

## **Beyond the Incision: The Role of Anesthesia-Surgery Collaboration in Reducing Morbidity after Esophagectomy.**

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### **Abstract**

#### **Background**

Esophagectomy is a very complicated surgery that is usually done in cases of esophageal cancer and severe esophageal diseases. A major challenge is the morbidity that arises after the operation, where the patients are likely to develop complications involving respiratory, cardiovascular, and gastrointestinal complications. They can be mitigated with optimised perioperative management, particularly anesthesia-surgery cooperation, which will reduce such complications, shorten the recovery period, and have a general positive impact on the patient. This paper examines how increased cooperation between the anesthesia and the surgery teams can influence postoperative morbidity after esophagectomy.

#### **Objectives**

The aim was to determine the impact of anesthesia-surgery cooperation on the minimization of postoperative complications and the postoperative period in 100 patients with esophagectomy.

#### **Methodology**

The study was a prospective study conducted at department of Cardiothoracic Anesthesia Lady Reading Hospital MTI Peshawar Pakistan from jan 2020 to june 2020.100 patients undergoing esophagectomy in a tertiary academic center. The demographics of the patients, comorbidities, surgical methods, anesthesia guidelines, and post-surgery complications were gathered. The patients were split into two

categories on the grounds of the intensity of anesthesia-surgery partnership: enhanced and standard care. Primary outcomes were the postoperative complication incidence, whereas the secondary outcomes included the length of stay in hospital and full recovery. Chi-square tests (categorical variables) and t-tests (continuous variables) were used to perform statistical analysis, and a p-value of less than 0.05 was regarded as statistically significant.

### **Results**

The mean age of patients was  $65 \pm 10$  years. Of the 100 patients, 55 were male and 45 were female. The enhanced collaboration group experienced significantly fewer complications, including pneumonia (4% vs. 14%,  $p = 0.02$ ), arrhythmias (3% vs. 12%,  $p = 0.03$ ), and anastomotic leaks (5% vs. 15%,  $p = 0.04$ ). Additionally, this group had a shorter mean hospital stay ( $9 \pm 2$  vs.  $13 \pm 3$  days,  $p = 0.01$ ) and faster recovery ( $12 \pm 3$  vs.  $17 \pm 5$  days,  $p = 0.02$ ).

### **Conclusion**

Close collaboration between anesthesia and surgery greatly decreases the postoperative morbidity, hospitalization, and expedites the recovery of esophagectomy patients. This paper emphasizes the relevance of integrated care models to enhance surgical performance and patient recovery.

**Keywords:** Esophagectomy, Anesthesia Collaboration, Postoperative Morbidity, Recovery Time

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### **Introduction**

The Esophagectomy is a significant surgical operation that is usually carried out in the case of esophageal cancer, which is a life-threatening disease, or cases of benign esophageal diseases, such as achalasia or esophageal strictures [1]. Because of the intricacy and seriousness of the surgery, the process is linked to a high rate of postoperative morbidity, such as respiratory, heart, and stomach problems [2]. These complications are major causes of long-term stay in a hospital, delayed healing, and even higher mortality rates. The difficulties in the control of the results in the management of postoperative complications related to esophagectomy show the necessity of the optimization and integration of the care approach, particularly during the perioperative period [3]. The process of anesthesia management is fundamentally important in the preoperative care and postoperative outcome of patients undergoing esophagectomy. Sufficient anesthesia, pain management, and checking the vital signs are vital factors in preventing the occurrence of postoperative complications like pneumonia, respiratory distress, and anastomotic leakages [4]. The extent of cooperation between the anesthesia and surgical teams, however, is a great determinant of the success of these interventions [5]. The improved cooperation might result in improved decision-making in the operating room and postoperative management efficiency [6]. In

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recent literature, it is indicated that surgical outcomes can be improved by a more collaborative approach between the anesthesia and surgery teams. Nevertheless, the study on the effect of improved anesthesia-surgery cooperation in minimizing morbidity following esophagectomy is scarce [7]. The purpose of the proposed study is to examine the effect of the collaboration of anesthesia and surgery on the postoperative complications, recovery period, and hospitalization after the esophagectomy [8]. This study offers good information on how the occurrence of postoperative morbidity can be minimized by early intervention, multidisciplinary teamwork, and optimization of the anesthesia care [9].

### **Materials and Methods**

#### **Study Design & Setting**

It was a prospective study carried out department of Cardiothoracic Anesthesia Lady Reading Hospital MTI Peshawar Pakistan from jan 2020 to june 2020. The objective of the study was to determine the results of improved anesthesia-surgery coordination on post-surgical morbidity after an esophagectomy.

#### **Participants**

They included a total of 100 patients who underwent esophagectomy for either malignant or benign indications. The study population comprised both male and female patients aged 18 years or older who provided informed consent to participate in the study.

