



# Effect of initiative pulmonary bullectomy on the risk of postoperative pneumothorax in patients with esophageal carcinoma: a propensity score-matched analysis

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**Background:** Postoperative pneumothorax can lead to additional invasive intervention and extended hospitalization. The effect of initiative pulmonary bullectomy (IPB) during the esophagectomy on preventing postoperative pneumothorax remains controversial. This study evaluated the efficacy and safety of IPB in patients who underwent minimally invasive esophagectomy (MIE) for esophageal carcinoma complicated by ipsilateral pulmonary bullae.

**Methods:** Data from 654 consecutive patients with esophageal carcinoma who underwent MIE from January 2013 to May 2020 were retrospectively collected. A total of 109 patients who had a definite diagnosis of ipsilateral pulmonary bullae were recruited and classified into two groups: the IPB group and the control group (CG). Propensity score matching (PSM, match ratio =1:1), incorporating preoperative clinical features, was used to compare the perioperative complications and analyze efficacy and safety between IPB and control group.

**Results:** The incidences of postoperative pneumothorax in the IPB and control groups was 3.13% and 40.63% respectively, with a significant difference ( $P < 0.001$ ). Logistic analyses indicated that removing ipsilateral bullae was associated with a lower risk (OR 0.030; 95% CI: 0.003–0.338;  $P = 0.005$ ) of incident postoperative pneumothorax. No significant difference was found between the two groups in terms of the incidence of anastomotic leakage (6.25% vs. 3.13%,  $P = 1.000$ ), arrhythmia (3.13% vs. 3.13%,  $P = 1.000$ ), chylothorax (0% vs. 3.13%,  $P = 1.000$ ) and other common complications.

**Conclusions:** In esophageal cancer patients with ipsilateral pulmonary bullae, IPB performed in the same anesthesia process is an effective and safe method for the prevention of postoperative pneumothorax, allowing for a shorter postoperative rehabilitation time, and it does not exert unfavorable effects on complications.

**Keywords:** Pulmonary bullectomy; pneumothorax; esophageal carcinoma; postoperative complication; propensity score match

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## Introduction

As one of the most aggressive malignancies, esophageal carcinoma accounts for 3.1% and 5.4% of global new cases and cancer deaths, ranking seventh in terms of incidence and sixth in mortality in 2020 respectively (1,2). Esophageal carcinoma which is characterized by geographic tendency presents a relatively high incidence rate in eastern Asia and eastern and southern Africa (3-6). Although the application of surgery, chemotherapy, radiotherapy, and immunotherapy has improved survival to some extent, the general outcome remains comparatively poor in terms of overall 5-year survival rates (7,8).

In the last few decades, esophagectomy based on minimally invasive techniques has shown promising results and has become the primary treatment for patients without invasion of adjacent organs or distant metastasis (9-11). However, due to the high complexity and invasive two-cavity procedure, minimally invasive esophagectomy (MIE) is still prone to induce postoperative complications, ranging from 45% to 80% of cases (12,13). Of these complications, postoperative pulmonary complications, such as pulmonary infection, atelectasis, respiratory failure, and pneumothorax, are among the major concerns. Although pneumonia is the most commonly reported postoperative respiratory complication, postoperative pneumothorax, the incidence of which remains poorly estimated, which can lead to rapid deterioration, additional invasive intervention and extended hospital stay after operation (14). In clinical practice, for some patients undergoing MIE with pulmonary bullae found during surgery, the accompanying pulmonary bullae

are likely to rupture due to perioperative mechanical ventilation or active coughing, resulting in pneumothorax or postoperative continuous air leakage and even serious tension pneumothorax. Misdiagnosis or inappropriate treatment might have devastating consequences, whereas an effective and safe strategy to prevent postoperative pneumothorax could reduce the occurrence of postoperative complications and improve patient prognosis (15). Therefore, several surgeons advocated initiatively simultaneous pulmonary bullectomy during the operation. However, the effect of initiative pulmonary bullectomy (IPB) on preventing postoperative pneumothorax remains controversial and related studies have remained very limited. In this retrospective study, the effectiveness and safety of simultaneous ipsilateral IPB in esophageal carcinoma patients receiving minimally invasive esophagectomy were evaluated. We present the following article in accordance with the STROBE reporting checklist (available at <https://jtd.amegroups.com/article/view/10.21037/jtd-22-1061/rc>).

