

## **Risk Factors Associated with Oropharyngeal Dysphagia in Patients with Lung Transplantation**

**Zoha Asif<sup>1\*</sup>, Hafeez Punjani<sup>1</sup>, Afshan Memon<sup>1</sup>, Ali Punjani<sup>2</sup> and Tasneem Ali<sup>2</sup>**

<sup>1</sup>*Audiologist and Speech Language Therapist, College of Speech Language and Hearing Sciences, Faculty Health Sciences, Ziauddin University, Karachi, Pakistan*

<sup>2</sup>*Speech Language Therapist, College of Speech Language and Hearing Sciences, Faculty Health Sciences, Ziauddin University, Karachi, Pakistan*

**\*Corresponding Author:** Zoha Asif, Audiologist and Speech Language Therapist, College of Speech Language and Hearing Sciences, Faculty Health Sciences, Ziauddin University, Karachi, Pakistan.

**Received:** April 11, 2023; **Published:** June 06, 2023

### **Abstract**

**Objective:** To identify most prevalent risk factors having greater likelihood of developing oro-pharyngeal dysphagia in patients after the procedure of lung transplantation.

**Materials and Methods:** 5 databases were searched systematically to select studies for a review. Inclusionary criteria involved studies conducted on patients post lung transplant as their primary surgery, post-operative onset of oropharyngeal dysphagia and laryngeal dysfunction identified in acute settings, original studies available in English.

**Result:** The analysis of studies shows that there is a greater likelihood of development of oropharyngeal dysphagia in patients after lung transplantation. The most common causes of oropharyngeal dysphagia in patients with lung transplantation include recurrent laryngeal nerve damage, vocal cord palsy, and prolonged endotracheal intubation.

**Discussion:** The existing articles indicate that signs and symptoms of Oropharyngeal dysphagia are evident in patients after lung transplantation.

**Conclusion:** Swallow assessment of patients after lung transplantation is crucial due to high incidence of oropharyngeal dysphagia in this population.

**Keywords:** *Oropharyngeal Dysphagia; Risk Factors; Lung Transplantation; Swallow Assessment*

### **Introduction**

Swallowing difficulties or dysphagia is considered as the potential post-lung transplant consequence [1]. Population with end-stage lung disease (ESLD) may be particularly susceptible to dysphagia due to numerous premorbid risk factors [2], surgical risk factors and/or laryngeal injury associated with post-extubation dysphagia [3,4]. Aspiration, or deviant bolus passage into the trachea during swallowing, is one of the common causes of oropharyngeal dysphagia in the acute recovery phase of post-lung transplantation [5]. Oropharyngeal dysphagia can result in respiratory infections, malnutrition, dehydration, hospitalizations and higher expenditures [6]. Furthermore, dysphagia is one of the prevalent risk factors of aspiration pneumonia, which can lead to death [7]. The objective of the study is to highlight

the prevalent risk factors that give rise to oropharyngeal dysphagia in patients after lung transplantation. Identification of risk factors will facilitate practicing speech therapists to initiate early screening for identifying signs and symptoms of oropharyngeal dysphagia that may prevent further medical complications. It is multi-factorial, associated with commodities and poor prognosis, and treatment requires a multidisciplinary approach, including the participation of various professionals and family members.

