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Centralisation of oesophagogastric cancer services: can specialist units deliver?

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ABSTRACT

INTRODUCTION Oesophagogastric cancer surgery is increasingly being performed in only centralised units. The aim of the study was to examine surgical outcomes and service delivery within a specialist unit.

PATIENTS AND METHODS The case notes of all patients undergoing attempted oesophagogastrectomy between January 2000 and May 2003 were identified from a prospective consultant database.

RESULTS A total of 187 patients (median age, 63 years; range, 29–83 years; M:F ratio, 3.9:1) underwent attempted oesophagogastrectomy. Of these, 91% were seen within 2 weeks of referral and treatment was instituted after a mean of 31 days (range, 1–109 days). More patients underwent surgery (63%) than neoadjuvant therapy (56%) within 1 month of referral. The main indication for surgery was invasive malignancy in 166 patients (89%). The 30-day mortality was 0.5% (1 death) and in-hospital mortality was 1.1% (2 deaths). The median length of hospital stay was 14 days (range, 7–69 days). Significant postoperative morbidity included: pulmonary complications (36%), cardiovascular complications (16%), wound infection (13%) and clinically significant anastomotic leaks (7%). Of the study group, 28 patients (15%) were admitted to ICU with a median stay of 10 days (range, 1–44 days); this accounted for 0.9% of ICU bed availability. Twelve patients (6.4%) were returned to theatre, most commonly for bleeding. The 1-year survival rates were 78%. During 2002–2003, national waiting list targets for both hernia repair and cholecystectomy were achieved.

CONCLUSIONS Despite recent increases in workload, high volume specialist units can deliver an efficient and timely service with both good treatment outcomes and minimal impact upon elective surgical waiting lists and ICU provision.

KEYWORDS

Cancer, oesophagus or gastric – Oesophagectomies – Study outcome – Audit

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The *NHS Cancer Plan* sets out to improve cancer treatment within the National Health Service.[1] Carcinoma of the oesophagus and oesophagogastric junction has traditionally been associated with poor outcomes, both in terms of operative mortality[2] and long-term survival.[3] This is partially related to its late presentation especially in an elderly population affected by significant co-morbidity. As part of a series of improvements in cancer care, in 2001, the Clinical Outcomes Group recommended the centralisation of oesophagogastric cancer services into centres serving a minimum population of at least 1 million people.[4] In work-load terms, this would equate to approximately 100 oesophagogastric resections at each centre per annum with an estimated 250 patients being assessed by the multidisciplinary team. However, there has been little consensus regarding the possible benefits of either specialisation or operative volume on the outcomes of oesophagogastric cancer surgery in the UK.[5–9]

The *NHS Cancer Plan* states that no patient with suspected cancer should wait longer than 2 months from an urgent referral by their general practitioner (GP) and no longer than 1 month from cancer diagnosis to the start of treatment. This has been applied to all cancers since 2001 and it is hoped that targets will be achieved by 2006.[10]

The aim of this study was to assess patient access, service delivery and treatment outcomes compared to current national standards within a high volume specialist upper gastrointestinal (GI) unit. The impact on intensive care provision and waiting lists for elective surgery were also assessed.

Patients and Methods

The upper GI unit received mainly tertiary referrals from other hospitals and, to a lesser extent, direct urgent referrals from local GPs. During the study period,

oesophagogastric cancer services were redeveloped. A historical referral pattern from a number of hospitals in London, Kent, Essex and East Sussex was reorganised to cover predominantly the South East London Cancer Network (London boroughs of Bexley, Bromley, Greenwich, Lambeth, Lewisham and Southwark) with a catchment population of 1.47 million (based upon 2001 census data). The total number of patients diagnosed with carcinoma of the oesophagus and oesophagogastric junction considered by the upper GI multidisciplinary meeting (MDM) between January 2000 and May 2003 was obtained from the MDM data collection officer.

All patients undergoing attempted oesophagogastrectomy between January 2000 and May 2003 were identified from personal prospective consultant log books, cross referenced against both hand-written and computerised theatre log books. The surgical workload during this period was compared to 1992–1996 using the same data sources. The consultant log book listed basic demographic data together with histology, operative mortality and major complications. This was supplemented by a retrospective case note review and data collection using a piloted proforma based upon the Association of Upper Gastrointestinal Surgeons' minimum dataset for oesophageal cancer. A minority of patients treated by oesophagogastrectomy for benign conditions of the oesophagus were included in the analysis of treatment outcomes.

