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Achieving long term survival in oesophagectomy patients aged over 75

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HIGHLIGHTS

- Long term survival is achievable in patients over 75 undergoing oesophagectomy.
- The only factors that significantly affect long term survival are tumour stage and resection margins.
- Peri-operative mortality in patients aged over 75 can be reduced by using an enhanced recovery after surgery programme.

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ABSTRACT

Aims: Surgical resection is often the only curative treatment for oesophageal cancer. The aim of this retrospective cohort study was to analyse outcomes following oesophageal resection in patients aged 75 years and older and the impact of an Enhanced Recovery after Surgery (ERAS) program in this cohort.
Methods: Patients aged over 75 years undergoing oesophagectomy between 2003 and 2013 were identified from a single centre using an electronic database. Data on pre-operative comorbidity, tumour stage and length of hospital stay (LOS) were collected. Complications were classified according to the Clavien-Dindo system. Thirty day, 1- and 5-year mortality rates were calculated.
Results: 147 patients were identified with a median age of 78.5 (IQR 76.7–80.9). 33% (n = 44) had a grade 3 complication or higher. Median LOS in hospital was 16 days (IQR 13.0–22.0). Thirty-day mortality was 3.4%, 1-year and 5-year survival was 65% and 21% respectively. 45% of patients were enrolled into an Enhanced Recovery After Surgery program and they demonstrated a significantly reduced length of stay from 18 to 14 days ($p = 0.005$) and 30-day mortality from 6.2% to 0% ($p = 0.04$) compared to the time period before the program.
Conclusion: Long-term survival is achievable in patients aged over 75 years.

1. Introduction

Half of all patients with oesophageal cancer are aged over 75 [1–4]. Of the 15–20% of patients with resectable disease, the 5 year survival rates are approximately 25% [5,6]. Surgical resection is associated with a 30-day morbidity and mortality of 32% and 2% respectively [7]. The outcomes of surgical resection in elderly patients such as those aged 75 years and over are presumed to be worse as a result of a poorer physiological reserve and more co-morbidity. Indeed, increasing age is associated with a lower resection rate for oesophageal cancer [8]. However, studies demonstrate no difference in survival for patients aged 75 years and over in comparison to patients aged under 75 years [5]. In addition, there have been many improvements in peri-operative care, particularly since the introduction of an Enhanced Recovery After Surgery (ERAS) programs. The effect of this is unclear on the outcomes of patients aged 75 years and over undergoing oesophageal resection.

The Nottingham Oesophagogastric Cancer Unit (NOGU) is a regional centre for major cancer resections covering a population of 4.5 million patients, performing 180 cancer resections a year [7,9]. *[centre name]* have demonstrated significant improvements in outcomes in younger patient cohorts since the introduction of ERAS programs [10]. The aim of this study to analyse the outcomes of those aged over 75 undergoing oesophagectomy for oesophageal

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cancer and the effect on outcomes of the introduction of ERAS.

2. Materials and methods

This is a single centre retrospective observational study using data generated from an electronic database. The unit policy is all patients undergo a clinical review in the outpatients and multidisciplinary team discussion prior to surgery. All patients undergoing surgery have a pre-operative assessment including clinical examination, blood tests and an electrocardiogram. Further tests such as pulmonary function, blood gas sampling were performed as clinically indicated at the discretion of the clinician. Routine follow up comprised of 3 monthly reviews for the first two years then six monthly thereafter up to a period of 5 years post operatively. These data and outcomes are all recorded electronically in the NOGU database.

2.1. Inclusion and exclusion criteria

Any patient aged over 75 at time of operation undergoing an oesophago-gastric resection for oesophageal malignancy between the dates of January 2003 and August 2013 were included. Any patient who did not undergo resection with curative intent was excluded.

2.2. Outcome measures

The outcomes of interest were post-operative morbidity and mortality plus length of stay in hospital. After discharge, all patients had an outpatient review every 3 months for the first two years and 6 monthly thereafter, up to a period of 5 years. Survival data was calculated based on follow up until August 2013, to give one and five year survival rates.

2.3. Explanatory variables

Patient's age and co-morbid status were recorded. All patients underwent a clinical review and were discussed at the MDT prior to surgery. The results were electronically documented, a patient was considered to have a disease if it was recorded as present in the electronic notes. Co-morbidities were classified by system according to their ICD-10 (International Classification of Diseases version 10) codes for analysis [11].

Disease variables included the histological TNM stage, the use of neo-adjuvant therapy and surgical approach. Details of post-operative complications were recorded in the electronic notes and graded according to the Clavien-Dindo classification system [12]. Complications were classified according to their organ of origin. Respiratory complications included post-operative pneumonia, lower respiratory tract infection, pulmonary oedema or pulmonary embolus. Cardiac complications included any post-operative arrhythmia or myocardial infarction. Specific complications of interest such as anastomotic leak were recorded individually.

In August 2009 an ERAS program was used routinely for all patients. This consisted of early mobilization with daily physiotherapy goals, optimizing analgesia with epidural or paravertebral catheters rather than opioid analgesia and early oral feeding day 5 post-operatively (Table 1).

2.4. Statistical analysis

All statistical analysis was performed using SPSS version 23 with a p value of <0.05 considered significant. Categorical variables were analysed using a Chi-Squared test. A Mann-Whitney *U*-test was used for continuous, non-parametric data.

Survival analysis was performed using the Kaplan-Meier estimates. Univariate analysis was undertaken for each variable using the log rank test in order to identify which variables had a significant effect on survival.

3. Results

The initial database search returned 175 patients, 28 were excluded leaving 147 patients for further analysis (Table 2).

3.1. Patient demographics

The median age was 78.5 (IQR 76.7–80.9) (Fig. 1). 72% of patients had at least one significant co-morbidity, the most common being hypertension and cardiac disease followed by endocrine disorders. Only 21% received neo-adjuvant chemotherapy prior to surgery (Table 3).

3.2. Operative variables

Resection rates increased throughout the decade; 74% ($n = 97$) of the resections took place in the second half of the study period. Histology showed the majority of patients had advanced disease with a high rate of circumferential margin involvement (Table 4).

3.3. Post-operative recovery and complications

The median length of stay in hospital was 16 days (IQR of 13.0–22.0). The majority of patients experienced a post-operative complication, this was usually cardio-respiratory in origin (47%,

Table 1
Enhanced recovery after surgery pathway for oesophagectomy patients [10].

Post-operative day	
Day 0	Extubate as soon as possible if on ventilator
	Analgesia: epidural or paravertebral ± patient controlled analgesia
Day 1	Leave critical care
	Physiotherapy goal: chest physio and sit out of bed
Day 2	Physiotherapy goal: chest physio, sit out of bed, walk 10 m
Day 3	Chest drain changed to valved bag
	Physiotherapy: chest physio, sit out of bed, walk the length of the ward ×2
Day 4	Physiotherapy: sit out of bed, walk the length of the ward ×3
Day 5	Commence oral intake if no clinical evidence of leak.
	Remove nasogastric tube, chest drain, epidural/paravertebral and central line. Start oral analgesia.
	Physiotherapy: walk freely on ward, shower
Day 6	Physiotherapy: shower, walk independently, climb stairs
Day 7	Full mobilization and activities of daily living. Discharge.