Original Article
Yonsei Med J 2026 Apr;67(4):334-340
https://doi.org/10.3349/ymj.2025.0153

Yonsei Medical Journal
YMJ
pISSN: 0513-5796 · eISSN: 1976-2437

Effect of Donor Lung Resection Technique on Bronchopleural Fistula in Transplantation: Pulmonary Tailoring Versus Hilar Dissection

Young Ho Yang[1*], Ruari Krueger Lee[2*], Zhu Jing Jun[3], Nguyen Minh Dung[4], Tae Hee Hong[1], Ha Eun Kim[1], Byung Jo Park[1], Chang Young Lee[1], Dae Joon Kim[1], and Jin Gu Lee[1]

[1]Department of Thoracic and Cardiovascular Surgery, Yonsei University College of Medicine, Seoul, Korea;
[2]Department of Thoracic Surgery and Anesthesia, Lung Center of the Philippines; Institute of Surgery, St. Luke's Medical Center, Quezon City, Philippines;
[3]Department of Thoracic Surgery, Yanbian University Hospital, Yanji, Jilin, China;
[4]Department of Thoracic and Cardiovascular Surgery, University of Medicine and Pharmacy, Ho Chi Minh City, Vietnam.

Purpose: Donor shortages in many countries necessitate the use of marginal donor lungs despite challenges such as size mismatch, and donor lung pathologies requiring resection, such as consolidation or anatomical abnormalities. One way to address these challenges is through major pulmonary resection of the donor lung, which can be in the form of hilar dissection (HD), an anatomical resection, or pulmonary tailoring (PT), a non-anatomical resection. No studies have compared these two techniques; hence, we aimed to compare their intraoperative and postoperative outcomes.
Materials and Methods: We retrospectively analyzed 40 lung transplant recipients who underwent major pulmonary resection of donor lungs between January 2014 and May 2023. The patients were divided into HD (n=18) and PT (n=22) groups, and their intraoperative and postoperative outcomes were compared.
Results: Postoperative bronchopleural fistula (BPF) occurred in 22.2% of patients in the HD group but was absent in the PT group (p=0.033). There were no significant differences between the two groups in terms of total operative time, ischemic time for each lung, occurrence of primary graft dysfunction, bronchial anastomotic dehiscence, bronchial stenosis, or pneumothorax. The survival curves were also similar between the two groups.
Conclusion: The PT technique significantly reduced the risk of BPF compared with the HD technique, suggesting its potential as a safer technique for managing oversized donor lungs and addressing other pathologies requiring resection.

Key Words: Lung transplantation, major pulmonary resection, size mismatch, bronchopleural fistula, anatomical resection, non-anatomical resection

Received: June 4, 2025 **Revised:** September 9, 2025
Accepted: October 30, 2025 **Published online:** February 12, 2026
Corresponding author: Jin Gu Lee, MD, PhD, Department of Thoracic and Cardiovascular Surgery, Yonsei University College of Medicine, 50-1 Yonsei-ro, Seodaemun-gu, Seoul 03722, Korea.
E-mail: CSJGLEE@yuhs.ac

*Young Ho Yang and Ruari Krueger Lee contributed equally to this work.
•The authors have no potential conflicts of interest to disclose.

INTRODUCTION

Donor shortages are a pressing concern[1-3] in many countries, especially regarding lung transplantation. Consequently, marginally acceptable donor lungs are commonly encountered. The reasons for donor lungs being considered marginal are numerous and may include defects found in them. However, the most commonly encountered reason is size mismatch between donor lungs and recipients, which has been shown to independently affect survival.[4] More specifically, the donors being larger than recipients may pose problems in the postoperative management of recipients.[1,4] Although some studies have shown the advantages of oversized donor grafts,[5] issues such as anatomical fit, increased functional residual capacity, altered compliance characteristics, and potential hemodynamic effects on the heart and major vessels can arise.[6-8] Several approaches can be used to address this problem when larger donor lungs are available. These include accepting wider cutoffs for size mismatches, physiology-based management strategies, and surgical approaches, such as trimming the donor lungs or leaving the chest open after surgery, with delayed closure.[9]

