A PRELIMINARY STATISTICAL SURVEY OF CARCINOMA OF THE OESOPHAGUS IN THE AFRICAN WITH SPECIAL REFERENCE TO ACQUIRED OESOPHAGEAL FISTULAE

JOSEPH KATZ, M.B., F.R.C.S.E., *Department of Surgery*, and GEORGE COHEN, M.B., B.CH., D.M.R.D. (R.C.P. & S.),

Department of Radiology, General and Non-European Hospitals, Johannesburg

Fistulae of the oesophagus are frequent among the patients with inoperable oesophageal cancer admitted to the Johannesburg Non-European Hospital over the past 4 years, and hitherto undescribed peculiarities have been noted.

The oesophagus is an organ peculiarly liable to perforation. Even in its normal condition, following closely the course of the lower cervical and thoracic spines, it is comparatively friable. Its situation is far posterior and it is suspended tautly between points of fixation at both upper and lower ends. This naturally diminishes its mobility. It is therefore not surprising that, during attempts to overcome obstruction either instrumental or by natural deglutition, an oesophagus which has a further increase in friability because of disease is not uncommonly subject to fistula. It is with particular reference to this that we feel some conclusions can be drawn.

Oesophageal fistulae may be congenital or acquired. Congenital fistulae have been adequately described in the literature, but the descriptions of acquired oesophageal fistulae have been few and inadequate. The following brief classification of possible causes of acquired fistulae of the oesophagus may be of help in diagnosis:

I. *Neoplastic.* While carcinoma of the oesophagus is the commonest cause of oesophageal fistulae,[1] it is well to remember that fistulae of the oesophagus sometimes occur as a result of extra-oesophageal malignancies of trachea, bronchus, larynx, pyriform fossa,[2,3] and thyroid.[3,4]

II. *Inflammatory*

(A) *Intra-oesophageal*

1. *Acute:* Oesophagitis and peptic ulceration.
2. *Chronic:* (*a*) Tuberculosis,[1,5-7] (*b*) Syphilis.

(B) *Extra-oesophageal*

Chronic: (*a*) Tuberculosis of mediastinal lymph glands and empyema, [6-9] (*b*) Actinomycosis.[4,10,11]

III. *Traumatic*[12]

1. Foreign bodies, especially fish and chicken bones.[1,13]
2. Corrosive chemicals—caustic soda, acids, etc.
3. Indirect crush injuries, e.g. 'stove-in' chest.[2]
4. Direct injuries, e.g. gunshot[2] or stab wounds, crush injuries,[1] penetration by fractured bones (ribs, sternum or vertebrae).[2]
5. Instruments (*a*) Dilating bougies, (*b*) Souttar's tube, (*c*) Oesophagoscope.[1]

IV. *Spontaneous rupture*, in cases which have been accounted for by alcohol,[13] severe vomiting,[14] vascular thrombosis and infarctions of oesophageal wall,[2] cardiospasm,[2] oesophagitis and peptic ulceration, strictures,[2] radiation,[13] etc.[1,6,15]

PRESENT SERIES

Referred cases of suspected carcinoma of the oesophagus, after preliminary clinical examination, were investigated radiologically, and accuracy of assessment was increased by endoscopy, biopsy, and examination of stools for occult blood.

Our series of cancer of the oesophagus dates from 1955, since which time we have seen 120 cases, as follows: 15 cases in 1955, 25 cases in 1956, 44 cases in 1957, and 36 cases in 1958. Of these cases 10 were female, i.e. 8·3% or 1 female for every 11 males. This proportional incidence in females is considerably less than that in other surveys, in which the percentage of females varies from 25% to 33%. This difference may well be the result of a greater consumption of carcinogen-containing alcoholic beverages by the African male.[16]

