Editorial

Minimally invasive esophagectomy in elderly patients

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Comment on: Hol JC, Heisterkamp J, Martijnse IS, *et al.* Morbidity and mortality in elderly patients after minimally invasive esophagectomy. Ann Esophagus 2019;2:3.

Received: 01 May 2019; Accepted: 22 May 2019; Published: 25 May 2019.

doi: 10.21037/aoe.2019.05.01

View this article at: http://dx.doi.org/10.21037/aoe.2019.05.01

Hol *et al.* (1) report their experience with minimally invasive esophagectomy (MIE) in patients older than 70 years of age in "Morbidity and mortality in elderly patients after minimally invasive esophagectomy". The authors analyzed outcomes of 60 patients at a single institution undergoing minimally invasive Ivor Lewis and McKeown esophagectomy. Patients older than 75 years (group 1, 19 patients) were compared to patients aged 71–75 years (group 2, 41 patients). Data for patients 70 and younger were not provided. The two groups had no statistically significant differences in morbidity or mortality. However, although not statistically significant, there appear to be trends toward increased leak rates in the older group (21.1% *vs.* 14.6%), increased cardiovascular complications (31.6% *vs.* 14.6%), and increased 90-day mortality (10.5% *vs.* 4.9%).

The impact of age on esophagectomy outcomes has been previously explored. In the open esophagectomy experience, it appeared that age was associated with an increase in non-surgical morbidity and mortality, as well as a decrease in disease-specific survival. Cijs *et al.* (2) reported a single institution series of 811 patients undergoing esophagectomies for cancer. Patients younger than 70 years were compared to those 70 years and older. The older group had more underlying respiratory and cardiovascular disease at baseline and experienced more nonsurgical complications (35% *vs.* 27%), had higher 30-day mortality (8.0% *vs.* 3.8%), and decreased disease-specific survival (median 20.2 *vs.* 24.9 months). No significant differences in surgical complications were noted. Another series reported by Tapias *et al.* (3) analyzed 474 patients split into three groups: age less than 70 years, age 70–79 years, and age 80 years and older. There was an incremental increase in morbidity with increasing age (35.6% *vs.* 47.9% *vs.* 62.5%, respectively, in the three groups) and incremental increase in 90-day mortality (2.2% *vs.* 6.1% *vs.* 14.3%, respectively). Leak rates were equivalent in the three groups, although stricture rates were lowest in the oldest group.

Another recent analysis of minimally invasive esophagectomies by Baranov *et al.* (4) included 446 patients from three institutions. Patients younger than 75 years were compared to patients 75 years of age and older. There were no statistically significant differences in the rates of Clavien-Dindo grade 3 and higher complications (35.9% younger group *vs.* 43.8% older group) or 90-day mortality (5.0% *vs.* 9.0%) after binomial logistic regression analysis. The younger group had significantly fewer cardiac complications (14.0% *vs.* 24.7%) and delirium (11.8% *vs.* 27.0%), and shorter lengths of stay (11 *vs.* 13 days).

The current study by Hol *et al.* (1) presents a thought-provoking analysis, and suggests that the increase in morbidity and mortality with increasing age seen after open esophagectomy may be mitigated with the minimally invasive approaches. Although encouraging, there are several limitations to consider in interpreting the results. The two groups compared were of relatively small numbers, with only a total of 60 patients included to exclusion of patients aged 70 years and younger from reporting and analysis. Given multiple non-statistically significant trends in morbidity and mortality, the lack of significance may be due to an underpowered study. Additionally, as with any retrospective study, there is a significant selection bias as most surgeons are more cautious and less likely to offer surgery to elderly patients, and the fact that the two groups had similar comorbidity profiles points to this bias.

The lack of reported data for patients younger than 71 years does limit our ability to place these outcomes in context. The mortality and anastomotic leak rates in both groups appear higher than expected compared to modern series at high-volume centers, but it is not clear if this discrepancy is due to patient factors such as age or another cause such as performing many of the resections in the elderly patients while still on the learning curve. Our prior analysis using a side-to-side stapled technique showed a leak rate of 4.4% in intrathoracic anastomoses and 8.5% for cervical anastomoses (5). The leak rate in the minimally invasive arm of the randomized TIME trial (Traditional Invasive *vs.* Minimally invasive Esophagectomy) was reported at 12% (6). Factors such as being still on the learning curve of the MIE would lead to higher complications rates, as a multi-institutional analysis showed that the learning curve for MIE is 119 cases based on analysis of anastomotic leak rates with a plateau at 8% after the learning curve (7). Lastly, the authors do not comment on the specific type of the anastomosis used for the intrathoracic or cervical anastomoses (stapled versus hand-sewn, type of stapled) which may impact leak rates, although this remains controversial.

Age alone is an inadequate measure of underlying functional status and suitability for major surgery. Various groups have reported on the impact of frailty as a predictor of morbidity and mortality after surgeries including esophagectomies (8) and the modified frailty index can predict morbidity and mortality after esophagectomy better than age (9). The selection of patients for surgical resection is nuanced and age is only one factor in the multitude of relevant considerations including functional status, medical comorbidities, disease biology, and patient goals and wishes. Medically complex and elderly patients are best treated at experienced, high volume centers after multidisciplinary discussion and consensus in order to achieve optimal outcomes.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the editorial office, *Annals of Esophagus*. The article did not undergo external peer review.

Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/aoe.2019.05.01). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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doi: 10.21037/aoe.2019.05.01
Cite this article as: Peng JS, Hochwald SN. Minimally invasive esophagectomy in elderly patients. Ann Esophagus 2019;2:8.