## Methods

### Patients

A retrospective analysis of 654 consecutive patients with esophageal carcinoma who underwent minimally invasive esophagectomy between January 2013 and May 2020 at Daping Hospital was conducted. All the patients included in this research fit the following criteria: (I) pathologically confirmed esophageal carcinoma; (II) a definite diagnosis of ipsilateral pulmonary bullae based on preoperative radiological findings or intraoperative exploration; and (III) complete medical records. Incomplete resection and only contralateral pulmonary bullae were considered exclusion criteria.

Of the 654 esophageal carcinoma patients, 109 were included in the analysis. Among the 545 patients excluded from the study, 538 patients were confirmed to have no definite ipsilateral pulmonary bullae, four patients did not have detailed medical records, and 3 had undergone incomplete esophageal tumor resection (*Figure 1*). All patients included in the study were restaged according to the 8th edition of the American Joint Committee on Cancer classification system. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). This study was approved by the Ethics Committee of Daping Hospital (No. 2022[159]). The need for patient consent was waived due to the retrospective

### Highlight box

#### Key findings

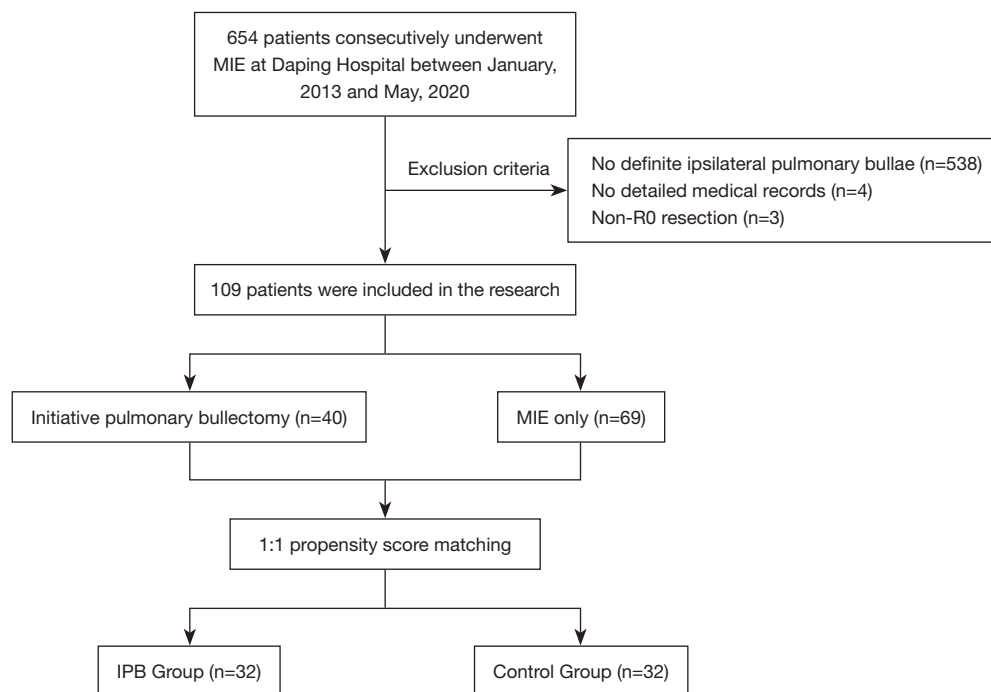
- Initiative pulmonary bullectomy is an effective method for the prevention of postoperative pneumothorax in esophageal cancer patients with ipsilateral pulmonary bullae.

#### What is known and what is new?

- IPB is an efficacious measure to prevent postoperative pneumothorax after MIE, with a statistically significant reduction in the incidence of pneumothorax.
- The simultaneous IPB does not increase other common postoperative complications of MIE.

#### What is the implication, and what should change now?

- Based on our experience in the current study, initiative pulmonary bullectomy during the esophagectomy is advocated in esophageal carcinoma patients complicated by ipsilateral pulmonary bullae.