Trimming is a direct method of managing significantly oversized donor lungs.[9] Trimming, which can be performed by visual estimation of size discrepancies,[6] can also address other encountered issues, such as partial donor-lung consolidation and anatomic abnormalities. In the literature, there are two methods for performing major pulmonary resection of donor lungs: non-anatomic pulmonary broncho-vascular dissection and resection, also known as pulmonary tailoring (PT), and anatomic pulmonary broncho-vascular dissection reduction, known as hilar dissection (HD).[9] The PT technique involves transecting the bronchovascular bundle, leaving the lung parenchyma around the transected structures. The HD technique involves isolating the bronchovascular structures from each other, with separate transection of the structures. Previous studies have described experiences with PT[7]; however, no comparison has been made between the HD and PT techniques. Therefore, this study aimed to compare the occurrence of postoperative complications in patients who underwent HD and PT during major pulmonary resection of donor lungs during lung transplantation.

MATERIALS AND METHODS

This study involved a single-center retrospective cohort analysis conducted at Yonsei Severance Hospital, South Korea. Patients who underwent lung transplantation between January 2014 and May 2023 were included, focusing specifically on those who required major pulmonary resection of the donor lungs prior to implantation. The inclusion criteria were adult lung transplant recipients who underwent major pulmonary resection of the donor lungs for various indications, such as size mismatches, consolidation, or anatomical abnormalities. The exclusion criteria were as follows: 1) not having undergone pulmonary resection of the donor lung; 2) having undergone only minor pulmonary resection of the donor lung; 3) re-transplantation; 4) multi-organ transplantation; and 5) combined lung transplantation with other procedures, such as valve surgery, coronary bypass surgery, atrial septal defect repair, or pulmonary angioplasty. Patients meeting the eligibility criteria were divided into two groups based on the resection technique employed: HD or PT. This division enabled a comparative analysis of intraoperative factors and postoperative complications, including bronchopleural fistula (BPF), bronchial stenosis, and other surgical outcomes. This study was approved by the Severance Hospital Institutional Review Board (IRB No. 4-2024-1587). Informed consent was waived by the Institutional Review Board due to the retrospective nature of the study.

Surgical techniques and definitions

Donor/recipient size matching was defined as having a donor-to-recipient lung size ratio exceeding 30% variability,[10] wherein the ratio was computed by calculating the predicted total lung capacity (pTLC) of the donor divided by the pTLC of the recipient, using the following equations:

$$\text{Male patients: pTLC (L)}=(0.094\times\text{height in cm})\times(0.015\times\text{age in years})\times 9.167.$$

$$\text{Female patients: pTLC (L)}=(0.079\times\text{height in cm})-(0.008\times\text{age in years})-7.49.$$

Major pulmonary resection was defined as the removal of the entire basal segment group or an entire lobe of the donor lung.

The PT technique was defined as a non-anatomical major pulmonary resection, in which the artery and bronchus or vein were stapled together with the surrounding lung parenchyma, and the stapled area was reinforced using polydioxanone (PDS) 4-0 by forward continuous horizontal mattress suture followed by running interlocking sutures (Figs. 1 and 2, Supplementary Video 1, only online).[7] A GIA™ stapler with Tri-Staple™ technology (Medtronic, Minneapolis, MN, USA) was used for all stapling procedures. Depending on the tissue thickness, either black cartridges (for extra-thick tissue; closed staple height 4.0–5.0 mm) or purple cartridges (for medium-to-thick tissue; closed height 3.0–4.0 mm) were used. The HD technique involved an anatomical major pulmonary resection, where the artery, vein, and bronchus of the lobe were dissected and stapled separately. The bronchus stump was reinforced using PDS 3-0 interrupted sutures (Fig. 1). The choice between PT and HD was determined by surgeon preference and institutional practice patterns. Until 2019, HD was the primary downsizing technique employed. Since then, PT has become more commonly used due to its technical simplicity and the potential benefit of preserving peribronchial blood supply. In most cases,

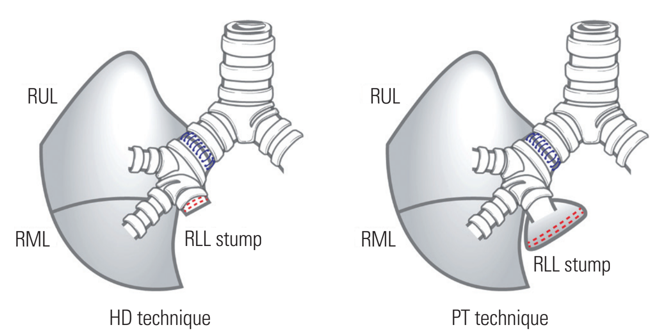

Fig. 1. HD and PT technique for size reduction. HD, hilar dissection; PT, pulmonary tailoring; RLL, right lower lobe; RML, right middle lobe; RUL, right upper lobe.

