Journal of Surgery: Open Access
ISSN 2470-0991 | Open Access

RESEARCH ARTICLE

Volume 4 - Issue 3 | DOI: http://dx.doi.org/10.16966/2470-0991.171

Minimally Invasive Esophagectomy in the Elderly: Short and Long-Term Outcomes

Thomas Fabian*, Jeremiah Martin and Dorothy Chiaravalle

Department of Surgery, Albany Medical College, New York, USA

***Corresponding author:** Thomas Fabian, Department of Surgery, Albany Medical College, New York, USA, Tel: (518) 262-5864; E-mail: FabianT@amc.edu

Received: 07 Jul, 2018 | **Accepted:** 28 Jul, 2018 | **Published:** 02 Aug, 2018

Citation: Fabian T, Martin J, Chiaravalle D (2018) Minimally Invasive Esophagectomy in the Elderly: Short and Long-Term Outcomes. J Surg Open Access 4(3): dx.doi.org/10.16966/2470-0991.171

Abstract

Background: Age is considered a significant risk factor for mortality following esophagectomy. We sought to evaluate surgical outcomes in elderly patients undergoing Minimally Invasive Esophagectomy (MIE) for cancer.

Study design: Utilizing a prospectively maintained MIE database outcomes of elderly patients (age ≥ 70 years) between (June 2005-August 2008) undergoing esophagectomy for cancer are reported. Primary outcome measures included operative mortality, length of stay, complications and long term survival.

Results: Twenty elderly patients underwent MIE for malignancy during the 4 year period and median survival follow-up as 79 months (59-96). Complications occurred in 12 (60%) of 20. Mean length of stay was 12 days (8-34). Hospital mortality was 0 (0%) of 20 and overall two, three, and five year survival were 74%, 60%, and 50% respectively.

Conclusions: Appropriate patients in this age group have excellent short, intermediate and long term survival following MIE. In experienced hands MID has a low mortality and should be considered an appropriate approach in the elderly population.

Keywords: Minimally invasive esophagectomy; Esophageal cancer; Elderly patients; Mortality

Introduction

Despite advances in surgical techniques and postoperative care, the surgical morbidity and mortality following esophagectomy remains high for all patients [1]. Elderly patients suffering from various malignancies are frequently undertreated as a result of provider concerns regarding morbidity of optimum treatment [2]. As the incidence of esophageal cancer and the aging population continue to increase surgeons are more frequently evaluating elderly patients for surgical treatment of their disease. Frequently surgical intervention is avoided in this patient population due to correct and incorrect perceived risks of complications and limited survival. In the elderly population age is considered an independent risk factor for mortality following open esophagectomy [3]. Perioperative mortality in the elderly is reported between 7% and 19% [3,4] and long term survival/benefit is also thought to be limited in comparison to younger patients [5].

Newer surgical techniques including minimally invasive techniques for esophagectomy have been purported to offer fewer complications, shorter recovery time, and extremely low mortality rates [6] then what is typically reported in the surgical literature [1]. The question of whether these proposed benefits are seen in the elderly population remains unclear. The objective of this paper is to identify short and long-term outcomes of elderly patients undergoing MIE.

Methods

Institutional Review Board approval was obtained at the Hospital of Saint Raphael, New Haven, CT. A prospectively maintained esophagectomy database was utilized to review outcomes following MIE performed between (June 2005-August 2008) in patients >70 years old with esophageal cancer. Patients undergoing esophagectomy for non-cancerous esophageal pathology as well as non-elective open resections were excluded from analysis. Patients were not excluded based on stage of cancer, receipt of neoadjuvant therapy, location of tumor, or emergent nature of the procedure. All procedures were performed by one of three thoracic surgeons at a single institution.

During the study period, 29 patients >70 years of age underwent esophagectomy. Of these, 20 patients met our inclusion criteria. Data was collected prospectively in all MIE patients. Data recorded included patient demographics, location of tumor, pathologic stage of cancer, operative technique, length of stay, complications, mortality, and number of lymph nodes procured. Mortality was defined as any in hospital death and any death within 30 days of surgery. Long term survival/death data was confirmed utilizing medical records from

office visits and the Social Security Death Index (SSDI) which are current as of July 2013 to confirm survival.

Our surgical technique varies depending on patient and tumor factors. Surgical approach and in the MIE group surgical approaches included cervical and intrathoracic anastomosis and our specific techniques have been described elsewhere [7,8].