**Figure 1** Flowchart demonstrating patient inclusion and exclusion. MIE, minimally invasive esophagectomy; IPB, initiative pulmonary bullectomy.

nature of the study.

### ***Surgical procedures***

All operations were performed under single-lumen intubation and artificial pneumothorax. The position during surgery, incisions, esophageal mobilization and dissection as well as mediastinal lymph node dissection were performed essentially as previously described (16). After dissecting the esophagus and mediastinal lymph nodes, ipsilateral pulmonary bullectomy was performed under the same anesthesia in IPB group. The target regions selected using preoperative imaging and intraoperative findings were carefully inspected, and wedge resections of the visible bullae (Varderschueren classification III and IV stages) of the lung surface were accomplished using endostaplers. During the surgery, two chest tubes were routinely placed in the mediastinal and basal positions.

### ***Postoperative management***

As a potentially life-threatening postoperative complication, pneumothorax is the accumulation of air in the pleural space, usually due to rupture of the pulmonary bullae.

During the postoperative course, pneumothorax was suspected in the presence of rapid breathing, respiratory distress, decreased blood oxygen saturation and an absence of or decrease in respiratory sounds on the affected side. A definite diagnosis was made by radiographic methods. Additional thoracic drainage was performed when pneumothorax occupied more than 30% of the hemithorax or subcutaneous emphysema was progressively exacerbated. Uniform routine postoperative management, including fluid management, pain relief, enteral and oral feeding, removal of drains and so on, was applied based on guidelines (17,18).

### ***Statistical analysis***

All statistical tests were performed using SPSS software, version 22.0 (IBM, Chicago, IL, USA). Statistical analyses were performed using Student's *t*-test, the chi-square test and logistic regression analysis between the initiative pulmonary bullectomy group and the control group. To balance the heterogeneity in baseline characteristics between the two groups (IPB group *vs.* control group), a 1:1 PSM was performed with a caliper width of 0.05. Propensity scores were based on age, sex, smoking history, body mass index (BMI), history of chronic obstructive

pulmonary disease (COPD), percent predicted forced expiratory volume in one second (FEV1%) of predicted, pleural adhesion and tumor location.  $P < 0.05$  was considered statistically significant.

## Results

### Patient characteristics

Before PSM, totals of 40 (36.70%) and 69 (63.30%) esophageal carcinoma patients were assigned to the IPB group and control group, respectively, according to whether initiative pulmonary bullectomy was performed. The IPB group consisted of 40 men, with a mean age of  $62.58 \pm 6.98$  (range, 48–77) years old, whereas the control group included more female patients ( $n=6$ , 8.70%,  $P=0.084$ ) with the mean age was  $64.94 \pm 8.17$  (range, 46–76,  $P=0.380$ ) years old. Patients receiving IPB had relatively poorer pulmonary function [both percent predicted forced vital capacity (FVC%) and FEV1%,  $95.22\% \pm 14.99\%$  vs.  $100.84\% \pm 19.89\%$  and  $86.25\% \pm 17.58\%$  vs.  $93.34\% \pm 24.95\%$ ,  $P=0.017$  and  $0.032$ ]. There were 31 patients (77.50%) in IPB group and 53 patients (76.81%) in control group detected bullae by preoperative CT ( $P=1.000$ ). The distribution of the pathologic T stage between the two groups differed significantly ( $P=0.028$ ). In addition, more tumors located in the middle thoracic esophagus were found in the control group (35.00% vs.

59.42%,  $P=0.049$ ). The proportion of patients who had smoking history in the IPB group was slightly greater than that in the CG, but the difference was not statistically significant (97.50% vs. 85.51%,  $P=0.053$ ). Furthermore, no obvious differences were observed in body mass index, drinking history, underlying diseases, neoadjuvant therapy, pathological type, pathological N staging, tumor differentiation or pleural adhesion between the two groups (Table 1).

After PSM, the cohorts were narrowed to 32 patients in each group. The baseline data, such as smoking history, FEV1% of predicted, pathologic T stage and tumor location, were compared between the two groups (Table 1). All further statistical analyses were performed on this population.