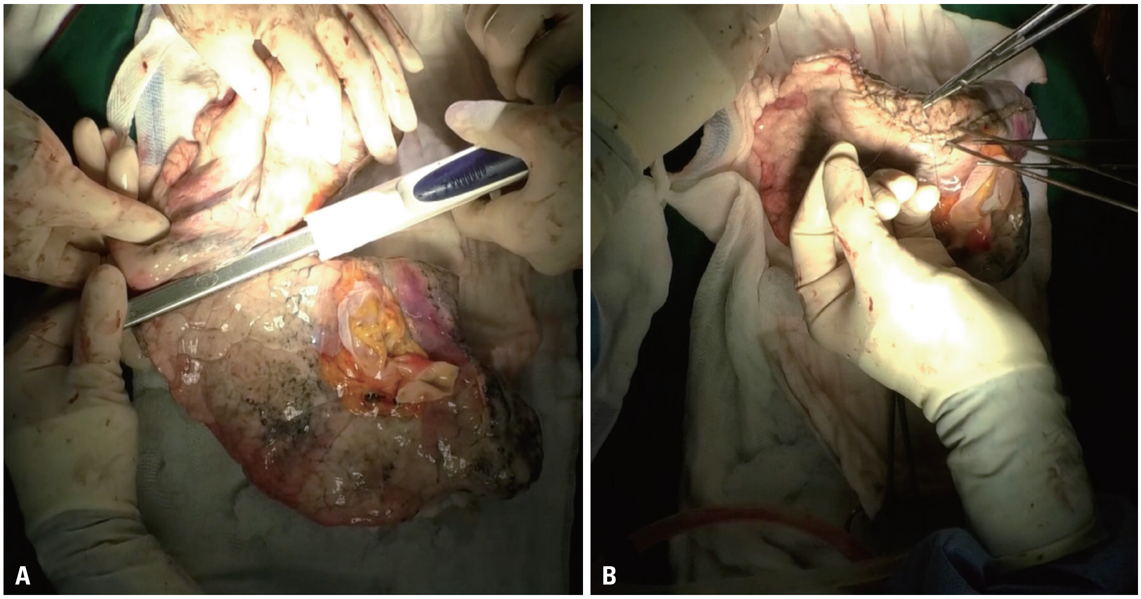

Fig. 2. Pulmonary tailoring technique in common basal segmentectomy. (A) Stapling with the surrounding lung parenchyma. (B) Reinforcement using polydioxanone 4-0 by forward continuous horizontal mattress suture returning running interlocking suture.

lobar transplantation was performed due to significant donor-recipient size mismatch. Given the relatively large volume of the lower lobe, it was often resected to avoid volume overload in the recipient's thoracic cavity. Furthermore, the lower lobe frequently showed pathological findings such as consolidation or inflammation, making the upper lobe a more suitable graft in many cases.

Donor procurement and implantation protocol

Pulmonary harvest was performed according to standard techniques using the median sternotomy approach. Prior to lung removal, we performed intraoperative retrograde perfusion via the left and right superior and inferior pulmonary veins using cold Perfadex solution. Most recipients underwent sequential bilateral lung transplantation with the right side first. In cases in which the size difference was large, pulmonary resection was performed before implantation. In cases where lobectomy was performed, the donor's lobar bronchus stump was left behind, and the donor's main bronchus was connected to the recipient's main bronchus. Bronchial anastomosis was performed using PDS 4-0 continuous sutures for the membranous portion and PDS 3-0 interrupted sutures for the cartilaginous portion. Pulmonary vein anastomosis was performed using PDS 4-0 continuous sutures with intima-to-intima apposition. Finally, pulmonary artery anastomosis was performed using PDS 5-0 continuous sutures. For closure, we placed two chest tubes on each side, with one of the tubes being right-angled and curved inferiorly, following the dome of the diaphragm. Additionally, a Blake drain was placed into the pericardial cavity.