Statistical analysis was performed using GraphPad Prism version 6.0c for Mac, GraphPad Software, San Diego California USA, www.graphpad.com. Survival curves were plotted according to the Kaplan-Meier [9] method. A P value of less than 0.05 was used to determine significance on all tests.

Results

During the 4 year study period 29 patients underwent esophagectomy. Of these 20 patients met our inclusion criteria. Patient demographics, tumor stage, and receipt of neoadjuvant therapy are reported in table 1. Median follow-up data was 79 months (59-96). Surgical approaches and level of anastomosis are listed in table 2. There was 1 (5%) conversion to open due to inadequate conduit length necessitating conversion to thoracotomy with high intrathoracic anastomosis.

Mean intraoperative blood loss 196 ml MIE (range 75-300 ml) and lymph node procurement of 16 nodes (range 2-30). Complications occurred in 12 (60%) of 20 of those major complications occurred in 5 (25%) of 20. Specific complications are listed in table 3. There were no in hospital or 30 day mortality in this group and median length of stay was 12 days (range 8-24 days). Overall two, three, and five year survival was 74%, 60%, and 50% respectively (Figure 1).

Discussion and Conclusions

Despite recent advances in surgical care, morbidity and mortality following esophagectomy remains 11% nationally [1]. With the aging population in the United States and the increasing incidence of esophageal cancer, surgeons are more frequently asked to consider surgical treatments for elderly patients. Moskovitz AH et al. [3] demonstrated *via* a retrospective study that age was an independent risk factor predictive of postoperative mortality. The reported mortality for patients over the age of 70 and 80 was 7.3% and 19.4% respectively. Internullo E et al. [4] reported similar mortality of 7.8% and major morbidity in 24.7% in patients over the age of 70. In the only study of minimally invasive esophagectomy in the elderly Perry Y et al. [10] reported 41 patients without a mortality [10]. The focus of that study was surgical morbidity and no reference to long term survival was made.

Table 1: Patient demographics, tumor and treatment characteristics

		%
Number of patients	20	
Male	14	(70)
Female	6	(30)
Age (mean, range)	78.4 70.88	
Tumor Location Distance from incisors, cm (median, range)	35.5 20-40	
Tumor stage		
Stage I	10	(50)
Stage II a	5	(25)
Stage II b	2	(10)
Stage III	3	(15)
Stage IV	0	(0)
Adenocarcinoma	18	(90)
Squamous Cell Carcinoma	2	(10)
Neoadjuvant therapy	4	(20)

Table 2: Surgical approaches

Thoracoscopic/Laproscopic/Cervical anastomosis*	16
Totally Laproscopy	2
Laproscopy/VATS	2

Table 3: Occurrence of complications

	n	%
Overall Complications	12	60
Major Complications	5	25
Anastomatic Leak	2	10
Chylous Leak	1	5
Respiratory Failure	1	5
Atrial Fabrillation	0	0
Vocal Card paralysis/paresis	4	20
Delirium tremens	2	10

*Some patients had more than one of the individually enumerated complications listed

Our MIE program began in June 2005 and has become our preferred surgical approach for esophagectomy. The initial experience of our MIE program demonstrated statistically significant improvements in operative blood loss, lymph node procurement, discharge within 10 days, as well as, trends toward reduced postoperative mortality when comparing MIE patients to open esophagectomy patients [7]. An increasing number of institutions have now published mortality rates of less than 3% when utilizing minimally invasive approaches [6,7,11,12]. With increasing application of these procedures for esophagectomy the question of short and long term outcomes gains interest. To date no randomized study of patients has been performed to evaluate MIE outcomes compared to OE techniques. A retrospective comparison of open esophagectomy, thoracoscopic assisted, and total MIE was performed by Smithers BM et al. [12] showing no difference in mortality or long term survival. Limitations of this work relate to relatively small numbers in the MIE group, selection bias, and MIE learning curve. Recently a multi-institutional feasibility study evaluating MIE has been completed (ACOSOG 2202) but these results are still pending.

In the case of elderly patients even less data exists to support whether these newer techniques may further reduce morbidity or mortality in the elderly. We sought to determine if the application of minimally invasive surgical techniques in the elderly is an acceptable approach and potentially offering similar benefits seen in other publications.