### Postoperative complications

As shown in Table 2, the total complication rates in the two groups were 43.75% and 56.25% respectively ( $P=0.454$ ), and the most frequent complication in both groups was postoperative pneumonia (37.50% vs. 43.75%,  $P=0.799$ ). No significant difference was found between the two groups in terms of the incidence of anastomotic leakage (6.25% vs. 3.13%,  $P=1.000$ ), arrhythmia (3.13% vs. 3.13%,  $P=1.000$ ), or chylothorax (0% vs. 3.13%,  $P=1.000$ ). Postoperative pneumothorax occurred in only one patient in the IPB

**Table 1** Characteristics of patients in our series before and after propensity score matching

Characteristics	Before propensity score matching			After propensity score matching		
	IPB (n=40)	CG (n=69)	P value	IPB (n=32)	CG (n=32)	P value
Age (years)	62.58±6.98	64.94±8.17	0.380	63.16±7.51	63.38±8.16	0.610
Gender			0.084			1.000
Male	40 (100.0)	63 (91.30)		32 (100.0)	32 (100.00)	
Female	0	6 (8.70)		0	0	
BMI (kg/m <sup>2</sup> )	21.74±2.93	21.66±2.61	0.344	21.24±2.68	21.79±2.49	0.669
Smoking history	39 (97.50)	59 (85.51)	0.053	31 (96.88)	31 (96.88)	1.000
Drinking history	28 (70.00)	41 (59.42)	0.307	21 (65.63)	21 (65.63)	1.000
Hypertension	9 (22.50)	16 (23.19)	1.000	6 (18.75)	4 (12.50)	0.732
Diabetes	3 (7.50)	5 (7.25)	1.000	3 (9.38)	4 (12.50)	1.000
COPD	6 (15.00)	22 (31.88)	0.069	6 (18.75)	9 (28.13)	0.556
Arrhythmia	1 (2.50)	4 (5.80)	0.650	1 (3.13)	2 (6.25)	1.000

Table 1 (continued)

Table 1 (continued)

Characteristics	Before propensity score matching			After propensity score matching		
	IPB (n=40)	CG (n=69)	P value	IPB (n=32)	CG (n=32)	P value
PFT						
FVC% (%)	95.22±14.99	100.84±19.89	0.017	95.58±14.02	95.44±18.37	0.090
FEV1% (%)	86.25±17.58	93.34±24.95	0.032	86.31±17.46	94.36±23.31	0.315
MVV% (%)	90.95±21.28	88.62±25.80	0.368	91.44±22.91	91.61±25.75	0.781
First discovered by			1.000			0.732
Preoperative CT	31 (77.50)	53 (76.81)		28 (87.50)	26 (81.25)	
Intraoperative exploration	9 (22.50)	16 (23.19)		4 (12.50)	6 (18.75)	
Neoadjuvant	10 (25.00)	10 (14.49)	0.172	10 (31.25)	8 (25.00)	0.782
Time of operation (min)	323.38±52.24	321.98±57.37	0.904	324.69±51.38	327.19±61.32	0.862
Tumor location			0.049			0.130
Upper	12 (30.00)	13 (18.84)		9 (28.13)	6 (18.75)	
Middle	14 (35.00)	41 (59.42)		10 (31.25)	18 (56.25)	
Lower	14 (35.00)	15 (21.74)		13 (40.62)	8 (25.00)	
Pathological types			0.181			1.000
Squamous cell	40 (100.00)	66 (95.65)		32 (100.00)	31 (96.88)	
Adenocarcinoma	0	3 (4.45)		0	1 (3.12)	
Pathological T classification			0.028			0.100
Tis	3 (7.50)	0 (0)		3 (9.37)	0 (0)	
T1	6 (15.00)	12 (17.39)		4 (12.50)	3 (9.37)	
T2	15 (37.50)	14 (20.29)		12 (37.50)	7 (21.88)	
T3	13 (32.50)	38 (55.07)		12 (37.50)	20 (62.50)	
T4	3 (7.50)	5 (7.25)		1 (3.13)	2 (6.25)	
Pathological N classification			0.477			0.657
N0	22 (55.00)	33 (47.83)		17 (53.12)	13 (40.63)	
N1	7 (17.50)	17 (24.64)		5 (15.63)	7 (21.87)	
N2	7 (17.50)	16 (23.19)		6 (18.75)	9 (28.12)	
N3	4 (10.00)	3 (4.35)		4 (12.50)	3 (9.38)	
Tumor differentiation			0.726			1.000
G1	13 (32.50)	16 (23.19)		10 (31.25)	10 (31.25)	
G2	19 (47.50)	38 (55.07)		15 (46.88)	15 (46.88)	
G3	5 (12.50)	8 (11.59)		4 (12.50)	4 (12.50)	
NA	3 (7.50)	7 (10.15)		3 (9.37)	3 (9.37)	
Pleural adhesion	13 (32.50)	23 (33.33)	0.929	12 (37.50)	16 (50.00)	0.450

