
MINI REVIEW

Examining the effect of surgical length on esophageal cancer

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ABSTRACT

Surgery that is completed more quickly has shown better results. In the current study, we sought to ascertain if the length of the surgical procedure had an impact on patients who had esophagectomy on their Overall Survival (OS). We also evaluated elements that affect how long a surgery takes. A single surgeon performed an Ivor-Lewis esophagectomy on 128 patients between 2005 and 2019 in this single-center retrospective cohort analysis. The length of surgery, neoadjuvant chemotherapy, pathological grade of depth of tumour invasion, Lymph Node (LN) metastases, Body Mass Index (BMI), and cervical LN dissection were all examined for their associations with Overall Survival (OS) using the Cox proportional hazard model. A logistic regression analysis was also used to look at the

components that contribute to prolonged surgical duration. The length of the esophagectomy procedure for esophageal cancer was found to be strongly influenced by BMI in a review of patients who received the same surgical procedure with a single surgeon; however, the length of the procedure had no effect on patient survival.

Key Words: Anomia; Occult breast cancer; Surgical care; Prophylactic antibiotic

INTRODUCTION

The impacts of surgical duration among patients undergoing pancreatoduodenectomy, biliary procedures, and esophageal operations is one risk factor that has been recently published in data that suggests that many other risk factors are also involved in the occurrence of postoperative problems [1-3]. Because surgical duration may be influenced by a variety of factors, including a difference in the surgical approach, a difference in the skill of specific surgeons, and a difference in the stage of cancer progression, it is challenging to ascertain whether surgical duration differences affect postoperative survival. In the current study, we sought to assess the link between surgical time and Overall Survival (OS) and, in turn, to identify the variables influencing surgical time in patients handled by a single surgeon using the same surgical method. An esophagectomy for esophageal cancer was performed on a group of patients in a retrospective cohort study at Hakodate Goryokaku Hospital between January 2005 and December 2019. Data from 138 patients who underwent an Ivor-Lewis esophagectomy during a right thoracotomy

and laparotomy for curative resection were contributed to this study. Cases without a mediastinum-wide lymph node dissection were disqualified. A single surgeon with board accreditation from the Japan Esophageal Society operated on all of the research participants. The Hakodate Goryokaku Hospital's ethical committee gave its approval to the study protocol. Due to the retrospective study design, informed consent was waived; however, the committee also confirmed that the data remained confidential by obscuring participant privacy. The TNM Classification of Malignant Tumors, 7th edition, was used to categorize the cancer status of the patients [4]. The Guidelines for Diagnosis and Treatment of Esophageal Carcinoma were used to assess the indications for surgical intervention and Neo-Adjuvant Chemotherapy (NAC) [5]. Postoperative complications were graded using the Clavien-Dindo system [6]. Body Mass Index (BMI; kg/m²) was computed using the precise height and weight measurements taken during surgery. The definition of surgical duration refers to the time during which the surgical procedure was actually carried out, omitting the time spent

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under anaesthesia before and after the procedure. The NAC regimen includes cis-diamine platinum and 5-fluorouracil, which were given twice before surgery to the candidates for preoperative treatment, in accordance with the recommendation of a Japan Clinical Oncology Group Study (JCOG9907) [7]. Ivor-Lewis esophagectomy with extensive lymphadenectomy was planned for all patients. To briefly describe the surgical process, skin incisions were made for the right thoracotomy and upper abdomen laparotomy. The right intrathoracic anastomosis was made in the thorax using a circular anastomosis device between the remaining oesophagus and the gastric conduit following resection of the thoracic oesophagus with cancer and dissection of the mediastinal LN. When preoperative Computed Tomography (CT) imaging revealed enlarged cervical LN or the location of the tumour was in the upper part of the oesophagus, cervical LN dissection was also carried out in the neck region. The postoperative care was administered in accordance with the regimen we previously detailed [8, 9]. According to the findings of a Japanese Clinical Oncology Group Study, postoperative adjuvant chemotherapy was recommended for patients with positive pathological LN metastases, and it was given to them (JCOG9204). 10 patients underwent thoracoabdominal CT scans, physical exams, measurements of their serum tumour markers, and evaluations at 6-months intervals following surgery. Every three years, esophagogastroduodenoscopy procedures were carried out. Patients with unexpected anomalies in serum tumour markers and those with suspected cancer recurrence on CT scans were treated with positron-emission tomography. The time until death from any cause was used to determine patient survival. In June 2021, the patient's life and death were officially confirmed. A minimum of one year and six months was required for the observation period.