Blood loss was minimal in this group with median EBL of 196 ml (range 75-300 ml) which minimizes the risk of blood transfusion requirements. Surgical procurement of lymph nodes was 16 nodes and is consistent with that reported by other open and MIE groups [13,14]. Although no randomized trial to date has documented survival benefit from extended lymphadenectomy during esophagectomy there is growing awareness of the importance of nodal staging related to its prognosis [15]. We believe the lymph node procurement demonstrates the ability of MIE techniques to maintain oncologic principles and is at least comparable to open esophagectomy in this regard.

Overall complication rate was 60% but significant complications were less common occurring in only 5 patients. Reintubation occurred

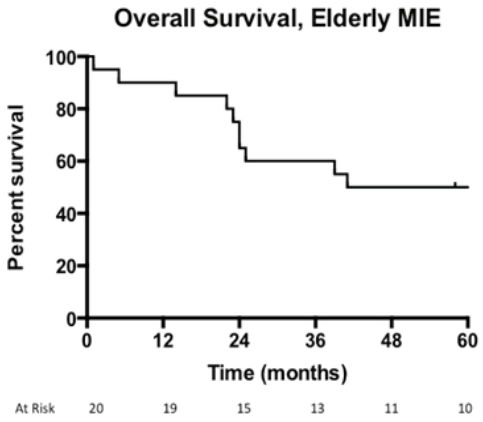

Figure 1: The number of osteoblasts in the three groups.

in 1(5%) patient following an apparent aspiration event although no pneumonia occurred. Moskovitz AH et al. [3] reported in their series of open esophagectomy patients over the age of 80 that pulmonary complications, namely pneumonia, occurred in 29% of patients. In the largest reported series of elderly esophagectomy patients, Rahamim JS et al. [5] reported the incidence of pneumonia to be 10 percent. No patient in our series undergoing MIE developed pneumonia. This low incidence of pulmonary complications following MIE is consistent with the UPMC group [10] where 1 (2.4%) of 41 patients developed respiratory failure secondary to pneumonia.

Respiratory complications have been reported to be the most common cause of death following esophagectomy [16] therefore avoidance of these complications are of the utmost importance. Not surprisingly it has been shown that patients undergoing thoracoscopic esophageal mobilization have less postoperative pain and improved vital capacity than do those undergoing thoracotomy [13].

The lack of mortality in the MIE group is thought to be secondary to the avoidance of respiratory complications. Our standard approach to all esophagectomy patients during the study period includes routine use of epidural catheter, immediate postoperative OR extubation, early ambulation, and aggressive pulmonary toilet. It is the author's opinion that avoidance of laparotomy and thoracotomy allows us to employ these measures successfully which may ultimately translate into better outcomes.

Overall long term survival is frequently considered poor with reports of one year overall survival of 58% in the elderly (over 70) and disease specific survival 27% at five years. This was recently reported by Cijs TM et al. [17] who studied their outcomes in a single high volume center practicing a primarily open (thoracoabdominal) approach to the procedure. Survival in the current series was better than expected with overall 2 and 3 year survival of 74% and 50% respectively. This may be a reflection of reduced operative mortality related to minimally invasive approaches rather than cancer related survival. Cancer free survival and cancer survival were not analyzed in this study. Overall survival may be more helpful in determining differences in this unique patient group.

Limitations of this paper include the lack of a comparison control group. Attempts were made to compare the outcomes of 15 open esophagectomies during the immediate 4 years prior to beginning our MIE program however patient disparities, particularly surgical indications, made conclusion from such comparisons impossible. All

Table 4: Patients treated with open esophagectomy following initiation of our MIE program

Limited cervical Esophagectomy	1
Esophagolaryngectomy	1
Thoracoabdominal Esophagectomy following previous partial gastrectomy	1
Esophageal perforation in end-stage achalasia	1
End-stage achalasia with advanced cancer	2
Recurrent giant hiatal hernia	1
Total Open	7

the esophagectomies included in this study are contemporary (2004-2008). There have been advances in perioperative management and preoperative staging, as discussed above, during that time and could be a spurious factor influencing better outcomes. Also we elected to exclude open esophagectomies performed following the initiation of our MIE program to avoid selection bias. Seven patients underwent open esophagectomy during this period all were performed open for specific indications listed in table 4. There were no mortalities in this open esophagectomy group. A total of 27 elderly patients underwent esophagectomy during the study period without mortality.

