ORIGINAL ARTICLE

Site distribution of oesophagogastric cancer

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J Clin Pathol 2002;**55**:191–194

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Accepted for publication 5 September 2001

Aims: It has been suggested that adenocarcinomas of the lower oesophagus and gastric cardia should be reclassified as oesophagogastric junction (OGJ) cancers. This study aimed to define the frequency of OGJ cancers in a geographically defined population of 4.3 million people.

Methods: All cases of oesophageal and gastric cancer occurring in 1993 were identified by the North Western Regional Cancer Registry. A total of 1192 hospital case notes were reviewed and a study group of 1067 patients was defined. Tumour involvement was documented at individual subsites in the oesophagus and stomach, allowing for tumour presence in more than one oesophageal/gastric subsite.

Results: There were 627 tumours in men and 440 in women. The tumour was confined to the oesophagus in 281 (26.3%) cases and to the stomach in 454 (42.6%) cases. The tumour encroached upon or crossed the OGJ in 332 (31.1%) cases. Overall, tumours involved the cardia, OGJ, or lower oesophagus in 633 (59.3%) cases; in 179 (18.5%) cases the tumour involved the lower oesophagus but not the OGJ, and in another 122 (11.4%) cases the cardia was involved but not the OGJ.

Conclusions: Oesophagogastric cancers in this population predominantly involve the OGJ, lower oesophagus, and/or cardia.

The incidence of oesophageal cancer has increased in the USA,[1–4] UK,[5 6] and elsewhere in the Western world since the mid-1970s.[7–9] There has been a concurrent decrease in gastric cancer incidence in the USA and UK,[5 10 11] and a proximal shift in subsite towards the gastric cardia.[10 12 13]

It has been suggested that the oesophagogastric junction (OGJ) should be considered as a separate subsite when categorising oesophagogastric cancer. This proposal is based in part on population[14] and institution[15] based studies that have identified similarities in the male to female ratio, age at diagnosis, and survival of patients with oesophageal and gastric cardia adenocarcinomas. Institution based series have described an increasing frequency of adenocarcinoma at the OGJ,[16 17] and have attempted subclassification on the basis of the tumour centre.[16–18]

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To date, the only population based analyses have been based on cancer registry data and not on comprehensive patient case note review. Therefore, we attempted to describe the tumour subsite and patient characteristics in a geographically defined population of 4.3 million, in the north west of England.

METHODS

The North Western Regional Cancer Registry (NWRCR) has been in operation since 1962, and collects data on all members of the Greater Manchester and Lancashire population (approximately 4.3. million residents) who develop cancer. The registry receives information from a variety of sources including hospitals, histopathology laboratories, general practitioners, and other cancer registries. In addition, the Office of National Statistics provides a copy of all death certificates of north western residents that mention cancer, and notifications of death are received from the National Health Service Central Register for all registered cases.

The cancer registry database was interrogated and all cases registered during the period 1 January 1993 to 31 December 1993 with a diagnosis of cancer of the oesophagus (international classification of diseases, version 9, code 150 (ICD-9 150)) or cancer of the stomach (ICD-9 151) were identified and the patients' hospital case notes were requested for review. To maximise ascertainment, cases registered as gastrointestinal, not otherwise specified (NOS) (ICD-9 159) were also included.

Patient data were abstracted from hospital case notes by an upper gastrointestinal surgeon (JPB). Information on the following variables was made available: sex, age at diagnosis, histological diagnosis, and tumour subsite.

Based on the histopathological diagnosis, tumours were categorised as adenocarcinoma, squamous cell carcinoma, other histological subtype, or carcinoma NOS. Where histological confirmation of disease was not obtained subtype was recorded as unknown.

Tumour subsite was allocated using a hierarchical system that utilised operative records, pathological reports, and reports of any other clinical investigations. Precedence was given to the pathological description of a resected specimen, followed by the operation note. When surgery was not performed, endoscopic findings were preferred to radiological description. Information at any level was supplemented by data from a lower hierarchical level when this was more detailed—for example, when the endoscopic report provided more detailed information than the operative note.

