



# Prevention of postoperative pulmonary complications after esophageal cancer surgery

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*Comment on:* Yu Z, Li S, Liu D, *et al.* Society for Translational Medicine Expert Consensus on the prevention and treatment of postoperative pulmonary infection in esophageal cancer patients. *J Thorac Dis* 2018;10:1050-7.

Submitted Apr 01, 2019. Accepted for publication Apr 08, 2019.

doi: 10.21037/jtd.2019.04.57

**View this article at:** <http://dx.doi.org/10.21037/jtd.2019.04.57>

Esophageal cancer is the 8<sup>th</sup> most common cancer worldwide and the 6<sup>th</sup> most common cause of cancer death (1). Although squamous cell carcinoma remains the predominant histologic type worldwide and represents 87% of all esophageal cancer (2), the incidence of adenocarcinoma has increased substantially over the past 20 years in Western countries due to the rising prevalence of obesity and gastroesophageal reflux disease (3,4).

Esophagectomy remains the cornerstone treatment for esophageal cancer. Although refinement of surgical techniques, enhancement of postoperative care, and centralization towards high volume centers have led to an improvement of outcomes, morbidity after esophageal cancer surgery remains high (5-7). Pulmonary complications, primarily pneumonia, are the most common complications after esophagectomy and can occur in up to 40% of patients (8). For instance, a study reviewing the American College of Surgeons' National Surgical Quality Improvement Program (ACS-NSQIP) database investigated the incidence of pulmonary complications after major abdominal operations and found that the highest rate of overall pulmonary complications occurred in patients undergoing esophagectomy (25.6%). The rate of pneumonia in the esophagectomy group was 2.5 times higher than that of the next highest group (gastrectomy) (9).

The Society for Translational Medicine has recently published an expert consensus on the prevention and treatment of postoperative pulmonary infection in esophageal cancer patients (10). The authors highlighted

protective strategies to reduce postoperative pulmonary complications before the operation, intraoperatively, and postoperatively. Preoperative measures mainly consist of adequate pulmonary function assessment, smoking and alcohol cessation, chest physiotherapy, and nutritional support. Shorter operative times and use of anesthesia methods and drugs with little lung function impairment are important intraoperative measures. Appropriate postoperative measures include epidural analgesia and breathing exercises to increase patients' chest wall motion and ventilatory capacity. The consensus also establishes clear treatment guidelines for patients with postoperative pulmonary infection which should not rely only on effective antibiotic treatment, but should also include assisted expectoration, prevention of aspiration pneumonia, adequate operative side lung re-expansion, nutritional support, and supported cardiac function (10).

This consensus is timely and particularly important for esophageal cancer surgeons for many reasons: (I) pulmonary complications are strongly associated with longer hospital stay, intensive care unit admissions, and increased rates of mortality (11); (II) pulmonary complications represent a high burden for the health care system. For instance, the cost of the hospitalization can be 2-fold to 12-fold higher when these complications occur (11). A study using the National Inpatient Sample database demonstrated that patients with postoperative hospital-acquired pneumonia stayed in the hospital 11 days longer, and were associated with a 75% mean increase in total hospital charges

(approximately \$28,000) (12); (III) pulmonary complications may also correlate with worse oncologic outcomes. Baba *et al.* (13) recently showed that patients undergoing surgical resection of squamous cell carcinoma with pulmonary complications had worse long-term overall survival than those without pulmonary complications (HR 1.51, 95% CI: 1.20–1.88). Similarly, a recent study reported that postoperative pneumonia was the most important parameter for predicting the overall survival after salvage esophagectomy (14).

Overall, strategies to reduce pulmonary complications after esophageal cancer surgery are critical for improving short- and long-term outcomes. The consensus published by Yu and colleagues (10) provides useful and standardized measures for the prevention and treatment of pulmonary complications after esophagectomy. This will help for better management of esophageal cancer patients and future research and quality initiatives.

## Acknowledgements

None.

## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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**Cite this article as:** Schlottmann F, Patti MG. Prevention of postoperative pulmonary complications after esophageal cancer surgery. *J Thorac Dis* 2019;11(Suppl 9):S1143-S1144. doi: 10.21037/jtd.2019.04.57