### Discussion

The preferred course of therapy for end-stage cardiac and/or pulmonary illness, which offers improved survival and quality of life, is heart and/or lung transplantation [8]. In patients with oropharyngeal dysphagia after lung transplantation, rates of silent aspiration have been observed to reach 77%. With the mean period for resolution being up to 91.8 +/- 170 days, OPD after transplantation might last for a very long time. The occurrence of these complications is reported to be significant in the current literature, with results of oropharyngeal dysphagia and vocal fold paralysis and paresis (vocal fold palsy), with the high rate of occurrence ranging from 2.9% to 34% [9]. The results of earlier studies show that speech-language therapists receive high percentage of referrals. Clinical indications of oropharyngeal dysphagia and laryngeal dysfunction, which may lead to poorer health outcomes, are the reason why patients undergoing heart or lung transplantation are referred to speech language pathologists at a high rate (24 percent) [1]. Non-randomized, cross-sectional, retrospective study was conducted with a purpose to highlight the frequency of reported referrals to speech therapists following lung or heart transplantation. It involved reviewing the data of 284 consecutive participants who had lung or heart transplants performed at one center between January 2010 and December 2013. On the basis of the clinical signs of dysphagia and laryngeal dysfunction, the nursing staff retrieved the records of 68 participants from hospital records and referred those patients to speech language therapists. Patients who had tracheostomies were included in this research as well. Results showed that 88% of participants (58/66) presented with oropharyngeal dysphagia recognized during bedside assessment, and 97% of participants overall (66/68) were referred to speech language therapists. In a videofluoroscopy or FEES objective investigation, eight out of 68 individuals were included [10]. Since clinical indicators of oropharyngeal dysphagia and laryngeal dysfunction are known to be linked to longer hospital stays and worse health outcomes in a variety of patient populations, data also showed a high rate of referrals to speech therapists (24%) following heart and/or lung transplantation. Despite extensive study on OPD and LD after thoracic and cardiac surgery substantial research investigating the occurrence of these issues after lung and/or heart transplantation has been scant [9]. There have been reports of oropharyngeal dysphagia rates as high as 70.5%, with 25% of these individuals also having vocal cord palsy [11]. To identify and define recovery stages, swallow patterns, the effects of prescription drugs, demographics, and medical conditions on swallowing processes following lung transplantation, a retrospective and observational study was done on patients. Patients who underwent the procedure of lung transplantation at single tertiary hospital between the period of February 2014 and November 2018 were included in the study [1]. To gather information on demographics, perioperative, and post-operative characteristics, a cardiovascular critical care database was employed [12]. Drooling, failing to consume oral food, coughing up secretions, and tracheostomy tube installation were among the signs that led to referrals to speech language therapists [13]. The protocol included FEES, a tool for measuring swallowing. Similar to other trials, a substantial percentage of patients experienced aspiration, silent aspiration, and vocal fold paralysis post-operatively (75%, 63%, and 34%, respectively) [1]. The study's conclusions showed that taking prescription drugs can affect the way food is swallowed by reducing attentiveness, consciousness, and voluntary muscular control. The prevalence of aspiration in patients with lung transplants was investigated in an effort to reduce the postoperative risk of silent aspiration [14]. Retrospective evaluations of lung transplant patients were conducted between April 2009 and September 2012. The speech language pathology team conducted a clinical bedside assessment before doing a modified barium swallow or fiberoptic endoscopic evaluation of swallowing. Out of 321 individuals who were referred for evaluation, 24 patients were unable to finish it. In 160 individuals (54%), there were clinical signs of aspiration [15]. Deep laryngeal penetration or aspiration was detected in 198 cases (67%) according to instrument assessment. The clinical assessment of 81 individuals (27%) revealed deep penetration or aspiration despite the fact that they had a perfect score [16]. Laryngeal penetration and tracheal

