Should oesophagectomies be performed by trainees? – The experience from a single teaching centre under the supervision of one surgeon

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ABSTRACT

INTRODUCTION Surgical training is threatened by anxieties about trainees performing major procedures. We have analysed the outcome of oesophagectomies performed by a consultant surgeon and compared these to the performance of trainees (years 4–6) operating under direct supervision.

PATIENTS AND METHODS Data were collected retrospectively in a computerised database on all patients who underwent oesophagectomy at a teaching tertiary centre between December 1997 and April 2004 with a minimum 15 months' follow-up. Analysis of outcome was according to measures of technical adequacy, postoperative course, histological analysis, recurrence and survival.

RESULTS During the study period, 241 oesophagectomies were carried out; 157 (65.1%) of these procedures were performed by the consultant and 84 (34.9%) were performed by surgeons-in-training under direct consultant supervision. Pre-operative, technical adequacy, postoperative course, histological analysis, recurrence and survival were comparable in both groups.

CONCLUSIONS These data demonstrate comparable patient outcome when suitably experienced trainees are supervised in performing oesophagectomies and support its continued use in operative training.

KEYWORDS

Oesophagus – Trainee – Surgery

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It is important for surgeons-in-training to acquire the technical competencies to perform major surgical procedures. This should not, however, be at the expense of patient care and operative outcome. A number of other studies have looked at outcomes of procedures performed by consultants versus trainees in vascular^{1–4} and lower gastrointestinal surgery,^{5–7} but few papers have done the same in upper gastrointestinal surgery,⁸ with none looking at survival and recurrence of malignancy. This paper analyses the outcomes of oesophagectomies performed by a consultant surgeon compared with those performed by trainees (SpRs years 4–6) operating under direct supervision.

Patients and Methods

Data were collected retrospectively in a computerised database on all patients who underwent oesophagectomy at the John Radcliffe Hospital, Oxford, between December 1997 and April 2004.

The data collected included: (i) details of patient gender and age at the time of operation; (ii) pre-operative management and disease specific details including whether neoadjuvant chemotherapy was given, the site of disease, whether the disease was benign or malignant and the type of malignancy; (iii) operative details including first surgeon and assistant, the type of procedure carried out and whether the anastomosis was stapled or hand-sewn; (iv) postoperative details including in-hospital mortality and morbidity, time spent in the intensive care unit and total hospital stay; (v) pathological details of the stage and grade of disease; and (vi) follow-up details including locoregional recurrence and survival.

Postoperative mortality and morbidity included those events occurring between the time of the operation and discharge from hospital. Specific complications of oesophagectomy were identified individually as: anastomotic leak, development of acute respiratory distress syndrome or acute lung injury, thoracic duct leak requiring re-operation,

haemorrhage requiring re-operation and ischaemia of the gastric tube. Other complications recorded included: cardiovascular complications, cerebrovascular accident, septicaemia, pulmonary embolism, and other organ failure. Anastomotic leak included both clinically and radiologically diagnosed leaks, all patients having undergone a gastro-graffin swallow 1-week postoperatively.

All operations included in this study were carried out by a single consultant surgeon (NDM) or by a suitably qualified trainee of at least specialist registrar grade (years 4–6) under the direct supervision and guidance of NDM who was scrubbed in theatre during the operations. The first surgeon in this study was defined as the first surgeon recorded in the notes; if the majority of the procedure, including the anastomosis, was performed by a trainee, it was recorded as a trainee procedure. The allocation of whether a trainee or consultant performed the procedure was at the discretion of NDM and, therefore, was not randomised.

Patients were followed up postoperatively until death or July 2005 with a minimum follow-up time of 15 months.

Statistical analysis

Differences between discrete variables were analysed using the χ^2 test while differences between means of normally distributed continuous variables were analysed using the Student unpaired two-tailed *t*-test. Survival data were analysed using Kaplan–Meier survival techniques and difference in survival with the log rank test. The probability of statistical significance was accepted as $P < 0.05$.