Statistical methods

Continuous variables were presented as mean±standard deviation, and intergroup differences were analyzed using Student's t-test. Non-normally distributed variables were presented as medians (interquartile range) and compared using the Mann–Whitney U test. Differences in categorical variables were analyzed using the χ^2 test or Fisher's exact test. Survival curves were estimated using the Kaplan–Meier method and compared using the log-rank test. Statistical significance was set at a $p<0.05$. Multivariable Cox proportional hazards regression was conducted to identify risk factors for the occurrence of BPF. Variables with a $p<0.20$ on univariate analysis were used as input variables for the multivariable Cox regression analysis. The statistical analyses were performed using IBM SPSS Statistics for Windows, version 26 (IBM Corp., Armonk, NY, USA).

RESULTS

Supplementary Fig. 1 (only online) shows a flow diagram of the patients recruited for this study. A total of 413 lung transplantations were performed between January 2014 and May 2023. Among them, there were 118 cases of pulmonary resection of the donor lung and 40 cases of major pulmonary resection of the donor lung prior to implantation. Overall, 18 and 22 patients underwent major pulmonary resection using the HD and PT technique, respectively.

Table 1 shows the clinical profiles of the patients in both groups. The mean age of the patients was 59.5 years and 58.0 years for the HD and PT groups, respectively, and a minority of the patients in both groups were male (44.4% and 27.3%, respectively). Age, sex, blood type, and New York Heart Association Classification were not significantly different between the two groups. The most common indication for lung transplantation in both groups was restrictive lung disease, including idiopathic pulmonary fibrosis and bronchiolitis obliterans. Obstructive lung diseases (such as bronchiectasis and lymphangioleiomyomatosis) and pulmonary vascular diseases (such as pulmonary hypertension) were the other indications for lung transplantation. Most patients were on preoperative ventilatory or extracorporeal membrane oxygenation (ECMO) support. No significant differences were observed in terms of indications for transplantation or preoperative cardiorespiratory support.

Table 2 shows the operative data for the two groups. The donor-to-recipient ratio (%) did not significantly differ between the two groups, with a mean of 120.5% in the HD group and 134.8% in the PT group (p=0.262). Almost all patients underwent clamshell incision during lung transplantation.

Regarding the type of pulmonary resection performed, all patients in the HD group underwent lobectomy of the donor lung (n=18), whereas in the PT group, 59.1% of the patients underwent lobectomy and 40.9% of the patients underwent basal segmentectomy (p=0.007). The site of donor lung resection varied between the groups, with most patients in the HD group undergoing resection in the right lower lobe, whereas resection was performed more frequently in the right middle lobe in the PT group (p=0.005). The most common cause of donor pulmonary resection in both groups was size mismatch (50.0% in the HD group and 77.3% in the PT group); other causes included lung consolidation, bronchial abnormalities, and donor vein injury (p=0.218) (Table 3).

Ischemic time for the first and second lung was also not significantly different between the groups, with a mean of 212.0 minutes and 209.5 minutes for the first lung (p=0.605) and 331.5 minutes and 302.0 minutes for the second lung in the HD and PT groups, respectively (p=0.053). The total operative time was 421.0 minutes in the HD group and 378.0 minutes in the PT group, which was not significantly different.

Table 1. Preoperative Clinical Profiles

Variable	HD (n=18)	PT (n=22)	*p*
Age (yr)	59.5 [39.0, 64.0]	58.0 [49.0, 63.0]	0.744
Male, sex	8 (44.4)	6 (27.3)	0.424
Blood group			0.879
A+	8 (44.4)	7 (31.8)	
AB+	2 (11.1)	3 (13.6)	
B+	4 (22.2)	6 (27.3)	
O+	4 (22.2)	6 (27.3)	
NYHA class			0.114
III	0 (0.0)	4 (18.2)	
IV	18 (100)	18 (81.8)	
Indication			0.817
Obstructive lung disease	3 (16.7)	2 (9.1)	
Restrictive lung disease	14 (77.8)	19 (86.4)	
Pulmonary vascular disease	1 (5.6)	1 (4.5)	
Preoperative ventilator use	11 (61.1)	13 (59.1)	>0.990
Preoperative ECMO support	9 (50.0)	13 (59.1)	0.798

HD, hilar dissection; PT, pulmonary tailoring; ECMO, extracorporeal membrane oxygenation; IQR, interquartile range; NYHA, New York Heart Association.
Data are shown as n (%) or median [IQR].