In conclusion, we believe that MIE has a role in the surgical management of elderly patients with esophageal cancer as evidenced by our short and long term (5-year) outcomes. MIE in our hands offers better than expected long term overall survival. This data supports the ongoing use of MIE in elderly patients and suggests that in experienced hands MIE should be considered appropriate surgical intervention for these patients. In the absence of MIE experience open esophagectomy remains appropriate.

Disclosure Statement

Drs. Thomas Fabian and Jeremiah Martin have no conflicts of interest or financial ties to disclose.

References

1. Birkmeyer JD, Siewers AE, Finlayson EV, Stukel TA, Lucas FL, et al. (2002) Hospital volume and surgical mortality in the United States. N Engl J Med 346: 1128-1137.

2. Glotzer OS, Fabian T, Chandra A, Bakhos CT (2013) Non-small cell lung cancer therapy: safety and efficacy in the elderly. Drug Healthc Patient Saf 5: 113-121.

3. Moskovitz AH, Rizk NP, Venkatraman E, Bains MS, Flores RM, et al. (2006) Mortality increases for octogenarians undergoing esophagogastrectomy for esophageal cancer. Ann Thorac Surg 82: 2031-2036.

4. Internullo E, Moons J, Nafteux P, Coosemans W, Decker G, et al. (2008) Outcome after esophagectomy for cancer of the esophagus and GEJ in patients aged over 75 years. Eur J Cardiothorac Surg 33: 1096-1104.

5. Rahamim JS, Murphy GJ, Awan Y, Junemann-Ramirez M (2003) The effect of age on the outcome of surgical treatment for carcinoma of the oesophagus and gastric cardia. Eur J Cardiothorac Surg 23: 805-810.

6. Luketich JD, Alvelo-Rivera M, Buenaventura PO, Christie NA, McCaughan JS, et al. (2003) Minimally invasive esophagectomy: outcomes in 222 patients. Ann Surg 238: 486-494.

7. Fabian T, Martin JT, McKelvey AA, Federico JA (2008) Minimally invasive esophagectomy: a teaching hospital's first year experience. Dis Esophagus 21: 220-225.

8. Fabian T, Martin J, Katigbak M, McKelvey AA, Federico JA (2008) Thoracoscopic esophageal mobilization during minimally invasive esophagectomy: a head-to-head comparison of prone *versus* decubitus positions. Surg Endosc 22: 2485-2491.

9. Kaplan EL, Meier P (1958) Nonparametric Estimation from Incomplete Observations. J Am Stat Assoc 53: 457-481.

10. Perry Y, Fernando HC, Buenaventura PO, Christie NA, Luketich JD (2002) Minimally invasive esophagectomy in the elderly. JSLS 6: 299-304.

11. Nguyen NT, Hinojosa MW, Smith BR, Chang KJ, Gray J, et al. (2008) Minimally invasive esophagectomy: lessons learned from 104 operations. Ann Surg 248: 1081-1091.

12. Smithers BM, Gotley DC, Martin I, Thomas JM (2007) Comparison of the outcomes between open and minimally invasive esophagectomy. Ann Surg 245: 232-240.

13. Nguyen NT, Follette DM, Wolfe BM, Schneider PD, Roberts P, et al. (2000) Comparison of minimally invasive esophagectomy with transthoracic and transhiatal esophagectomy. Arch Surg 135: 920-925.

14. Palanivelu C, Prakash A, Senthilkumar R, Senthilnathan P, Parthasarathi R, et al. (2006) Minimally invasive esophagectomy: thoracoscopic mobilization of the esophagus and mediastinal lymphadenectomy in prone position--experience of 130 patients. J Am Coll Surg 203: 7-16.

15. Gu Y, Swisher SG, Ajani JA, Correa AM, Hofstetter WL, et al. (2006) The number of lymph nodes with metastasis predicts survival in patients with esophageal or esophagogastric junction adenocarcinoma who receive preoperative chemoradiation. Cancer 106:1017-1025.

16. Poon RT, Law SY, Chu KM, Branicki FJ, Wong J (1998) Esophagectomy for carcinoma of the esophagus in the elderly: results of current surgical management. Ann Surg 227: 357-364.

17. Cijs TM, Verhoef C, Steyerberg EW, Koppert LB, Tran TC, et al. (2010) Outcome of esophagectomy for cancer in elderly patients. Ann Thorac Surg 90: 900-907.