It has been generally accepted that carcinoma of the oesophagus is divisible, according to situation, into 3 main groups—in the upper, middle and lower thirds. We have made these divisions a little more exact by defining them (according to measurements taken from the lower incisor teeth) as being 16-25 cm., 25-35 cm., and over 35 cm. (to the cardiac orifice). Because of inadequate records, details of the exact situation on oesophagoscopy were only available in 50 cases. Of these, 13 cases (26%) presented in the upper third, 32 (64%) in the middle third and 5 (10%) in the lower third. These statistics are at variance with those reported in the literature, as will be seen from the following table, which quotes 2 other series:

	Present Series	*Series A*[17]	*Series B*[18]
Upper third	26%	17%	8%
Middle third	64%	36%	32%
Lower third	10%	47%	60%

The preponderance of carcinoma at the level of the middle third in the present series (as opposed to the lower third in other series) suggests the possibility of a different aetiological factor, which may well, as mentioned above, be a carcinogen-containing drink.

Radiologically, however, our statistics in a series of 29 non-selected consecutive cases showed a slightly different proportion, viz. 77% middle third, 11·5% upper third and 11·5% lower third. We suspect the difference in percentage of levels between those found on oesophagoscopy and those demonstrated radiographically to be due to the fact that the lesion is seen 2-3 cm. higher on oesophagoscopy.

Fistulae

In our study of fistulae, 1957 was taken as a representative year because it was during that year that our interest resulted in fully comprehensive investigations and records. That year the abovementioned 29 cases were radiologically investigated. Of these, 13 presented with fistulae of one sort or another (about 45%). This is a very much higher percentage than in other reported series, and may be due to the more advanced stage at which we see the patients.

Direction of fistulae. In the literature the following directions of fistulae have been described:

1. *Respiratory Tract*
   (*a*) Trachea[1,10,19]
   (*b*) Bronchial tree[1,4,10,19,20]
   (*c*) Lungs[13,19,20]
   (*d*) Pleural cavity[1,6,8,9,13,20-22]
2. *Pericardium*[1,2]
3. *Skin*[1]
   (*a*) Neck[2]
   (*b*) Chest[21]
4. *Mediastinum*[1,13]
5. *Great Vessels*[19]
   (*a*) Subclavian (perhaps aberrant subclavian) artery.
   (*b*) Aorta.
   (*c*) Carotid artery.

In our series we did not encounter all the above, but found the direction of the fistulae to be as follows: 6 cases (46% of the fistulae) into the mediastinum; 5 cases (38%) into the respiratory tree—trachea or bronchi; and 2 cases (15%) into a pleural cavity.

All but 3 of these fistulae were caused by the growth. In trying to correlate the direction of the fistula with the level of the carcinoma we found that in the 6 mediastinal fistulae there was a marked variation of the level of the carcinoma, ranging from the 4th to the 8th thoracic vertebra. In the bronchial fistulae, however, the level of the carcinoma was at the 7th thoracic vertebra in all 5 cases. the maximum deviation being from the lower part of the 6th to the upper part of the 8th thoracic vertebra. In both of the pleural fistulae the level of the carcinoma was at the 10th thoracic vertebra.

Of the 3 fistulae which were not spontaneous but resulted from operative interference, 2 were oesophago-pleural and one post-cricoid. A fistula of special interest was one which presented originally as a spontaneous (carcinogenic) oesophago-mediastinal fistula, and became oesophago-mediastino-bronchial after oesophagoscopy (Fig. 1).

CASE REPORTS

The following are representative fistulae of the various types:

Case 1 (Fig. 2)

A middle-aged African male was to be treated for an inoperable carcinoma of the middle third of his oesophagus with a Souttar's tube containing radium, and 24 hours after the tube had been installed a perfectly comfortable patient was sent for a routine post-operative X-ray of the chest. A hydropneumothorax was seen and an immediate diagnosis was made of oesophago-pleural fistula. This was outlined by means of an iodized-oil swallow and confirmed when, on aspiration of the pleural cavity with a wide-bore needle, lipiodol made its exit together with liquid and semi-solid material which he had imbibed without authority.