Table 2. Operative Data

Variable	HD (n=18)	PT (n=22)	*p*
D/R ratio (%)	120.5 [104.4, 132.1]	134.8 [118.9, 143.0]	0.262
Incision			0.138
Clamshell	17 (94.4)	22 (100)	
Thoracotomy	1 (5.6)	0 (0.0)	
Ischemic time (min)			
First lung	212.0 [191.0, 255.0]	209.5 [188.0, 318.0]	0.605
Second lung	331.5 [297.0, 458.0]	302.0 [278.0, 355.0]	0.053
Operation time (min)	421.0 [342.0, 489.0]	378.0 [356.0, 426.0]	0.131

HD, hilar dissection; PT, pulmonary tailoring; D/R, donor/recipient; IQR, interquartile range.
Data are presented as n (%) or median [IQR].

Table 3. Major Pulmonary Resection Data

Variable	HD (n=18)	PT (n=22)	*p*
Pulmonary resection			0.007
Basal segmentectomy	0 (0.0)	9 (40.9)	
Lobectomy	18 (100)	13 (59.1)	
Site			0.005
BLL	3 (16.7)	4 (18.2)	
LLL	6 (33.3)	5 (22.7)	
RLL	9 (50.0)	3 (13.6)	
RML	0 (0.0)	10 (45.5)	
Cause of pulmonary resection			0.218
Size mismatch	9 (50.0)	17 (77.3)	
Consolidation	7 (38.9)	5 (22.7)	
Bronchial abnormality	1 (5.6)	0 (0.0)	
Donor vein injury	1 (5.6)	0 (0.0)	

HD, hilar dissection; PT, pulmonary tailoring; BLL, both lower lobes; LLL, left lower lobe; RLL, right lower lobe; RML, right middle lobe.
Data are presented as n (%).

Table 4. Postoperative Data

Variable	HD (n=18)	PT (n=22)	*p*
Intraoperative ECMO weaning	6 (33.3)	10 (45.5)	0.650
Primary graft dysfunction			0.362
0	4 (22.2)	6 (27.3)	
1	3 (16.7)	1 (4.5)	
2	0 (0.0)	2 (9.1)	
3	11 (61.1)	13 (59.1)	
Bronchial anastomosis dehiscence	0 (0.0)	0 (0.0)	>0.990
Bronchopleural fistula at bronchial stump	4 (22.2)	0 (0.0)	0.033
Bronchial stenosis	1 (5.6)	2 (9.1)	>0.990
Pneumothorax	1 (5.6)	0 (0.0)	0.450

HD, hilar dissection; PT, pulmonary tailoring; ECMO, extracorporeal membrane oxygenation.
Data are presented as n (%).

Table 4 shows the postoperative data for both groups. The number of patients who were weaned from ECMO support intraoperatively did not differ significantly between the two groups (p=0.650). The number of patients who had primary graft dysfunction at 72 hours also did not differ between the groups (p=0.362). Regarding postoperative complications, the occurrence of BPF was 22.2% of patients in the HD group, whereas no patient in the PT group had BPF (p=0.033). The occurrence of other complications, such as bronchial anastomosis dehiscence, bronchial stenosis, and pneumothorax, did not significantly differ between the two groups. The survival curves of the HD and PT groups did not show any significant differences (p=0.520) (Fig. 3).

DISCUSSION

This study highlights that PT significantly reduces the risk of BPF, compared with HD, in lung transplantation involving oversized donor lungs or donor lungs with additional pathologies, such as consolidation or anatomical abnormalities. The absence of BPF in the PT group underscores the importance of preserving the bronchial blood supply, likely facilitated by the retention of parenchyma around the bronchial structures.