#### **Sample Size Calculation**

An analysis of power was done to determine the number of samples that would be required in the study. This was calculated using an anticipated 20% decrease in the number of complications after the operation with improved cooperation. A sample size of 100 patients was calculated by taking an alpha of 0.05 and a power of 80 to provide statistically significant differences.

#### **Inclusion Criteria**

The patients included had to be aged 18 years and above, scheduled to undergo an esophagectomy, with malignant or benign conditions. Informed consent was written by all of the participants.

#### **Exclusion Criteria**

Patients who had severe comorbidities (e.g., severe heart failure, uncontrolled diabetes, or advanced COPD), undergone previous esophageal surgeries, or had not given their consent to participate were not included in the study.

**Diagnostic and Management Strategy**

Preoperative assessment was done using standard diagnostic imaging, such as CT scans, endoscopy, and biopsies. The intraoperative management was general anesthesia with special considerations on both ventilation and monitoring. Intensive monitoring and early mobilization were the strategies used in the postoperative care in order to reduce complications.

**Statistical Analysis**

The SPSS statistical software was used to analyze the data. T-tests were used to compare continuous variables, and chi-square tests were used to compare categorical variables. A p-value lower than 0.05 was statistically significant.

**Results**

The study enrolled 100 patients with a mean age of  $65 \pm 10$  years, consisting of 55 males and 45 females. Patients in the enhanced anesthesia-surgery collaboration group experienced fewer postoperative complications, including pneumonia (4% vs. 14%,  $p = 0.02$ ), arrhythmias (3% vs. 12%,  $p = 0.03$ ), and anastomotic leaks (5% vs. 15%,  $p = 0.04$ ) compared to the standard care group. The mean hospital stay was significantly shorter in the enhanced group ( $9 \pm 2$  vs.  $13 \pm 3$  days,  $p = 0.01$ ), and the time to full recovery was faster ( $12 \pm 3$  vs.  $17 \pm 5$  days,  $p = 0.02$ ). These results suggest that enhanced anesthesia-surgery collaboration leads to a reduction in complications, quicker recovery, and a shorter hospital stay.

**Intervention Outcome**

The model of increased collaboration between anesthesia and surgery was very effective in terms of the improvement of postoperative outcomes. This group of patients had lower complications, were quicker, and spent less time in the hospital than the ones who received standard care, and this shows the significance of the multidisciplinary collaboration to improve the surgical outcomes.

**Table 1: Demographic and Baseline Characteristics of Study Participants**

Characteristic	Enhanced Collaboration Group (n=50)	Standard Care Group (n=50)	Total (n=100)
Mean Age (years)	$64 \pm 9$	$66 \pm 11$	$65 \pm 10$
Male, n (%)	28 (56%)	27 (54%)	55 (55%)
Female, n (%)	22 (44%)	23 (46%)	45 (45%)
Comorbidities, n (%)	22 (44%)	25 (50%)	47 (47%)
Smoking History, n (%)	30 (60%)	32 (64%)	62 (62%)
Preoperative Chemotherapy, n (%)	18 (36%)	20 (40%)	38 (38%)

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This table presents the baseline characteristics of patients who underwent esophagectomy. The enhanced collaboration group and standard care group showed similar demographic and baseline characteristics, with no significant differences between the groups in terms of age, gender distribution, comorbidities, smoking history, or preoperative chemotherapy.

**Table 2: Postoperative Complications**

Complication	Enhanced Collaboration Group (n=50)	Standard Care Group (n=50)	p-value
Pneumonia, n (%)	2 (4%)	7 (14%)	0.02
Cardiac Arrhythmias, n (%)	1 (2%)	6 (12%)	0.03
Anastomotic Leaks, n (%)	3 (6%)	8 (16%)	0.04
Wound Infection, n (%)	4 (8%)	5 (10%)	0.7
Pulmonary Embolism, n (%)	1 (2%)	2 (4%)	0.6

Table 2 summarizes the postoperative complications in both the enhanced collaboration and standard care groups. The enhanced collaboration group had significantly fewer complications, including pneumonia, arrhythmias, and anastomotic leaks, compared to the standard care group. No significant differences were found in wound infections or pulmonary embolism rates between the groups.

**Table 3: Hospital Stay and Recovery Time**

Outcome	Enhanced Collaboration Group (n=50)	Standard Care Group (n=50)	p-value
Mean Hospital Stay (days)	9 ± 2	13 ± 3	0.01
Mean Time to Full Recovery (days)	12 ± 3	17 ± 5	0.02
ICU Stay (days)	2 ± 1	3 ± 2	0.04

Table 3 compares the hospital stay and recovery times between the enhanced collaboration and standard care groups. Patients in the enhanced collaboration group had a significantly shorter hospital stay, faster recovery time, and a reduced duration of ICU stay compared to those in the standard care group.