Results

Patient group demographics

During the study period, 241 oesophagectomies were carried out; 157 (65.1%) of these procedures were performed by the consultant and 84 (34.9%) were performed by surgeons-in-training under direct consultant supervision. Over the study

period, nine SpRs of year 4 or above worked with the consultant. The average number of oesophagectomies performed by each trainee was 9 (range, 4–20). There was no significant difference in gender distribution between the two groups (Table 1). The mean patient age at the time of operation in the consultant group was 61.8 years (SD 11.12 years) and in the trainee group was 63.9 years (SD 9.63 years; NS, $P = 0.15$). There was no significant difference between the number of patients with benign, adenocarcinoma or squamous cell carcinoma disease between the two groups or whether the patients had received pre-operative neoadjuvant chemotherapy (Table 1).

Operative details

Of the operations carried out for malignant disease there was a tendency for the consultant to perform the more technically demanding operations for upper and middle third oesophagus disease although this observation was not statistically significant. There was no statistical significance between the two groups in tumour stage or node status (Table 2).

Over the study period, four main types of operation were carried out – Ivor Lewis, left thoraco-abdominal, transhiatal and three-stage oesophagectomies. There was no significant difference between the numbers of these performed by consultants and trainees (Table 3). There was also no significant difference in the ratio of stapled to hand-sewn anastomoses between the two groups (Table 3). The mean nodal yield for histology in the consultant group was 16.8 (SD 10.52) compared with 20.4 (SD 11.53) for the trainee group; this difference was significant ($P = 0.02$).

Postoperative details

The number of in-hospital deaths was 6 in both groups (3.8%, consultant versus 7.1%, trainee) this difference was not statistically significant. The only significant difference in postoperative complications between the two groups was

Table 1 Patient demographics

		Consultant (<i>n</i> = 157)		Registrar (<i>n</i> = 84)		<i>P</i> -value
		<i>n</i>	%	<i>n</i>	%	
Sex	Male	119	75.8	65	77.4	NS
	Female	38	24.2	19	22.6	
Pathology	Adenocarcinoma	112	71.3	62	73.8	NS
	Squamous cell carcinoma	35	22.3	16	19.0	
	Benign	10	6.4	6	7.1	
Neoadjuvant chemotherapy		93	59.2	57	67.9	NS

Table 2 Details of malignancy

		Consultant (<i>n</i> = 147)		Registrar (<i>n</i> = 78)		<i>P</i> -value
		<i>n</i>	%	<i>n</i>	%	
Site	Gastro-oesophageal junction	11	7.5	9	11.5	NS
	Lower third oesophagus	105	71.4	57	73.1	
	Middle third oesophagus	28	19.0	12	15.4	
	Upper third oesophagus	3	2.0	0	0.0	
Tumour stage	T0	1	0.6	1	1.2	NS
	T1	31	19.7	11	13.1	
	T2	19	12.1	21	25.0	
	T3	93	59.2	42	50.0	
	T4	3	1.9	3	3.6	
Node status	N0	56	35.7	27	32.1	NS
	N1	86	54.8	50	59.5	
	N2	5	3.2	1	1.2	

Table 3 Operative details

		Consultant (<i>n</i> = 157)		Registrar (<i>n</i> = 84)		<i>P</i> -value
		<i>n</i>	%	<i>n</i>	%	
Operation type	Ivor Lewis	26	16.6	17	20.2	NS
	Left Thoraco-abdominal	71	45.2	41	48.8	
	Trans-hiatal	50	31.8	25	29.8	
	Three-stage	10	6.4	1	1.2	
Anastomosis	Stapled	98	62.4	52	61.9	NS
	Hand-sewn	59	37.6	32	38.1	

Table 4 Complications

		Consultant (<i>n</i> = 157)		Registrar (<i>n</i> = 84)		<i>P</i> -value
		<i>n</i>	%	<i>n</i>	%	
Technical complications	ARDS/ALI	78	49.7	31	36.9	NS
	Anastomotic leak — all	11	7.0	17	20.2	< 0.01
	Hand-sewn	6	10	7	22	0.1
	Stapled	5	5	10	19	< 0.01
	Thoracic duct leak*	2	1.3	1	1.2	NS
	Ischaemic gastric tube	1	0.6	2	2.4	NS
	Haemorrhage*	2	1.3	3	3.6	NS
Non-technical complications	Septicaemia	4	2.5	1	1.2	NS
	Cardiovascular	5	3.2	1	1.2	NS
	Cerebrovascular accident	2	1.3	1	1.2	NS
	Pulmonary embolism	1	0.6	2	2.4	NS
	Other organ failure	1	0.6	1	1.2	NS

*Requiring re-operation.