Tumour subsite involvement was documented according to the information explicitly stated in the written case note records, supplemented by review of the available clinical information. Oesophageal subsite was recorded as upper, middle, and lower; gastric subsite as cardia, body, antrum, or pylorus. The OGJ was defined as the anatomical junction of the oesophagus and stomach. It was recognised that this delineation of subsite was merely a subdivision of a continuum and all subsites were considered to run contiguously. Thus, no attempt was made to assign tumours to

Abbreviations: ICD, international classification of diseases; NOS, not otherwise specified, NWRCR, North Western Regional Cancer Registry; OGJ, oesophagogastric cancer

Table 1 Distribution of study variables (all sites, oesophagus, oesophagogastric junction (OGJ), and stomach)

	All sites (n=1067)	Oesophagus (n=281)	OGJ (n=332)	Stomach (n=454)
Sex				
Male	627 (58.8)	141 (50.2)	232 (69.9)	254 (55.9)
Female	440 (41.2)	140 (49.8)	100 (30.1)	200 (44.1)
Mean age (all patients)	71.0	70.6	68.1	73.2
Mean age (men)	68.7	67.4	66.5	71.5
Mean age (women)	74.1	73.9	71.8	75.5
Histological subtype				
Adenocarcinoma	746 (69.9)	107 (38.1)	270 (81.3)	369 (81.3)
Squamous cell	142 (13.3)	124 (44.1)	17 (5.1)	1 (0.2)
Other	14 (1.3)	2 (0.7)	4 (1.2)	8 (1.8)
Carcinoma NOS	38 (3.6)	14 (5.0)	11 (3.3)	13 (2.9)
Unknown	127 (11.9)	34 (12.1)	30 (9.0)	63 (13.9)

Values in parentheses are percentages.
NOS, not otherwise specified.

a single subsite and the presence or absence of tumour at all eight possible individual subsites was recorded (data not presented).

For the purpose of some analyses presented here, the tumours have been categorised as involving the oesophagus, OGJ, or stomach. "Oesophagus" and "stomach" described those tumours confined entirely to the oesophageal (upper, middle, and lower) and gastric (cardia, body, antrum, and pylorus) subsites, respectively. All remaining tumours involving the oesophagogastric junction, with or without involvement of other oesophageal and/or gastric subsites, were classified as OGJ tumours.

RESULTS

Study population

Interrogation of the NWRCR database revealed that 1264 patients were registered as having had a diagnosis of primary oesophageal or gastric tumour made during the 12 month study period. One hundred and ninety seven patients (15.6%) were excluded from our analyses: 72 (5.7%) where the hospital case notes were unavailable for review, 80 (6.3%) where review did not confirm a diagnosis of invasive oesophageal or gastric cancer, and 45 (3.6%) where the diagnosis was made incidentally during a postmortem examination. The remaining 1067 patients comprised the final study population.

Subsite

Tumour was confined to the oesophagus in 281 (26.3%) patients and to the stomach in 454 (42.5%) (table 1). The remaining 332 (31.2%) tumours involved the OGJ, with or without extension to subsites in the oesophagus or the stomach. Of the 281 tumours located solely within the oesophagus, 179 (63.7%) involved the lower oesophagus, and of the 454 gastric tumours, 122 (26.9%) involved the gastric cardia (data not presented). Thus, in nearly two thirds of the study population (663; 59.3%), tumours involved the zone covering the cardia, OGJ, or lower oesophagus.

Sex

Six hundred and twenty seven (58.8%) patients were male, and 440 (41.2%) were female (table 1). For all cases, the sex ratio was not evenly distributed across the three main subsite groups, with a significantly greater male preponderance noted for tumours involving the OGJ (69.9% compared with 50.2% and 55.9% of patients in the oesophagus and stomach groups, respectively).