In South Korea, donor shortage is a constant challenge; therefore, our team is always seeking ways to expand the criteria for acceptable donor lungs. However, a major limitation of South Korea's lung transplantation program is its inability to use ex vivo lung perfusion (EVLP), which is widely used in other countries to assess and rehabilitate marginal donor lungs before transplantation.[11] The lack of EVLP implementation in South Korea is primarily due to regulatory restrictions, limited infrastructure, and the high costs associated with establishing and maintaining EVLP programs. Consequently, lung transplantation centers must rely on alternative strategies, such as lobar transplantation, which includes surgical resection of the compromised donor lung tissue, to address problems such as size mismatch, lung consolidation, anatomical abnormalities, and injuries to the donor lungs.

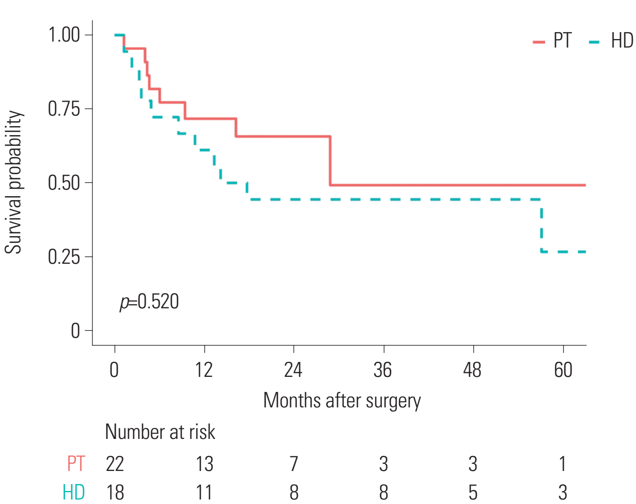

Fig. 3. Survival analysis for the HD group vs. PT group. HD, hilar dissection; PT, pulmonary tailoring.

However, lobar transplantation adds complexity to the process of lung transplantation.[9] For instance, if the lobar bronchial stump of the donor is smaller than that of the recipient, serious complications such as prolonged air leaks and BPF may occur.[12] To address this issue, Kayawake, et al.[13] proposed a lobar-to-lobar anastomosis to help avoid leaving donor bronchial stumps behind or exposed. In their study, there were cases in which donor bronchial stumps had to be left behind. All of these bronchial stumps were from the middle lobe bronchus, and no complications were encountered in these cases. Our institution employs an alternative approach to address this issue. Instead of lobar-to-lobar anastomosis, we close and leave the donor's lobar bronchial stump of the resected lobe or segment, and perform bronchial anastomoses between the main bronchus of the donor and that of the recipient. We believe that this approach helps to make the procedure more routine and reduces technical challenges associated with connecting the donor lobar bronchi to the recipient lobar bronchi or main bronchus.

Our results showed that PT and HD techniques do not affect operative factors, such as lung ischemia time, total operative time, and intraoperative ECMO weaning ability. The techniques also did not differ in terms of the occurrence of primary graft dysfunction and complications, such as bronchial stenosis or anastomotic dehiscence. This may have been due to the oversized lung grafts, as other studies have shown an advantage in the incidence of complications with oversized versus undersized grafts.[14-16] However, our results showed that BPF of the bronchial stump was observed in 22.2% of patients who underwent HD, whereas none of those who underwent PT developed BPF. Bronchoscopic images obtained during postoperative follow-up of patients who underwent the PT technique demonstrated well-healed bronchial stumps without evidence of fistula formation (Supplementary Fig. 2, only online). These findings visually support the clinical observation of zero BPF incidence in this group. This is a novel and significant finding, as the previously reported incidence of BPF (1%–3% of cases[17,18]) is always related to the anastomotic site and not to the bronchial stumps after major pulmonary resection of the donor lungs. We hypothesized that this problem most likely arose from excessive dissection in patients in the HD group, which inadvertently cut off the blood supply to the dissected bronchi. After lung transplantation, the antegrade blood supply to the bronchus is primarily through the recipient's bronchial arteries, whereas the retrograde blood supply comes from the donor pulmonary artery. We believe that the maintenance of both supplies is important to provide sufficient blood flow and avoid leaving the bronchial stump vulnerable to complications, such as BPF. Therefore, in addition to careful dissection of the recipient bronchial stump, we believe that the tailoring technique ex-

https://doi.org/10.3349/ymj.2025.0153

plains the absence of BPF in the PT group. This is because leaving the donor lung parenchyma around the dissected bronchus ensures adequate blood supply to the area. This tailoring technique has several advantages. It simplifies the surgical procedure by reducing the number of anastomoses, reducing differences in size discrepancies, and lowering the possibility of anatomical variation, which leads to reduced surgical time. This time saving is important because it is related to the ischemic time in transplant patients.