Postoperatively, all patients were kept intubated and ventilated overnight in the theatre recovery unit followed by extubation and discharge to a surgical high dependency unit the next day. The 6-bedded theatre recovery unit is available to all surgical specialities and staffed by anaesthetists and recovery nurses. This helps to avoid cancellations due to any lack of intensive care beds. Admission to the intensive care unit (ICU) represented an adverse event. Data were collected from the ICU regarding the number of patients admitted to the ICU and their length of stay. The effect on ICU bed availability was calculated.

Patient access data were available for all surgical patients. Patients urgently referred by their GPs were usually initially investigated and managed by gastroenterologists at our hospital. The dates of both GP and gastroenterology referrals were available in this group of patients. For patients referred from other hospitals, the date of their referral to the upper GI unit was only available. The majority of patients were reviewed in clinic after multidisciplinary team discussion. Local staging with endoluminal ultrasound was being established during this study and the patient wait for this service was assessed from endoscopy unit records. Patient wait to the commencement of neoadjuvant therapy was obtained from the oncology department. Patients with benign conditions of the oesophagus were excluded from the analysis of patient access.

The most common elective operations performed by the upper GI unit were cholecystectomy and inguinal hernia repair. The proportion of patients undergoing these operations within national waiting targets for the year 2002–2003 was assessed from data obtained from the waiting list office.

All values are presented as mean or median with an appropriate range. Statistical analysis was performed using an unpaired *t*-test (Graphpad Instat v 2.0; GraphPad Software, San Diego, CA, USA). A *P*-value of less than 0.05 was regarded as significant.

Results

Work-load

A total of 412 patients (mean 120 patients per annum) with carcinoma of the oesophagus and oesophagogastric junction were considered by the upper GI MDM between January 2000 and May 2003. The number of attempted oesophageal resections increased from a mean of 17 resections per annum in the time period 1992–1996 to a mean of 40 resections per annum in the time period of 2000–2002 ($P = 0.02$). The number of consultants increased from 2 to 3 between these time periods. The number of resections performed by each consultant during this 41-month period was 129, 42 and 16 (the latter consultant also performed pancreatic cancer resections), respectively.

Surgical outcomes

Between January 2000 and May 2003, 187 patients (median age, 63.4 years; range, 29.3–82.6 years; male:female ratio, 3.9:1) were identified as undergoing attempted oesophagogastrectomy. The patient characteristics are shown in Table 1. In all, 104 patients (56%) underwent transhiatal oesophagogastrectomy and 73 patients (39%) underwent transthoracic approaches (two or three stage or left thoraco-abdominal). Ten patients (5.3%) were found to be unresectable at the time of laparotomy either because of previously undetected metastatic disease (3 patients) or fixed inoperable tumours (7 patients).

The 30-day mortality was 0.5% (1 death) and the in-hospital mortality was 1.1% (2 deaths). One patient died from chest sepsis and multi-organ failure following an intrathoracic leak after an Ivor Lewis oesophagectomy. A second patient died from multi-organ failure after an uncomplicated transhiatal oesophagectomy with no evidence of a leak. The median length of hospital stay was 14 days (range, 7–69 days). The following significant postoperative complications were observed: pulmonary complications (36%), cardiovascular complications (16%), wound infection (13%), and left recurrent laryngeal nerve palsy (2%). Clinically significant anastomotic leaks were seen in 13 patients (7.3%): seven (54%) of these leaks occurred with cervical anastomoses and were associated with only wound infection and

Table 1 Patient characteristics

Characteristic	*n* (%)
Pre-operative diagnosis	
Benign stricture	2 (1)
High grade dysplasia	19 (10)
Invasive malignancy	166 (89)
Histology of invasive tumours	
Adenocarcinoma	126 (76)
Squamous cell carcinoma	35(21)
Other	5 (3)
Location of invasive tumours	
Middle third	12 (7)
Lower third	90 (54)
Cardia	64 (39)
Pre-operative TNM staging	
T1	16 (10)
T2	26 (16)
T3	109 (66)
T4	15 (9)
N0	85 (51)
N+	81 (49)
Neoadjuvant therapy	
Chemotherapy	80 (48)
Chemoradiotherapy	4 (2)

delay to resumption of oral nutrition. Twelve patients (6%) required re-operation for postoperative bleeding (4 patients), sepsis (3 patients), anastomotic leaks (2 patients) and chylothorax (2 patients).

