diabetes mellitus, one cardiospasm, and one a slow-growing carcinoma of the breast with a large hard lymph-node in the axilla. She refused treatment for this lesion and 12 months later is well, with considerable regression of the breast tumour and its lymph-node.

#### DISCUSSION

What is the expectancy of life of a patient presenting with oesophageal carcinoma? Wu<sup>3</sup> found only 1 of 76 cases of non-resectable tumour alive after 6 months, while Parker<sup>7</sup> assessed the average survival rate from onset of symptoms in non-resectable cases to be 8 months. Stranahan *et al.*<sup>10</sup> reviewed 64 cases up to 1950 and found the average period of survivals for patients receiving X-ray therapy to be 5.2 months, while it was

6.3 months for those receiving no treatment and 9 months for those subjected to resection.

In considering the average length of survival of surgically treated patients, those dying directly as the result of the operation must be included. A reduction, therefore, in the operative mortality will increase this average length of survival. Improved operative technique, too, will reduce operative mortality and render radical surgical removal more effective. Nevertheless, in spite of this, an inevitable mortality must remain because of the old age of many of these patients, and deaths from coronary thrombosis will continue to take their toll. It is unlikely that earlier diagnosis will result in an appreciable increase in the proportion of resectable cases, unless the public themselves become more cancer-conscious, as they have done in the USA, and present themselves to their doctors sooner than they do. On the other hand much of the delay is the fault of the doctor. A common early diagnosis for post-cricoid carcinoma is hysteria, while many a patient presenting with an unaccountable cough has not had a barium swallow done to exclude oesophageal disease.

Garlock was unable to detect any relationship between the duration of the symptoms and the operability and resectability at the time of the operation. He thought the operability rate for carcinoma of the gastric cardia less than for carcinoma of the oesophagus, because of a tendency for the former to metastasize to the liver, and because fewer cases present in the first 3 months after the commencement of the symptoms. A study of the tables (Tables VIII-XI) of the various groups of cases (Groups I-IV) will give an indication of the ages, length of symptoms before admission, treatment and survival of all the cases where records are adequate.

TABLE VIII. GROUP I. CASES TREATED BY OPERATION

Case	Sex	Age	Duration of Symptoms	Site and Type of Growth	Operation	Remarks	Survival
20	M	64	4 m.	Sq. lower oes.	OG	glands	7 m.
24	M	54	2½ m.	Undifferentiated AC oes.	OGR	—	14 d.
25	M	61	9 m.	Sq. lower oes.	OG	glands	9 d.
31	M	58	9 m.	AC cardia	OGR	secondaries in paracolic gutter	6 d.
32	M	48	2 m.	AC cardia	TGOJ	no glands	13 m.
33	F	60	3 m.	AC cardia	TGOJ	no glands	3½ m.
34	F	58	6 m.	AC cardia	OGR	glands and secondaries in liver	4 m.
44	M	51	3 m.	Sq. mid-oes.	OGR	glands	6 d.
46	M	53	5 w.	Sq. mid-oes.	OGR	glands	10 d.
50	M	36	6 m.	Sq. mid-oes.	TL	Inoperable glands	13 d.
51	F	59	5 m.	Sq. lower oes.	L	liver secondaries	8 m.
55	M	79	4 m.	Sq. mid-oes.	ATR1	nil	2 d.
58	M	71	2 m.	Sq. lower oes.	OGR	glands	31 d.
60	F	46	3 m.	AC cardia	L	inoperable	no record
63	M	64	—	AC lower third	OGR	—	4 d.
64	M	48	4 m.	AC cardia	OGR	glands	4 m.
67	M	58	—	Sq. lower oes.	OGR	—	died on table
71	M	63	2½ m.	Sq. mid-oes.	ATR2	nil	5 d.
72	M	59	4 m.	AC cardia	OG	glands	no record
78	M	70	3 m.	Sq. lower oes.	TGOJ	no glands	7 m.

OGR=oesophago-gastrostomy with resection. TGOJ=total gastrectomy and oesophago-jejunosotomy. TL=thoraco-laparotomy. ATR1=1st stage abdomino-thoracic resection. ATR2=2nd stage ditto. OG=oesophago-gastrostomy. L=laparotomy. AC=adenocarcinoma. Sq=squamous carcinoma. Oes=oesophageal. d.=days. w.=weeks. m.=months. y.=years.

In 20 cases there were 12 operative deaths (60%) and only 1 survived longer than 1 year. There is no record whether the lesion in cases 24 and 63 was primarily of oesophageal origin or gastric carcinoma infiltrating the oesophagus.