[There have been only 2 reports in the literature of oesophago-pleural fistulae caused by carcinoma of the oesophagus and, as far as we know, this is the first occasion on which an oesophago-pleural fistula of carcinogenic origin has been demonstrated with iodized oil. This fact is corroborated by Neuhof and Rabin, who state: 'Although we have not had occasion to make the observation (outlining of oesophago-pleural fistulae with contrast medium) in any of the cases of our series, it is conceivable that the ingested iodized oil may enter the pleural cavity in such an instance.']

Case 2 (Fig. 3)

A middle-aged African male was given a barium swallow for dysphagia. It was noted at fluoroscopy that the right lower-lobe bronchus was outlined *via* an oesophago-bronchial fistula. The trachea and bronchi to other lobes were also seen to contain radio-opaque contrast medium. The latter structures were outlined by inhalation of contrast medium which overflowed in a retrograde direction into trachea from the obstructed oesophagus.

Case 3 (Fig. 4)

A male African was X-rayed (as in case 1) as a routine measuae after a Souttar's tube had been installed for inoperable carcinom

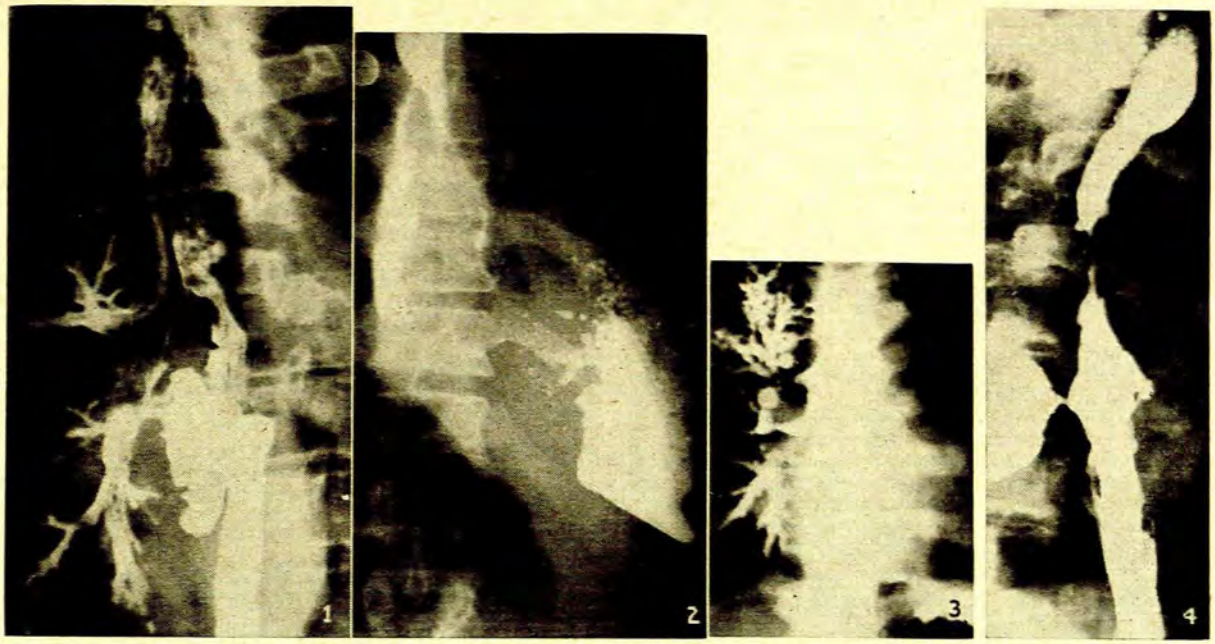

Fig. 1. Oesophago-mediastino-bronchial fistula.
Fig. 2. Case 1. Oesophago-pleural fistula.
Fig. 3. Case 2. Oesophago-bronchial fistula.
Fig. 4. Case 3. Oesophago-mediastinal fistula.

of the oesophagus. It was noted that surgical emphysema was present on the right side of the neck and in the left shoulder region. A diagnosis was made of oesophago-mediastinal fistula and an iodized-oil swallow was given. The fistula was noted to pass from the oesophagus anteriorly and to the right into the mediastinum. This indicates the importance of cervical emphysema as a diagnostic criterion in mediastinal fistulae.