Twenty-eight patients (15%) were admitted to ICU; the most common indications were respiratory failure (18 patients), anastomotic leak (5 patients), bleeding (3 patients) and sepsis (2 patients). The median length of ICU stay was 10 days (range, 1–44 days). A total of 337 ICU bed-days were used for oesophageal resections during the period of this study. This represented 0.9% of the total ICU availability during this period.

Out of 177 resections, 161 had histological evidence of invasive malignancy including patients with complete pathological responses after neoadjuvant therapy. A potentially curative resection was performed in 146 patients (91%) but 74 of these patients (46%) were subsequently found to have tumour cells at or within 2 mm from the circumferential resection margin. Residual microscopic disease was found at the proximal or distal resection margins in only 6 patients (4%). Residual macroscopic disease was present in 6 patients (4%). The 1-year survival following oesophagogastrectomy for malignancy was 78%.

Service delivery

Overall, 166 patients underwent attempted resection for initially diagnosed oesophageal malignancy: forty-eight patients were urgently referred from local GPs and initially investigated by gastroenterologists at our hospital prior to referral to the upper GI unit and 118 patients were referred from other hospitals. The mean wait to be seen in the upper GI unit after referral was 8.6 days (range, 0-26 days). Of these patients, 91% were seen within 14 days of referral. A total of 134 patients (72%) underwent endoluminal ultrasound after referral. The mean wait for endoluminal ultrasound after clinic review in the upper GI unit was 6.8 days (range, 0–42 days). Of patients, 42% underwent endoluminal ultrasound either prior to, or on the day of, their clinic appointment. The mean waiting times to first treatment are shown in Table 2. There was no significant difference between waiting times for surgery or neoadjuvant therapy (P = 0.23). For the subgroup of 48 patients referred to and initially investigated at our hospital, the mean wait from GP referral to first treatment was 62 days (range, 31-102 days); 52% of patients were treated within 2 months of GP referral.

During a 12-month period (2002–2003), all patients awaiting either primary inguinal hernia repair (n = 157) or cholecystectomy (n = 112) under the care of the three consultant surgeons underwent surgery within 12 months of being placed on the waiting list and 96.3% underwent surgery within 9 months of being placed on the waiting list.

Discussion

Any debate regarding the centralisation of oesophagogastric cancer services in the UK is based primarily upon the previously reported high operative mortality and morbidity rates for oesophageal resection[1] and its low incidence compared to other more common cancer types.[11] Proponents point to the advantages of specialist care for

Table 2 Waiting times to first treatment January 2000 to May 2003 (range in days in brackets).

	Mean waiting time to treatment from first referral[a]	% of patients treated within 1 month
Overall	31 (1–109)	60
Neoadjuvant therapy	32 (13–93)	56
Primary surgery	31 (1–109)	63

[a]Either from gastroenterologist at our hospital or tertiary referral from another hospital.

breast and ovarian cancer,[12–15] findings of an inverse relationship in oesophageal resections between operative volume and mortality[8,16,17] and that patients in specialist units are more likely to be investigated and treated.[7] However, the relationship between operative volume and mortality has not been universally confirmed.[9] It has also been suggested that moving complex surgery away from district general hospitals will de-skill staff from dealing with major emergencies.[7] In addition, many patients prefer to be treated in their local hospital.