A limitation of this study is that it was a retrospective, single-center study that included a small number of patients. Furthermore, the selection of surgical technique (PT vs. HD) was determined by surgeon preference and institutional practice patterns, particularly with a shift toward PT after 2019. This retrospective, non-randomized nature may introduce potential selection bias. The difference in resection extent between the two groups may be a potential confounder. However, in the PT group, segmentectomy typically involved removal of the common basal segments, leaving only the superior segment. This likely had minimal impact on lung function, and was intended to facilitate bronchial healing and improve graft fit within the thoracic cavity. However, as the study encompasses 10 years of experience at our institution and as no other study has performed similar comparisons between the two techniques, we believe that our results are valuable and may serve as a foundation for future studies investigating donor lung-reduction techniques. Owing to the limited number of patients, we were unable to determine whether both techniques had specific advantages in terms of the patients' primary diagnosis, sex, or age-related factors, as suggested by other studies.[4,19] These findings should be explored further in future studies.

In conclusion, our experience shows that the PT technique is associated with a lower incidence of BPF, compared with the HD technique. The PT technique may help prevent the occurrence of BPF when major pulmonary resection is required during lung transplantation.

The PT technique reduces the risk of BPF, compared with the HD technique, in lung transplantation involving major pulmonary resection. By addressing size mismatches and resecting damaged lung portions, PT has emerged as a safer and more effective approach. As donor shortages persist, optimizing surgical techniques, such as PT, could improve outcomes and expand the pool of acceptable donor lungs.

SUPPLEMENTARY DATA

Video 1. Pulmonary tailoring technique before implantation

ACKNOWLEDGEMENTS

The authors thank MID (Medical Illustration & Design) for providing excellent support with medical illustration.

AUTHOR CONTRIBUTIONS

Conceptualization: Young Ho Yang and Jin Gu Lee. Data curation: Young Ho Yang. Formal analysis: Young Ho Yang, Ruari Krueger Lee, and Zhu Jing Jun. Funding acquisition: Young Ho Yang, and Jin Gu Lee. Investigation: Young Ho Yang and Ruari Krueger Lee. Methodology: Young Ho Yang and Ruari Krueger Lee. Project administration: Young Ho Yang and Jin Gu Lee. Resources: Young Ho Yang, Ruari Krueger Lee, Ha Eun Kim, and Jin Gu Lee. Software: Young Ho Yang, Ruari Krueger Lee, and Zhu Jing Jun. Supervision: Chang Young Lee, Dae Joon Kim, and Jin Gu Lee. Validation: Chang Young Lee, Dae Joon Kim, and Jin Gu Lee. Visualization: Young Ho Yang. Writing—original draft: Young Ho Yang and Ruari Krueger Lee. Writing—review & editing: all authors. Approval of final manuscript: all authors.

ORCID iDs

Young Ho Yang https://orcid.org/0000-0002-0977-0525
Ruari Krueger Lee https://orcid.org/0009-0003-7392-0115
Zhu Jing Jun https://orcid.org/0000-0003-4903-4757
Nguyen Minh Dung https://orcid.org/0009-0009-8893-7909
Tae Hee Hong https://orcid.org/0000-0003-2708-8893
Ha Eun Kim https://orcid.org/0000-0001-9240-2215
Byung Jo Park https://orcid.org/0000-0001-5217-4764
Chang Young Lee https://orcid.org/0000-0002-2404-9357
Dae Joon Kim https://orcid.org/0000-0002-2182-010x
Jin Gu Lee https://orcid.org/0000-0003-2767-6505