aspiration were found in more than 70% of the 263 patients who underwent lung transplants, according to the results of a research to detect medical problems, physiological changes, and frequent complications after lung transplant [17]. Alteration of the immune system's defenses in the lungs as a result of anatomical changes, such as lung transplantation (which impairs the cough reflex), denervation, and injury to the phrenic nerve, which could paralyze the diaphragm along with impairing lymphatic drainage and causing accessory muscles weakness (causing weak cough important for mucous clearance and reducing respiration) [18]. Any vagus nerve injury sustained during surgery might impair gastric motility, raising the risk of aspiration and infection [19]. Gastroesophageal reflux disease (GERD), recurrent and superior laryngeal nerve damage, and local trauma during endotracheal intubation intraoperative trans-esophageal echocardiography are some of the factors that might result in oropharyngeal dysphagia after lung transplantation [20]. Respiratory status typically remains disturbed after heart and/or lung transplantation, at least in the initial phases after extubation [21]. It is commonly documented that breathing and swallowing go hand in hand. There is currently no research on how patients' changed breathing patterns after receiving a heart or lung transplant may influence their ability to swallow [22]. However, it is recognized that changes in respiratory physiology, such as those brought on by hypercapnia, tachypnoea, or hypoxemia, can impair the breath-swallow cycle, that can further the risk of laryngeal penetration and/or aspiration [23]. Another factor for the emergence of oropharyngeal dysphagia and laryngeal dysfunction is the necessity of endotracheal intubation during the procedure of lung and/or heart transplantation to provide adequate breath support [24]. The present authors have previously stated that the length and the frequency of intubations within the populations of heart and lung transplants are important determinants for making referrals to a swallow therapist for the management of oropharyngeal dysphagia and voice problems [25]. Up to 83% of patients in the critical care unit who need the support of mechanical ventilation were reported to have laryngeal damage accompanied by dysphonia as a consequence of intubation [26]. The existence of laryngeal pathology postextubation can directly affect swallowing function because of the larynx's crucial role in protecting the airway [27]. It is challenging to distinguish between recurrent laryngeal nerve damage and intubation trauma as the main mechanisms for vocal fold palsy and/or dysphonia because of the complexity of the procedure of heart and/or lung transplantation and the post-operative complications [9]. The recurrent laryngeal nerve which innervates the intrinsic muscles of larynx are situated adjacent to the cardiovascular tissues involved in heart and lung transplantation, increasing the risk of intraoperative harm [28]. Glottic incompetence caused by vocal fold palsy carries a significant aspiration risk [29]. The results of vocal fold paralysis following lung transplantation were examined in a single centre retrospective research. All patients who had their initial bilateral lung transplant between January 2010 and June 2015 had their bronchoscopy reports examined for this research [30]. Participants who received a single lung transplant or any other type of transplantation were excluded from the study. 606 patients' bronchoscopy records (85%) were examined. The main conclusions of this study are that 8.1% of recipients experience vocal cord palsy, which is a rather common occurrence [30]. Analysis showed that vocal cord paralysis affected 1:12 patients of bilateral lung transplants, about half of whom had no symptoms [31,32]. Despite its frequent occurrence, only a tiny percentage of patients who received vocal cord palsy experienced detectable endobronchial aspiration. Despite the well-documented high prevalence of dysphagia in patients needing intensive care unit admission, nothing is known about the precise relationship between intensive care unit admission and swallowing dysfunction, and there is little information about voice function [33]. High rate of incidence of aspiration 78% and 48% for liquids and saliva are reported, respectively [9]. Other causes of oropharyngeal dysphagia and/or dysphonia after the procedure of transplantation include short-term changes in neurological function brought on by sedatives, delirium, or more severe, long-term injuries such intra- or postoperative stroke [1]. Data on how altered sensorium affects swallowing function are scarce, however those who are not oriented to people, places, and time have been found to have a higher risk of aspiration. In 122 consecutive patients who had received lung transplants, a retrospective review and postoperative modified barium swallow exam were performed to investigate the incidence of dysphagia and other morbidity in patients with lung transplants [34]. It was discovered that aspirators had significantly lower Body Mass Index (BMI) than non-aspirators. Age, ethnicity, gender, and operative time did not appear to be related to aspiration status in any way [35]. Risk of high rate of occurrence of damage to recurrent laryngeal nerve, upper airway trauma due to orotracheal intubation is responsible for airway penetration and other complications both during and post surgery. Repeated aspiration incidents

following surgery are a significant cause of lung allograft function failure over the long term. The purpose of a descriptive, retrospective study was conducted to explain airway protection typically through the scores of penetration aspiration scale and to quantitatively explain the characteristics of swallowing mechanism in 10 participants (aged 49 years - 68 years). All participants underwent single-lung transplantation were included in the study. The primary objective of the study was to compare their scores to the published norms for healthy individuals [36]. Researchers and clinicians can better treat patients and develop safe swallowing techniques for new patients by identifying clinically significant risk factors by explaining the physiology of swallow mechanism. This will help future patients to avoid negative post-operative consequences and reducing the rate of morbidity and patient mortality [37].