Table 5 Hospital stay

	Consultant (<i>n</i> = 157)		Registrar (<i>n</i> = 84)		<i>P</i> -value
	median	range	median	range	
ITU stay – days	1	(1–59)	1	(1–41)	NS
In-hospital stay – days	12	(8–106)	12	(8–82)	NS

Table 6 Recurrence

	Consultant (<i>n</i> = 157)		Registrar (<i>n</i> = 84)		<i>P</i> -value
	<i>n</i>	%	<i>n</i>	%	
Locoregional recurrence	66	42.3	30	36.6	NS

in the rate of anastomotic leak (including radiological), with a leak rate of 7% in the consultant group compared with 20% in the trainee group ($P < 0.01$). Despite the higher leak rate in the trainee group, there was no significant difference in the number of patients requiring re-operation for this (3 in each group), there was also no significant difference in mortality due to oesophageal leak between the two groups (2 in the consultant group versus 1 in the trainee group). All other complications including respiratory complications were comparable (Table 4).

Follow-up

There was no significant difference in either the number of days spent on ITU postoperatively or in the total hospital stay between the two groups (Table 5).

During the study period there was no significant difference in the rates of locoregional recurrence between the two groups (Table 6).

One patient (0.64%) in the consultant group and two (2.38%) in the SpR group were lost to follow-up through moving away from the area; this difference was not significant. Mean survival in the consultant group was 38 months compared to 43 months in the trainee group. Analysis of survival using Kaplan–Meier techniques and the log rank test showed no statistical difference between the two groups ($P = 0.23$, see Fig. 1).

Discussion

Despite the non-randomised allocation of patients to either the consultant or trainee groups, the two groups in the study were relatively well matched, with no significant differences between the groups in terms of patient gender, age, disease type or whether the patients had received pre-operative chemotherapy. There was, however, a tendency for the consultant to perform the higher oesophageal resections, with the consultant performing 70% of the middle oesophageal resections and all of the upper oesophageal resections. There was also a tendency for the consultant to operate on the patients with more advanced tumours, with 59% of the consultant work-load being for T3 disease compared with 50% of the trainee workload, whereas for the less severe T2 disease the observation was

Figure 1 Survival.

reversed with the trainees work-load containing twice the number of resections (24%) as that of the consultants (12%).

We have demonstrated no significant difference in mortality, length of ICU stay, or total length of in-patient stay in this series. The only difference in morbidity between the two groups was in the rates of oesophageal leak with a significantly higher leak rate in the group of patients operated on by trainees than those operated on by the consultant. All patients in the study underwent a radiological gastrograffin swallow assessment of the anastomosis 7 days' postoperatively and all patients with evidence of leak were included regardless of whether they had clinical evidence of leak or not. In the majority of cases, oral feeding was with-held and the leak healed without affecting discharge timing or causing clinical deterioration. We demonstrated no significant difference in either the number of patients returning to theatre due to leak or in mortality due to leak between the trainee and consultant groups of patients. The increased leak rate with trainee procedures is a concern, and may reflect the particular need for precise technique during this part of the operation. It is re-assuring that this increased leak rate is not reflected in any increase in significant morbidity or mortality, but perhaps this should be discussed during consent if the trainee is going to carry out the whole procedure. This study is, of course, retrospective and anastomotic leak rate between trainees and consultants should be analysed prospectively.

In our series of patients, we also failed to demonstrate any significant difference in the rate of locoregional recurrence, or a survival difference between the two groups. The mean survival in the trainee group of 43 months compared to that in the consultant group of 38 months (NS) may be explained by the higher number of patients with more advanced disease being operated on by and the more technically demanding procedures being performed by the consultant.

Conclusions

In line with the paper by Paisley *et al.*,⁸ which compared the early outcomes in a range of upper gastrointestinal surgical procedures when performed by trainees versus the consultant, we have also demonstrated equivalent early outcomes for both groups. This study goes further to demonstrate similar long-term follow-up results and recurrence rates between the two groups giving further weight to the argument that it is safe for suitably experienced and supervised surgical trainees to perform oesophagectomies as part of their surgical training.

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