The length of survival after operation (where recorded—18 cases) was as follows (the bracketed figures represent deaths):

Months	0-3	3-6	6-9	9-12	12-15
Cases	0 (11)	0 (3)	0 (3)	0	0 (1)

TABLE IX. GROUP II. CASES TREATED BY OPERATION

Case	Sex	Age	Duration of Symptoms	Site and Type of Growth	Operation	Remarks	Survival
1	F	61	4 m.	Sq. lower third	TGOJ	and radiotherapy	alive after 17 m.
2	F	71	9 m.	AC cardia	OGR	glands present and Ca breast	alive after 15 m.
3	M	58	4½ m.	AC cardia	TGOJ	and radiotherapy	7 m.
4	F	50	5 m.	AC cardia	TGOJ	and radiotherapy	alive after 10 m.
5	M	60		Sq. mid-third	OGR	glands: radium	alive after 27 m.
6	M	67	8 m.	Anaplastic Sq. mid third	OG	inoperable	10 d.
7	M	46	1 y.	AC lower third	TGOJ	glands: radiotherapy	20 m.†
8	M	68	4 m.	AC cardia	Exploration only	inoperable	1 m.
9	M	67	7 m.	AC cardia	TGOJ	extensive direct spread	died on the table
10	M	47	3 m.	AC cardia	TGOJ	radium and radiotherapy	alive after 19 m.
11	M	70	*	AC cardia	OGR	no glands	15 m.‡
12	M	73	6 w.	Sq. mid-third	OGR	glands	10 m.
13	M	72	9 m.	Sq. lower third	OGR	double Ca: radium	4 m.
14	M	68	12 m.	Sq. mid-third	OGR	glands radiotherapy	alive after 3 m.
15	M	58	5 m.	Sq. mid-third	OGR	post-operative radium	21 m.
16	M	40	4 m.	AC cardia	Exploration only	inoperable	5 m.
80	M	51	1 y.	AC cardia	OGR		well 1 m. later

For index to contractions, see Table VIII.

\* Cardiospasm all his life. † Intestinal obstruction: no secondaries. ‡ Anastomotic recurrence.

In 17 cases there were 2 operative deaths (11.7%). In the 14 'curative' operations there was only 1 death (7%).

The time of survival after operation in the 17 cases was as follows (the bracketed figures represent deaths):

Months	0-3	3-6	6-9	9-12	12-15	15-18	18-24	27
Cases	1 (3)	1 (2)	(1)	1 (1)	0	1 (1)	2 (2)	1

Of the 7 patients who have survived more than 1 year, one died after 15 months from recurrence of growth at the anastomosis, one 20 months after operation from an acute intestinal obstruction, necropsy showing no evidence of cancer, and one of 'malnutrition' 21 months after operation. The last-mentioned was the only African in this series and was not attended medically for the last 14 months of his life.

TABLE X. GROUP III. RADIUM THERAPY AND INTRACAVITARY RADIUM ONLY

Case	Sex	Age	Duration of Symptoms	Intra-cavitary Radium	Teleradiation Tumour Dose	Survival after Admission
16	M	40	4 m.	6000 r		—
17	M	78	4 m.	5000 r		10 d.†
18	M	80	7 m.	5300 r	2 grids 5000 r	alive 13 m. later
19	M	79	5 m.	5500 r	2 grids 5000 r	alive 12 m. later
20	M	64	4 m.		multiple fields 1750 r	7 m.
21	M	71	14 m.	5000 r		9 w.
22	M	46	3 m.		4700 r	3 m.
23	M	78	3 w.		multiple fields 6500 r	2 w.
26	M	53	9 w.		3 fields 4500 r	4 m.
28	F	77	—		3 fields 5300 r	7 m.
35	M	57	18 m.		multiple fields to the neck	alive 4 m. later
36	F	47	6 m.	1000 r	8 fields 6000 r	—
37	M	74	18 m.	5000 r		6 m.
38	M	52	6 w.			8 m.
40	M	66	3 m.	4000 r		2 m.
42	M	76	9 m.	1500 r		6 m.
50	M	36	6 w.	1000 r		4 w.
52	M	64	2 m.	6500 r	2 grids 6000 r	6 m.
53	M	74	*		2 grids 6000 r	alive 23 m. later
57	M	68	3 m.		5 fields 5700 r	14 w.
62	M	55	10 m.		3 fields 4250 r	alive 6 m. later
69	M	77	—	5000 r	3 fields 4000 r	8 m.