When analyses were confined to adenocarcinomas, the male dominance was apparent in patients with disease of the OGJ and lower oesophagus: 73.7% of those with OGJ adenocarcinomas and 67.0% of those with lower oesophageal adenocarcinoma were men (table 2). In oesophageal cancers, adenocarcinomas were more likely to arise in men than were squamous cell carcinomas (64.5% compared with 37.9%; table 3).

Age

For all cases the mean age at presentation was 71.0 years, with women presenting at an older age than men (74.1 years and 68.7 years, respectively). Patients with OGJ tumours were younger (mean age, 68.1 years) than patients with oesophageal (70.6 years) or gastric (73.2 years) disease. These age and sex differences persisted when analyses were stratified by sex and confined to adenocarcinomas.

Histological subtype

The proportion of tumours arising in the OGJ and stomach tumour groups that were classified as adenocarcinoma was over twice that for tumours arising in the oesophagus (81.3% compared with 38.1%, respectively). Within the oesophageal group, squamous cell carcinoma was the most commonly reported histological type (44.1%), with relatively few of these tumours arising within the OGJ group (5.1%). Oesophageal squamous cell carcinomas were more likely to involve the upper/middle oesophagus than were oesophageal adenocarcinomas (51.6% compared with 14.0%, respectively).

Table 2 Age and sex distribution of by tumour subsite (adenocarcinomas only)

	Lower oesophagus (n=91)	OGJ (n=270)	Cardia (n=100)	Gastric other (n=262)
Sex				
Male	61 (67.0)	199 (73.7)	58 (58.0)	150 (57.3)
Female	30 (33.0)	71 (26.3)	42 (42.0)	112 (42.7)
Mean age (all patients)	70.3	67.1	71.6	73.1
Mean age (men)	67.5	65.6	70.3	70.6
Mean age (women)	76.0	71.4	73.2	76.3

Values in parentheses are percentages. Excludes 23 histologically confirmed adenocarcinomas (15 involving upper and/or middle oesophagus without extension to the lower oesophagus and eight cases where oesophageal or gastric subsite could not be ascertained). The lower oesophagus catergory comprises cases involving the lower oesophagus, with or without extension to the middle oesophagus. The cardia category comprises cases involving the gastric cardia, with or without extension to other gastric sites.
OGJ, oesophagogastric junction.

Table 3 Site, age, and sex distribution of oesophageal adenocarcinomas and squamous cell carcinomas

	Adenocarcinomas (n=107)	Squamous cell carcinomas (n=124)
Site		
Upper/middle	15 (14.0)	64 (51.6)
Lower	91 (85.1)	56 (45.2)
Oesophagus (NOS)	1 (0.9)	4 (3.2)
Sex		
Male	69 (64.5)	47 (37.9)
Female	38 (35.5)	77 (62.1)
Mean age (all patients)	69.9	69.9
Mean age (men)	67.6	66.1
Mean age (women)	74.2	72.2

Values in parentheses are percentages. Upper/middle refers to cases involving the upper and/or middle oesophagus without extension to the lower oesophagus. Lower refers to cases involving the lower oesophagus, with or without extension to the middle oesophagus. NOS, not otherwise specified.

DISCUSSION

Ours is the first study to describe oesophagogastric junction involvement in gastric and oesophageal tumours occurring in a geographically defined population. Traditionally, cancer registration has recorded tumours of the upper gastrointestinal tract to be located either within the oesophagus (ICD-9 150) or within the stomach (ICD-9 151). Therefore, it is possible that substantial misclassification may arise with regard to the registration of tumours arising at the OGJ. Thus, we incorporated a detailed case note review of all patients identified in our study population to ascertain as precisely as possible the location of tumours arising within the upper gastrointestinal tract.