It was noteworthy that only one of our patients with fistulae presented with the severe fulminating symptoms that other authors noted in similar cases. The expected clinical evidence of gangrenous pneumonitis and mediastinitis was also not present.

SUMMARY

1. A series of 120 consecutive inoperable carcinomata of the oesophagus in the African is analysed.

2. The low incidence of cancer of the oesophagus in females is discussed, and a possible reason for it is suggested.

3. In 50 cases examined by oesophagoscopy and 29 by X-ray, the preponderance of growth in the middle third of the oesophagus is stressed.

4. Fluoroscopy and oesophagoscopy levels of neoplastic changes are compared.

5. The high percentage of spontaneous fistulae is noted.

6. Representative case reports are given.

7. In fistulae of carcinogenic origin the absence of fulminating symptoms and of clinical evidence of gangrenous mediastinitis is noted.

Our thanks are due to Dr. K. F. Mills and Dr. P. Keen for permission to investigate the series of cases, to Dr. Josse Kay fo. advice on the radiological aspect, to Mr. A. E. Wilkinson for photographs, and to the Radiotherapy Department for its helpr

REFERENCES

1. Abrams, H. S. (1954): Arch. Otolaryng., **60**, 371.
2. Abbott, O. A. (1945): J. Thorac. Surg., **14**, 382.
3. Mellins, R. B. (1952): New Engl. J. Med., **246**, 896.
4. Moersch, H. J. and Tinney, W. S. (1944): Med. Clin. N. Amer., **28**, 1001.
5. Zuppinger, C. (1903): Jb. Kinderheilk., **67**, 444.
6. Clagett, O. T., Payne, J. H. and Moersch, H. J. (1946): Surg. Gynec. Obstet., **82**, 87.
7. Kantor, A. J. and Madloff, I. (1937): Amer. Rev. Tuberc., **35**, 190.
8. Berman, J. K. and Walters, C. E. (1943): Ann. Surg., **117**, 100.
9. Blauvelt, H. (1938-39): Brit. J. Surg., **26**, 46.
10. Mangabeira-Albernaz, P. (1933): Ann. Oto-laryng. (Paris), p. 889.
11. Vinson, P. P. and Sutherland, C. G. (1926): Radiology, **6**, 63.
12. Vinson, P. P. (1939): *The Diagnosis and Treatment of Diseases of the Oesophagus*, p. 147. Springfield, Ill.: Charles C. Thomas.
13. Neuhof, H. and Rabin, C. B. (1940): Amer. J. Roentgenol., **44**, 684.
14. Gott, R., Jr. (1933): Amer. J. Med. Sci., **186**, 400.
15. Davidson, P. B. and Mills, E. S. (1923): Med. Clin. N. Amer., **7**, 999.
16. Burrell, R. J. W. (1957): S. Afr. Med. J., **31**, 17.
17. Kassem, K. A. (1958): J. Egypt. Med. Assoc., **40**, 7.
18. Shanks, S. C. and Kerley, P. (1950): *A Text-book of X-ray Diagnosis*, p. 57. London: H. K. Lewis.
19. Guise, Z. J. (1925): J. Laryng., **40**, 213.
20. Friedenwald, J. and Morrison, J. H. (1926): Amer. J. Med. Sci., **167**, 194.
21. Denning, G. B. (1942): Med. J. Austral., **2**, 299.
22. Torbett. J. W. and Bennett, A. C. (1941): Amer. J. Surg., **52**, 129.