Data are represented as mean ± SD or n (%). IPB, initiative pulmonary bullectomy; CG, control group; BMI, body mass index; COPD, chronic obstructive pulmonary disease; PFT, pulmonary function test; FVC, forced vital capacity; FEV1, first second forced expiratory volume; MVV, maximum ventilatory volume; CT, computed tomography.

**Table 2** Postoperative outcomes of patients in our series before and after propensity score matching

Characteristics	Before propensity score matching			After propensity score matching		
	IPB (n=40)	CG (n=69)	P value	IPB (n=32)	CG (n=32)	P value
Pneumonia	17 (42.50)	31 (44.93)	0.844	12 (37.50)	14 (43.75)	0.799
Anastomotic leak	3 (7.50)	4 (5.80)	0.706	2 (6.25)	1 (3.13)	1.000
Postoperative arrhythmia	2 (5.00)	2 (2.90)	0.623	1 (3.13)	1 (3.13)	1.000
Chylothorax	0	1 (1.45)	1.000	0	1 (3.13)	1.000
Pneumothorax			<0.001			<0.001
Ipsilateral	1 (2.50)	27 (39.13)		1 (3.13)	11 (34.38)	
Contralateral	0	6 (8.70)		0	2 (6.25)	
Length of postoperative stay, days	13.63±6.10	17.80±11.65	<0.001	13.28±6.32	16.13±8.35	0.045

Data are represented as mean ± SD or n (%). IPB, initiative pulmonary bullectomy; CG, control group.

group (3.13%) and 13 patients in the control group (40.63%), including 11 patients (34.38%) with surgery-ipsilateral pneumothorax, with a significant difference ( $P<0.001$ ). The mean time of occurrence of postoperative pneumothorax was  $3.44\pm 1.68$  days (range, 1–11 days). Except for one patient who underwent thoracentesis in the CG, the other 13 patients in both groups were treated with additional closed thoracic drainage, and no reoperations or hospital mortalities were reported among these patients. In addition, the length of postoperative hospital stay in the control group ( $16.13\pm 8.35$  days) was much longer than that of the remaining patients who received initiative pulmonary bullectomy ( $13.28\pm 6.32$  days,  $P=0.045$ ).

#### Univariate and multivariate logistic regression analysis

Finally, univariate and multivariate logistic analyses were performed to identify the independent factors associated with postoperative pneumothorax after MIE (Table 3). Initial univariate regression analyses showed that pulmonary bullectomy was significantly linked to a reduced risk of developing postoperative pneumothorax. In the multivariate analysis, the removal of ipsilateral bullae was also associated with a lower risk (OR 0.030; 95% CI: 0.003–0.338;  $P=0.005$ ) of incident postoperative pneumothorax, adjusting for age, COPD history, FEV1 and pleural adhesion. Therefore, the initiation of pulmonary bullectomy in patients with esophageal carcinoma complicated by ipsilateral pulmonary bullae was an independent protective factor for postoperative pneumothorax (Figure 2).