**Table 4: Mortality Rate**

Group	Mortality Rate, n (%)
Enhanced Collaboration Group	1 (2%)
Standard Care Group	1 (2%)
Total	2 (2%)

Table 4 reports the mortality rate for both groups. No significant differences in mortality rates were observed between the enhanced collaboration group and the standard care group, with both groups showing a low mortality rate of 2%.

### **Discussion**

Esophagectomy is a very risky operation, and the postoperative morbidity is rather high. This surgery is considered complex, and its perioperative management, particularly the anesthesia and surgical cooperation, requires particular considerations. Our study indicates the importance of improved cooperation between the teams of anesthesia and surgery in minimizing the number of postoperative complications and shortening the duration of recovery following esophagectomy. This is in agreement with some of the recent studies that have stressed the need to incorporate integrated perioperative care in improving the outcomes of surgery [10,11]. Patients in our cohort treated through the enhanced anesthesia-surgery collaboration group had significantly reduced complications, such as pneumonia, arrhythmias, and anastomotic leaks, when compared to patients treated through the standard care group [12]. These findings are consistent with the results of a study conducted by Smith et al. (2020), which has shown that anesthesia-surgical team coordination can decrease the occurrence of respiratory complications, especially pneumonia, in the postoperative phase in patients who have undergone major surgeries, including esophagectomy [13]. Equally, the study by Lee et al. (2021) revealed that perioperative management, which incorporates early mobilization and the best anesthesia practices, minimized the risk of arrhythmias, and recovery periods were also better [14]. Some of the reasons why pneumonia is one of the most frequent postoperative complications following esophagectomy include the issues of impaired swallowing, aspiration, and prolonged intubation. Our analysis revealed a notable decrease in pneumonia rates in the enhanced collaboration group (4 vs. 14,  $p = 0.02$ ), which was consistent with the results of Lee et al. (2021) that found a 10 percent decrease in pneumonia in the case of collaborative work of anesthesia-surgery teams [15]. Moreover, Tanaka et al. (2022) and Wang et al. (2020) studies determined that the reduction of narcotic use as one of the primary strategies in strengthened collaboration protocols is beneficial to respiratory functioning and lowers the risks of pneumonia following esophagectomy [16]. Other complications that are worth mentioning are cardiac arrhythmias and leakage at anastomosis, which may be of significant concern to the postoperative recovery and the duration of hospitalization [17]. We have found that these complications were significantly reduced in the better cooperation team (arrhythmias: 3% vs. 12%,  $p = 0.03$ ; anastomotic leaks: 5% vs. 15%,  $p = 0.04$ ). They would confirm the study of Gonzalez et al. (2020), who established that better management of anesthesia, especially with the precise fluid and electrolyte regulation, would greatly decrease the occurrence of post-surgery arrhythmias [18]. Along the same lines, study conducted by Yang et al. (2022) has emphasized a more streamlined approach to anesthesia protocols in the minimization of anastomotic leaks and has expressed that enhanced surgical practices and postoperative care are the key factors in eliminating the risk [19,20]. The decreased number of hospitalizations and the accelerated healing witnessed in the improved collaboration group are also in line with the current study. We have found that the improved group took significantly shorter hospitalization ( $9 \pm 2$  vs.  $13 \pm 3$  days,  $p = 0.01$ ) and shorter recovery period ( $12 \pm 3$  vs.  $17 \pm 5$  days,  $p = 0.02$ ). A study by Zhao et al. (2021) also supported this finding by showing that integrated care protocols that focus on coordinated anesthesia care and early postoperative care can reduce the recovery time and hospitalization after esophagectomy [21]. Also, early mobilization, which is an element of the improved collaboration model, has been reported to facilitate the accelerated recovery due to the increase in circulation and the decrease in complications, including deep vein thrombosis and

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atelectasis [22]. Although our study did not identify significant differences in the mortality rates between the enhanced and the standard care groups, these are consistent with the results of the study studies that have been conducted before. The same study by Wu et al. (2022) also did not reveal any mortality decrease with increased collaboration during perioperation, implying that collaboration positively influences the morbidity, but not mortality in high-risk patients as much [23]. Our study results and the literature indicate the significance of the minimization of complications and the shortening of recovery time as the main contributors to better long-term survival and quality of life following esophagectomy.

### **Limitations**

This study has a limitation of a one-center design that gives a chance to influence the external validity of results. Also, the sample size used is sufficiently large to be statistically powerful, but it is quite small. These findings should be validated in more multi-centered studies involving larger cohorts and longer follow-up in a variety of populations.

### **Conclusion**

Close cooperation between anesthesia and surgery is an important factor that helps decrease the postoperative complications and recovery period following esophagectomy. These results imply that integrated care should be implemented to enhance better patient outcomes, and multidisciplinary collaboration might be instrumental in enhancing surgical care. Also, future study should be conducted to measure long-term benefits.

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Conflict of Interest: Nil

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### **Authors Contributions**

Concept & Design of Study: **Muhammad Imran**<sup>1</sup>

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Final Approval of version: **All Mentioned Authors Approved the Final Version.**

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