\* Duodenal ulcer 5 years.

† Died of coronary thrombosis.

The length of survival after operation in the 20 cases that were traced was as follows (the bracketed figures represent deaths):

Months	0-3	3-6	6-9	9-12	13	23
Cases	1 (5)	2 (5)	(4)	1	1	1

Case 20 was subjected to operation and found to be unresectable, and a side-to-side oesophago-gastrostomy was performed. Case 16 was given intracavitary radium after exploration had demonstrated peritoneal secondaries. Case 50 was likewise subjected to exploration, having previously had intracavitary radiation. Cases 19 and 53, both of whom have done well with radio-therapy alone, had negative biopsies at oesophagoscopy, even though radiologically and on endoscopy they were thought to have carcinoma.

TABLE XI. GROUP IV. NO TREATMENT

Case	Sex	Age	Duration of Symptoms before Admission	Survival after Admission
21	M	71	—	2 m.
27	M	87	—	10 d.
29	M	61	3 m.	—
30	M	67	1 y.	—
39	M	78	3 w.	17 d.
41	M	73	5 m.	—
43	M	71	1 y.	—
45	M	83	1 y.	1 m.
48	F	58	—	—
54	M	80	months	10 d.
56	M	69	—	18 d.
59	M	79	4 w.	7 d.
60	F	46	3 m.*	—
61	F	75	2 y.	2 d.
65	M	80	9 m.	15 d.
66	F	63	7 m.	8 d.
68	M	81	6 m.	—
70	M	80	3 d.	4 d.
73	F	75	8 m.	2½ m.
74	M	80	10 w.	1 m.
75	M	80	2 m.	5 w.
76	M	69	3 m.	2 m.
77	M	64	1 m.	2 w.
79	F	33	5 m.*	6 w.

\* Laparotomy.

The length of survival after admission in the 17 cases that were traced was as follows (the bracketed figures represent deaths):

Months	0-3	3-6	6-9
Cases	(17)	0	0

It is astonishing that so many patients in Group IV should have been in such a debilitated state that many of them only survived a few days after admission. Could this be negligence?

It seems clear to me that some educational regime is necessary to make both patient and doctor more cancer-conscious, both as regards oesophageal cancer and cancer as a whole.

Comparisons in the results in the two surgical groups (I and II) are perhaps invidious. There are not enough cases presenting at our hospital for more than a few surgeons to develop technical skill in operating on this condition. The results of cases in Group III (those receiving radiotherapy) are hardly comparable; many of them were considered unsuitable for surgery.

I am sure that radiotherapy plays an indispensable part in the treatment of these patients, and many of mine have received radiotherapy after operation. Four cases of adeno-carcinoma of the gastric cardia have received radiotherapy to the epigastrium post-operatively, in spite of the fact that I am informed that radiotherapy is useless with these tumours. In 2 cases also in whom no post-operative telerradiation was administered I have given a post-operative intracavitary dose of radiation to the oesophagus extending for 5 cm. proximal to the line of anastomosis. This is done with a view to diminishing the possibility of recurrence at the anastomosis. Intracavitary radiation upsets the patient very little and I intend to continue its use.

## SUMMARY

The current trends of treatment of carcinoma of the oesophagus are reviewed. The results following surgery in some overseas clinics during recent years have been very encouraging and in those patients in whom a 'curative' resection has been carried out 30-40% 5-year survivals are recorded. The mortality has dropped from 50% to below 10% in the last 10 years.

Eighty cases that have been admitted to the Johannesburg General Hospital during the last 5 years are reviewed. The results of radiotherapy amongst this group are disappointing and the only 2 patients who have survived longer than a year gave negative biopsies at oesophagoscopy. There were 2 groups of surgically treated patients, one of 20 patients treated by various surgeons at the hospital, with a 60% operative mortality, and a second group of 17 patients treated by myself with 2 deaths, giving a mortality of 11.7%, or 7.1% mortality amongst the 14 'curative' resections.

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### POSTSCRIPT

Since this article was written the author has operated upon 5 more cases, performing resection in all, with high-level anastomosis in one. All survived without complications and at present all are alive and well, although 2 suffer from 'dumping' and one has required dilatation of the oesophago-gastric anastomosis. These cases bring the author's personal cases to 22 operations with 19 resections. There were 2 deaths, giving an over-all mortality of 9·2% and a mortality of 5·25% of the resectable cases.