Electronic medical records were used to collect baseline information. For multivariate analysis of surgery length, the following factors were divided into two groups: The patients were separated into the pT1-2 and pT3-4a groups based on the pathologic depth of tumour invasion, and the groups based on the pathological grade of LN metastasis. When it had a grade of II or higher, postoperative complications were considered to have occurred according to the Clavien-Dindo classification. In a univariate analysis, the surgical length of each categorised group was given as means with standard deviations and compared using the Student's t-test. The link between the length of the procedure and the year it was performed was examined using Pearson analysis. Estimating survival rates with the Kaplan-Meier method and comparing results with the Log-rank test were done. OS was studied using Cox proportional hazard models with the following variables: surgical duration, presence of NAC, pT status, pN status, BMI, and application of cervical LN dissection to determine the relationship between surgical duration and patient survival. The difference in surgery duration and the following factors were examined using logistic regression models: years, NAC, pT status, pN status, BMI, and cervical LN dissection. For each variable, 95% Confidence Intervals (CIs), Odds Ratios (ORs), and Hazard Ratios (HRs) were calculated. A P-value of 0.05 or lower indicated statistical significance in each analysis. IBM SPSS Statistics for Macintosh, version 21.0, was used for all statistical calculations (IBM, Armonk, NY).

In the current study, we assessed the relationship between surgical time and OS in patients having single-surgeon-performed Ivor-Lewis esophagectomy. Our findings showed that the length of the operation was not related to the patient's survival. In the past, it has been shown that longer surgical procedures result in more bleeding and more postoperative problems. According to a retrospective cohort research

with 2651 Ivor-Lewis esophagectomy patients, extended surgical time had a separate negative effect on postoperative complications but not on 30-days mortality. This study, which covered patients undergoing Ivor-Lewis esophagectomy, also showed that preoperative lower BMI may be related with worse OS (HR 0.901, P=0.058), but that surgery length did not alter OS (HR 1.065, P=0.837). According to a research of 922 esophageal cancer patients from the Netherlands on weight loss and postoperative prognosis, patients who lost 10% or more of their body weight or more had higher perioperative risk and lower 5-years survival rates. Another study from China examined the effects of BMI in 2031 patients who had esophagectomy surgery and found that high BMI (BMI>23 kg/m²) significantly increased postoperative complications but improved 10-years OS.

A number of explanatory variables, including the surgeon's experience and surgical skill level, should be taken into account as potential biases in order to find characteristics linked to disparities in surgical duration. We focused on patients who had surgery performed by a single surgeon using the same technique in order to remove these biases. Second, it should be taken into account when assessing the factors that determine surgical length that the advancement of the malignancy often makes resection challenging. The procedure time, which may be necessary for tumour excision and definitive LN dissection, is anticipated to be longer in patients with more invasive malignancy and in those who have positive LN metastases. However, its impact was not statistically significant in our multivariate analysis. Third, more intra-abdominal fat will probably make the surgery take longer. High BMI was substantially linked with prolonged surgery duration in the current investigation, according to logistic regression analysis (OR 1.304, P=0.000). Fourth, the current study revealed that the length of surgery was decreasing over time (OR 0.796, P=0.000). This is most likely a result of the surgeon's technique continually being improved over time. In our series of Ivor-Lewis esophagectomy procedures, we discovered that surgical length had no impact on patient survival. Of course, the length of a surgical procedure will vary depending on the surgical approach. Over time, new surgical techniques have been developed, and when new techniques are developed, successful ones become accepted norms. Small skin incisions and fewer scars are possible with minimally invasive surgery, but technical advancement and substantial expertise are required to reduce recovery time. Propensity score matching was used in a study in Japan that included 9584 patients and used the Nationwide Database. It found that minimally invasive surgery had higher rates of recurrent laryngeal nerve palsy and re-operation, small amounts of bleeding, and lower rates of wound infection and other complications. Although much longer in the minimally invasive esophagectomy group, the length of the procedure had no impact on 30-days mortality. A comparison study on long-term survival is now being conducted in Japan, however the superiority of minimally invasive surgery is still debatable (JCOG1409). Our study's surgical strategy was restricted to open esophagectomy, a procedure that took much longer to complete than thoracoscopic surgery. As a result, we were unable to find a link between shorter surgical time and better OS. It would also be true, though, that quicker surgical procedures result in shorter anaesthetic durations, improving the effectiveness of operating room use and lowering operation expenses, as well as having the potential to boost surgical productivity in general.

It is important to recognise the limitations of the current investigation. First off, this was a retrospective study with a small study population that was gathered over a 10-years period, done in a single institution without randomization. Second, the surgical operation was only performed using an open technique; it is unknown whether the study's conclusions apply to thoracoscopic esophagectomy. Third, our institution started using NAC as a therapeutic alternative prior to surgery in 2010. As a result, despite being a potential candidate for NAC, 39 patients included in this study prior to 2009 did not get preoperative chemotherapy. Due to

the brief follow-up period following the esophagectomy, 25 (19%) patients with an observation period of less than three years were unfortunately included in the survival time analysis. We found no effect of a shorter surgical length on patient survival based on our examination of patients who underwent the same surgical procedure by the same surgeon. However, we think it is beneficial for surgeons to cut the length of the procedure by honing their abilities and giving it their all.

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