#### Discussion

Over the past few years, surgical and anesthetic techniques have shown visible improvement; however, the complication rate seems to continue to stagnate due to the high complexity of the esophagectomy procedure. As reported in previous studies, pulmonary complications after esophagectomy or MIE, mainly including pneumonia, atelectasis, respiratory distress, and pneumothorax, are the major postoperative complications reported in up to 40% of esophageal carcinoma patients (19,20). Among them, pneumothorax is a relatively frequent complication after MIE. This is probably a consequence of parts of esophageal carcinoma patients complicated by pulmonary bullae or emphysema, intraoperative manipulation especially adhesiolysis, improper mechanical ventilation and over-vigorous cough after the MIE. Several previous studies have reported pneumothorax after minimally invasive esophagectomy with an incidence of 0.79% to 3.4% (14,21,22). However, the present study showed an 31.19% incidence of postoperative pneumothorax after surgery in patients with a definite diagnosis of pulmonary bullae or emphysema, compared to 5.19% in the whole cohort. The possible explanations for the higher incidence of postoperative pneumothorax compared with previous studies are as follows: (I) the higher tobacco use rates in the present cohort (76.76%); (II) more patients having a history of chronic respiratory disease (44.19%); and (III) overemphasis on active cough during preoperative publicizing and education.



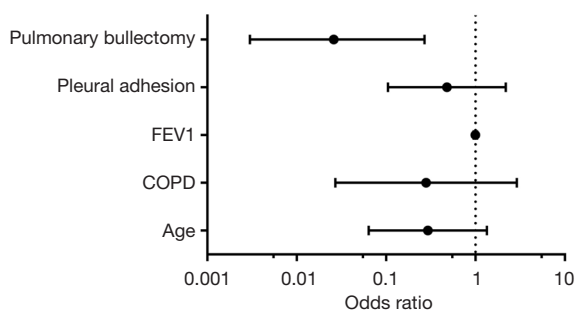
**Table 3** Logistic regression analysis after propensity score-matching

Characteristics	Univariable analysis			Multivariable analysis		
	OR	95% CI	P value	OR	95% CI	P Value
Age (<60 vs. ≥60 years)	0.316	(0.092–1.083)	0.067	0.293	(0.064–1.343)	0.114
Gender	0.280	(0–3.509)	1.000			
BMI, kg/m <sup>2</sup>			0.651			
18.5–23.99	1	–	–			
<18.5	3.800	(0.475–30.419)	0.208			
24–27.99	0.950	(0.174–5.194)	0.953			
≥28	0	–	0.999			
Smoking history	1.099	(0–1.549)	0.999			
COPD	0.474	(0.093–2.409)	0.368	0.280	(0.027–2.903)	0.286
FVC	1.003	(0.967–1.041)	0.866			
FEV1	1.023	(0.991–1.057)	0.161	0.997	(0.955–1.040)	0.882
MVV	1.004	(0.980–1.029)	0.741			
Neoadjuvant	1.029	(0.277–3.826)	0.966			
Tumor location			0.231			
Upper	1	–	–			
Middle	3.079	(0.570–16.633)	0.191			
Lower	1.083	(0.158–7.435)	0.935			
T classification			0.212			
Tis	1	–	–			
T1-2	1.000	–	0.999			
T3-4	1.000	–	0.999			
N classification			0.585			
N0	1	–	–			
N1	1.000	(0.166–6.028)	1.000			
N2	2.500	(0.592–10.555)	0.212			
N3	2.000	(0.299–13.375)	0.475			
Surgery approach	1.009	(0.000–1.347)	1.000			
Pleural adhesion	0.939	(0.288–3.159)	0.939	0.480	(0.105–2.187)	0.343
Bullectomy	0.062	(0.007–0.513)	0.010	0.030	(0.003–0.338)	0.005

BMI, body mass index; COPD, chronic obstructive pulmonary disease; FVC, forced vital capacity; FEV1, first second forced expiratory volume; MVV, maximum ventilatory volume; CI, confidence interval.

Due to surgical trauma, pain, postoperative dysfunction of respiratory muscles and diminished airway protection, lung function in these postoperative patients is likely to have been compromised; therefore, postoperative pneumothorax

often rapidly presents as a potentially life-threatening disease, requiring immediate intervention (15,23). These invasive manipulations, either manual aspiration with a needle or additional chest tubes connected to a water seal



**Figure 2** Forest plot shows that removing ipsilateral bullae is associated with a lower risk of incident postoperative pneumothorax. FEV1, first second forced expiratory volume; COPD, chronic obstructive pulmonary disease.

drainage device, will undoubtedly increase the unpleasant experience of patients, extend the length of hospital stay and impede postoperative recovery to some extent. For this reason, further exploration of promising prophylactic methods for postoperative pneumothorax in esophageal carcinoma patients is essential and quite urgent to reduce morbidity and mortality and improve short-term prognosis.