The results from our study suggest that there are distinct differences in the sex ratio, age at diagnosis, and distribution of histological types for tumours arising within the oesophagus, the OGJ, and the stomach. For all patients, tumours arising at the OGJ were more likely to be found in men and to present at a younger age than tumours arising elsewhere within the gastrointestinal tract. When analyses were limited to adenocarcinomas, lower oesophageal and OGJ tumours were more likely to be found in men. Oesophageal squamous cell carcinomas were more likely to be found in women and to arise in the upper/middle oesophagus than were oesophageal adenocarcinomas.

In a substantial number of cases (663; 59.3%) the tumour involved one or more subsites extending from the lower oesophagus to the OGJ and gastric cardia. Previous researchers have attempted to define the precise relation of these tumours to the OGJ,[16–18] based on the assumption that tumours grow at equal rates in all directions from a point of origin. However, as has been noted by other workers,[19 20] attributing tumour origin to the OGJ as a precise and distinct site is an action fraught with difficulty. In our retrospective study, where information was gained through case note review, we were almost entirely dependent upon the secondary evidence (that is, the written comments and interpretations of others) rather than on the primary evidence—for example, a resection specimen or video of an endoscopy examination. In view of this, we deliberately adopted a pragmatic definition of the OGJ; namely, the anatomical junction of the oesophagus and stomach.

Subsite assignment in each case was on the basis of the interpretation of information in the case notes by JPB, a surgical trainee and experienced endoscopist. However, only 33% of cases were resected and the standard of clinicopathological information in our series varied widely. Therefore, because of the quality of clinicopathological data available, we were unable to adopt a more precise definition of the OGJ in terms of its relation to the Z line or the condensation of muscular fibres at the lower oesophageal sphincter, as has been advocated by some workers.[15]

Take home messages

- There are distinct differences in the sex ratio, age at diagnosis, and distribution of histological types for tumours arising within the oesophagus, the oesophagogastric junction (OGJ), and the stomach
- These results support the concept that disease arising at the OGJ and including the lower oesophagus and/or gastric cardia should be considered as an entity separate from disease that arises from within the oesophagus and the stomach
- The use of existing classification systems results in misclassification of tumour sites

Documenting involvement of the OGJ as a distinct subsite has been suggested by Dolan *et al*,[14] and such an approach would assign one third of the oesophageal and gastric cancers in our population to this category. However, it is probably more important to acknowledge the fact that nearly 60% of tumours of the upper gastrointestinal tract in our population arise in the vicinity of the OGJ (involving the lower oesophagus, OGJ, and gastric cardia) than to quantify the precise number involving the OGJ. Surgery remains the only modality offering any prospect of a cure in most of these cancers. These data re-emphasise that surgeons managing oesophagogastric cancers require expertise in both abdominal and thoracic cavities.

However, it must be stressed that the accurate description of subsite localisation for tumours of the upper gastrointestinal tract remains an important issue. There is increasing support for the concept of disease arising at the OGJ and including the lower oesophagus and/or gastric cardia to be considered as an entity separate from disease that arises from within the oesophagus and the stomach.[15] This is especially pertinent for tumours of the adenocarcinoma type, whereby a common aetiological pathway involving progression through the Barretts metaplasia–dysplasia–carcinoma sequence has been postulated.[21 22]

However, the existing disease classification systems used by most population based registries and advocated by the International Agency for Research on Cancer—for example, the international classification of diseases produced by the World Health Organisation[23]—remain relatively inflexible, offering only "oesophagus" and "stomach" as possible sites of tumour origin. Inevitably, the use of such classification systems results in misclassification of tumour sites. Not only may this undermine studies that attempt to explore temporal and geographical variation in the incidence of these tumours, but it may also preclude comparisons of outcome achieved in different populations and by different institutions. In the current climate of "Calman-Hine" reorganisations[24] of cancer services (including recently published guidance for the management of upper gastrointestinal disease[25]), and performance management within the National Health Service, the importance of accurate data to inform policy decisions cannot be overstated.

ACKNOWLEDGEMENT

JMM is the recipient of a Christie Hospital Endowment fund.

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