REFERENCES

1. Franz M, Tavil S, de Manna ND, Aburahma K, Boethig D, Bobylev D, et al. Oversizing lung allografts deteriorates outcomes in patients with pulmonary fibrosis. J Heart Lung Transplant 2024;43:1126-34.
2. Abdelnour-Berchtold E, Ali A, Cypel M, Keshavjee S. Pushing the envelope for donor lungs. Semin Respir Crit Care Med 2021;42:357-67.
3. Yeo HJ. Allocation of donor lungs in Korea. J Chest Surg 2022; 55:274-6.
4. Eberlein M, Diehl E, Bolukbas S, Merlo CA, Reed RM. An oversized allograft is associated with improved survival after lung transplantation for idiopathic pulmonary arterial hypertension. J Heart Lung Transplant 2013;32:1172-8.
5. Eberlein M, Reed RM, Bolukbas S, Diamond JM, Wille KM, Orens JB, et al. Lung size mismatch and primary graft dysfunction after bilateral lung transplantation. J Heart Lung Transplant 2015;34: 233-40.
6. Egan TM, Thompson JT, Detterbeck FC, Lackner RP, Mill MR, Ogden WD, et al. Effect of size (mis)matching in clinical double-lung transplantation. Transplantation 1995;59:707-13.
7. Santos F, Lama R, Alvarez A, Algar FJ, Quero F, Cerezo F, et al. Pulmonary tailoring and lobar transplantation to overcome size disparities in lung transplantation. Transplant Proc 2005;37:1526-9.
8. Eberlein M, Reed RM, Permutt S, Chahla MF, Bolukbas S, Nathan SD, et al. Parameters of donor-recipient size mismatch and survival after bilateral lung transplantation. J Heart Lung Transplant 2012;31:1207-13.e7.
9. Campo-Canaveral De La Cruz JL, Dunne B, Lemaitre P, Rackauskas M, Pozniak J, Watanabe Y, et al. Deceased-donor lobar lung transplant: a successful strategy for small-sized recipients. J Thorac Cardiovasc Surg 2021;161:1674-85.
10. Barnard JB, Davies O, Curry P, Catarino P, Dunning J, Jenkins D, et

al. Size matching in lung transplantation: an evidence-based review. J Heart Lung Transplant 2013;32:849-60.
11. Haam S. Ex vivo lung perfusion in lung transplantation. J Chest Surg 2022;55:288-92.
12. Mitilian D, Sage E, Puyo P, Bonnette P, Parquin F, Stern M, et al. Techniques and results of lobar lung transplantations. Eur J Cardiothorac Surg 2014;45:365-70.
13. Kayawake H, Chen-Yoshikawa TF, Aoyama A, Motoyama H, Hamaji M, Hijiya K, et al. Surgical management of bronchial stumps in lobar lung transplantation. J Thorac Cardiovasc Surg 2018;156:451-60.
14. Santos Silva J, Olland A, Massard G, Falcoz PE. Does lobar or size-reduced lung transplantation offer satisfactory early and late outcomes? Interact Cardiovasc Thorac Surg 2020;31:93-7.
15. Eberlein M, Arnaoutakis GJ, Yarmus L, Feller-Kopman D, Dezube R, Chahla MF, et al. The effect of lung size mismatch on complications and resource utilization after bilateral lung transplantation. J Heart Lung Transplant 2012;31:492-500.
16. Eberlein M, Permutt S, Chahla MF, Bolukbas S, Nathan SD, Shlobin OA, et al. Lung size mismatch in bilateral lung transplantation is associated with allograft function and bronchiolitis obliterans syndrome. Chest 2012;141:451-60.
17. Soetanto V, Grewal US, Mehta AC, Shah P, Varma M, Garg D, et al. Early postoperative complications in lung transplant recipients. Indian J Thorac Cardiovasc Surg 2022;38(Suppl 2):260-70.
18. Loor G, Mattar A, Schaheen L, Bremner RM. Surgical complications of lung transplantation. Thorac Surg Clin 2022;32:197-209.
19. Moneke I, Semmelmann A, Ogutur ED, Senbaklavaci O, Jungraithmayr W. Increased donor organ size and age is associated with reduced survival in female lung transplant recipients. Transplant Proc 2024;56:1429-35.

https://doi.org/10.3349/ymj.2025.0153