In this study, we compared the postoperative pneumothorax rates and other short-term complications between the IPB group and control group. Our data showed that initiative pulmonary bullectomy during surgery is an efficacious measure to prevent postoperative pneumothorax after minimally invasive esophagectomy, with a statistically significant reduction in the incidence of pneumothorax. This result is similar to the study by Zhang *et al.* which indicated that prophylactic bullectomy should be performed as a routine procedure when a definite diagnosis is made based on intraoperative exploration without considering whether the bubble is ruptured (24). Moreover, Hu *et al.* summarized a clinical experience in the treatment of postoperative pneumothorax in 155 patients who received esophagectomy and suggested that esophageal tumors and pulmonary bullae should be managed at same time if possible (25). In addition, since no significant difference was detected between the two groups in other short-term complications, we believe that the prolonged hospital stays between the two groups reflects the impediment of postoperative pneumothorax during recovery in patients with esophageal carcinoma. Although some previous reports have shown the usefulness of prophylactic bullectomy for esophageal carcinoma patients, the current study is the first research to evaluate the effect of initiative intraoperative

pulmonary bullectomy on preventing postoperative pneumothorax based on a propensity score-matched analysis and represents the largest study to date.

The other question that should receive much attention is whether the safety of minimally invasive esophagectomy is decreased by routine-initiative pulmonary bullectomy. Tan *et al.* previously reported their experience in treating esophageal and cardiac cancer patients with coexisting severe emphysema by combining esophageal tumor resection with simultaneous unilateral lung volume reduction surgery in selected patients, with favorable outcomes (26). Similarly, Tang *et al.* also elucidated the simultaneous lung volume reduction surgery could not only increase the chance of receiving surgical therapy, but also improve the postoperative quality of life of esophageal carcinoma patients complicated by emphysema (27). In fact, resection of heterogenous lung parenchyma without respiratory function could counteract the effect of hyperinflation, providing decreased work to breathe and improved alveolar gas exchange (28). Coupled with the current results, we believe that simultaneous pulmonary bullectomy does not induce unacceptable relative morbidity and mortality. In contrast, it could have some postoperative benefits and survival advantages for selected patients. Although no extra air leakage was observed after surgical resection of diseased lung in this research, we still suggest that the surgical margin should be kept no less than 10 mm from the base of the lesion to avoid possible air leakage due to the absence of water tests or pleurodesis procedures. In our study, the incidences of postoperative pneumonia, anastomotic leakage, arrhythmia, and chylothorax in both groups were similar, demonstrating that simultaneous-initiative pulmonary bullectomy could be performed in combination with esophageal resection in esophageal carcinoma patients with coexisting pulmonary bullae, with acceptable morbidity and without mortality. However, the differences between the IPB and control groups in long-term complications, postoperative recovery of lung function and overall survival require further study.

In the present study, the retrospective nature, limited number of patients and single institution constituted major limitations. Although PSM was performed to improve comparability between the two groups, the results could be affected by the smaller sample sizes and potential selection biases. Therefore, a larger multicenter and randomized study with follow-up is needed to further validate our results.



## Conclusions

The present study revealed that initiative pulmonary bullectomy is an effective and safe method for reducing the occurrence of postoperative pneumothorax and it does not increase other common postoperative complications. We recommend performing simultaneous and initiative pulmonary bullectomy during MIE for patients with ipsilateral pulmonary bullae who suffer from esophageal carcinoma. The present study might provide a novel prophylactic strategy for postoperative pneumothorax, improve the postoperative outcomes of esophageal surgery, and contribute to enhanced recovery after surgery.

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## Footnote

*Reporting Checklist:* The authors have completed the STROBE reporting checklist. Available at <https://jtd.amegroups.com/article/view/10.21037/jtd-22-1061/rc>

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*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <https://jtd.amegroups.com/article/view/10.21037/jtd-22-1061/coif>). 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. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). This study was approved by the Ethics Committee of Daping Hospital (No. 2022[159]). The need for patient consent was waived due to the retrospective nature of the study.

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