The work-load has increased significantly at our unit in the last decade. This has been associated with not only satisfactory treatment outcomes but also the delivery of a rapid and efficient service to the majority of patients. Guidelines suggest that oesophagectomy should be undertaken only in centres capable of careful case selection, with a large case volume and sufficient surgical and intensive care experience.[18] All patients in this study were subject to multidisciplinary team treatment planning and their peri-operative care was handled by experienced surgeons and anaesthetists. This is reflected in the very low 30-day and in-hospital mortality rates. They compare very favourably with the results of large multicentre prospective audits.[19,20] Guidelines have suggested that the mortality rate in the UK should be less than 10% and the anastomotic leak rate less than 5%.[18] Whilst the mortality rate was low, the anastomotic leak rate was higher than expected. This can be partly explained by the prevalence of cervical anastomoses, which are associated with a higher leak rate but less morbidity.[21] It is also possible that, in a high volume unit, there is greater experience in managing complications and, thereby, salvaging more patients. The overall effect on ICU work-load was minimal. The availability of an overnight recovery unit helped to relieve pressure on ICU beds and minimise cancelled operations. In addition, there is always an upper GI surgeon available, which may not always be possible in smaller units. Previous studies have shown that the use of a team-based approach and increasing expertise within that team have been associated with a significant decrease in mortality from oesophagectomy with time.[22,23] It is now argued that 1-year survival rates following surgical resection give a better indication of the true mortality outcomes in oesophageal cancer.[24] The 1-year survival rates give some guidance about the degree of patient selection and whether or not the operation was really worthwhile. Our results compare favourably with the 1-year survival rates of approximately 61% from a number of Western series unadjusted for staging from the 1990s.[24]

This audit achieved an R0 resection rate greater than 30%, as suggested by UK guidelines.[18] R0 status is a known independent prognostic factor for survival.[25] The involvement of circumferential resection margins changed the classification of 74 patients (46%) from R0 to R1. Circumferential resection margin involvement has not been uniformly reported or necessarily included into the R1 status. Despite this, circumferential resection margin status has been found to be an independent predictor of survival; the rate of involvement was similar to previous studies.[26] However, even with more radical *en-bloc* resection strategies, it may be difficult to obtain clearance due to the proximity of vital structures and the lack of any fascial boundaries.

Waiting for specialist assessment, diagnostic tests and treatment can cause anxiety for patients with suspected cancer.[9] This study, covering a period before specific waiting target deadlines were applied to oesophagogastric cancer, shows that over 90% of patients were assessed within 2 weeks from the point of referral. This was achieved through the use of 'ring-fenced' clinic appointment slots, combining endoluminal ultrasound and clinic review in a single day and early contact and involvement with the clinical nurse specialist who also co-ordinated multidisciplinary team reviews. The need for further investigations such as endoluminal ultrasound did not appear to delay the treatment process. Achieving the *NHS Cancer Plan* waiting time targets proved more difficult: 60% of all patients were treated within 1 month of first referral but only 52% of local patients were treated within 2 months of GP referral. This suggests that most of the delay occurred with diagnosis and work-up prior to referral to the upper GI unit. We used the waiting time from referral to the upper GI unit to first treatment as a surrogate measure of the waiting time from cancer diagnosis to treatment on the assumption of a close temporal relationship between cancer diagnosis and referral to the upper GI unit. Co-ordinated and innovative strategies involving close collaboration between units within local cancer networks will be required to meet these targets by December 2005. Nevertheless, our results compare favourably with the one previous study examining waiting times and oesophagogastric cancer; in this study, less than 40% of patients met the deadline of 1 month to first treatment when the time of first multidisciplinary meeting review was considered as the reference point.[27] An even smaller proportion achieved this target when the time of endoscopic diagnosis was used. The exact date of cancer diagnosis is an arbitrary point and distinction needs to be drawn between endoscopic and pathological diagnosis. For a centralised specialist unit receiving referrals, the date of first referral would seem to represent an appropriate index point. Robust prospective data collection systems are also needed to document compliance with targets, record reasons for treatment delays and to ensure that patients receiving palliative oncology treatments meet targets. Despite a heavy surgical workload with the need to fit cancer cases into the operating schedule, often at short notice at the expense of benign cases, a higher proportion of patients underwent surgery compared to oncology treatment (63%

versus 56%) within 1 month of referral. This did not appear to impact upon waiting targets for elective benign surgery such as inguinal hernia repair and cholecystectomy.

Conclusions

Although it is difficult to extrapolate the results from a single unit, this study suggests that, despite a significant increase in workload, the majority of patients with oesophagogastric cancer can be expeditiously treated with good outcomes in specialist units and with little impact on ICU provision or the performance of benign elective surgery. Further service improvements will be required to meet NHS waiting time targets.

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