### Conclusion

Dysphagia is highly prevalent in Lung transplant patients and associated with significant morbidity. These findings emphasize the necessity of monitoring Lung transplant patients and further explains the critical role for the application of instrumental evaluation techniques for the precise and accurate identification of dysphagia.

### Conflict of Interests

The authors declare no conflict of interest.

### Authors Contribution

All authors contributed equally in this research study.

### Bibliography

1. Miles Anna., *et al.* "Dysphagia and medicine regimes in patients following lung transplant surgery: a retrospective review". *International Journal of Speech-Language Pathology* 23.4 (2021): 339-348.
2. Reedy Erin L., *et al.* "Characterizing Swallowing Impairment in a Post-Lung Transplant Population". *American Journal of Speech-Language Pathology* (2023): 1-16.
3. McIntyre Melanie., *et al.* "Post-extubation dysphagia incidence in critically ill patients: A systematic review and meta-analysis". *Australian Critical Care* 34.1 (2021): 67-75.
4. Labuschagne Jason John and Niels Hammer. "Intra-operative detection of a left-sided non-recurrent laryngeal nerve during vagus nerve stimulator implantation". *Medicina* 56.10 (2020): 489.
5. Schramm Dirk., *et al.* "Pediatric airway endoscopy: Recommendations of the Society for Pediatric Pneumology". *Respiration* 100.11 (2021): 1128-1145.
6. Marin Sergio., *et al.* "Healthcare costs of post-stroke oropharyngeal dysphagia and its complications: malnutrition and respiratory infections". *European Journal of Neurology* 28.11 (2021): 3670-3681.
7. Xu Zeqin., *et al.* "Dysphagia and aspiration pneumonia in elderly hospitalization stroke patients: risk factors, cerebral infarction area comparison". *Journal of Back and Musculoskeletal Rehabilitation* 32.1 (2019): 85-91.
8. Van Der Mark., *et al.* "Developments in lung transplantation over the past decade". *European Respiratory Review* 29.157 (2020).
9. Black Rebecca J., *et al.* "Swallowing and laryngeal complications in lung and heart transplantation: Etiologies and diagnosis". *The Journal of Heart and Lung Transplantation* 40.12 (2021): 1483-1494.

10. Black Rebecca J., *et al.* "Clinical predictors for oropharyngeal dysphagia and laryngeal dysfunction after lung and heart transplantation". *International Journal of Language and Communication Disorders* 54.6 (2019): 894-901.
11. Black Rebecca., *et al.* "Oropharyngeal dysphagia and laryngeal dysfunction after lung and heart transplantation: A systematic review". *Disability and Rehabilitation* 42.15 (2020): 2083-2092.
12. Yildiz Tulin., *et al.* "Does preoperative sleep quality and distress tolerance levels in cardiovascular surgery patients affect postoperative intensive care processes?". *Journal of Clinical Medicine of Kazakhstan* 18.4 (2021): 23-26.
13. Raciti Loredana., *et al.* "Neurogenic dysphagia and nutrition in disorder of consciousness: an overview with practical advices on an "old" but still actual clinical problem". *Medicines* 9.2 (2022): 16.
14. Dallal-York Justine., *et al.* "Incidence, risk factors, and sequelae of dysphagia mediated aspiration following lung transplantation". *The Journal of Heart and Lung Transplantation* 41.8 (2022): 1095-1103.
15. Huh Sungchul., *et al.* "Clinical impact of preoperative diaphragm dysfunction on early outcomes and ventilation function in lung transplant: a single-center retrospective study". *Journal of Intensive Care* 10.1 (2022): 23.
16. Dzierwas Rainer., *et al.* "Diagnosis and treatment of neurogenic dysphagia-S1 guideline of the German Society of Neurology". *Neurological Research and Practice* 3.1 (2021): 1-30.
17. Scarpel Renata D'Arc., *et al.* "Oropharyngeal swallowing dynamic findings in people with asthma". *Dysphagia* 36 (2021): 541-550.
18. Thomas Caroline R and Gunchu Randhawa. "The Respiratory System E-Book: Basic science and clinical conditions". Elsevier Health Sciences (2022).
19. Stojek Magdalena and Tomasz Jasiński. "Gastroparesis in the intensive care unit". *Anaesthesiology Intensive Therapy* 53.5 (2021): 450-455.
20. Jaime Méndez., *et al.* "Gastroesophageal Reflux and Respiratory Diseases". *Pediatric Respiratory Diseases: A Comprehensive Textbook* (2020): 561-569.
21. Fessler Julien., *et al.* "Inhaled nitric oxide dependency at the end of double-lung transplantation: a boosted propensity score cohort analysis". *Transplant International* 32.3 (2019): 244-256.
22. Saketkoo Lesley Ann., *et al.* "A comprehensive framework for navigating patient care in systemic sclerosis: A global response to the need for improving the practice of diagnostic and preventive strategies in SSc". *Best Practice and Research Clinical Rheumatology* 35.3 (2021): 101707.
23. Stepien Karolina M., *et al.* "Non-cardiac manifestations in adult patients with Mucopolysaccharidosis". *Frontiers in Cardiovascular Medicine* 9 (2022).
24. Wadia Rajeev S., *et al.* "Update on perioperative pediatric pulmonary hypertension management". *Journal of Cardiothoracic and Vascular Anesthesia* 36.3 (2022): 667-676.
25. Hoffmeister Jesse., *et al.* "Postextubation dysphagia in pediatric populations: incidence, risk factors, and outcomes". *The Journal of Pediatrics* 211 (2019): 126-133.
26. Osbeck Sandblom Hanna., *et al.* "Characterization of dysphagia and laryngeal findings in COVID-19 patients treated in the ICU-An observational clinical study". *PLoS One* 16.6 (2021): e0252347.

27. Langmore Susan E., *et al.* "Abnormalities of aspiration and swallowing function in survivors of acute respiratory failure". *Dysphagia* 36 (2021): 831-841.
28. Crespo Maria M., *et al.* "ISHLT consensus document on lung transplantation in patients with connective tissue disease: Part III: Pharmacology, medical and surgical management of post-transplant extrapulmonary conditions statements". *The Journal of Heart and Lung Transplantation* 40.11 (2021): 1279-1300.
29. Kim Christine M and Karuna Dewan. "Vocal fold paralysis and dysphagia". *Current Otorhinolaryngology Reports* 9 (2021): 101-106.
30. Seeliger Benjamin., *et al.* "Risk factors and outcomes of vocal cord paralysis after lung transplantation—a retrospective cohort study". *Transplant International* 32.6 (2019): 626-634.
31. Harabuchi Yasuaki., *et al.* "Clinical characteristics, the diagnostic criteria and management recommendation of otitis media with antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis (OMAAV) proposed by Japan Otological Society". *Auris Nasus Larynx* 48.1 (2021): 2-14.
32. Verdial Francys C., *et al.* "Safety and costs of endobronchial ultrasound-guided nodal aspiration and mediastinoscopy". *Chest* 157.3 (2020): 686-693.
33. Murry Thomas., *et al.* "Clinical management of swallowing disorders". Plural Publishing (2020).
34. Plowman EK., *et al.* "Incidence of Dysphagia and Associated Morbidity in Lung Transplanted Adults". *The Journal of Heart and Lung Transplantation* 39.4 (2020): S385.
35. Baijens Laura WJ., *et al.* "European white paper: oropharyngeal dysphagia in head and neck cancer". *European Archives of Oto-Rhino-Laryngology* 278 (2021): 577-616.
36. Pomfret Sarah A. "Characterizing oropharyngeal swallowing following single lung transplantation in adults". Diss. University of Pittsburgh (2016).
37. Cuenca Alex G., *et al.* "Pediatric liver transplantation". *Seminars in pediatric surgery*. WB Saunders 26.4 (2017).

**Volume 12 Issue 5 May 2023**

**©All rights reserved by Zoha Asif., *et al.***