

Comparison of the Performance of the Right and Left Sided Double Lumen Tubes for One Lung Ventilation during Thoracic Surgery in Chinese Population

Dr. Mahalaxmi Deuja¹, Dr. Smriti Singh²

¹Senior Registrar Anesthesiologist at Human Organ Transplant Centre, Bhaktapur, Nepal.

²Assistant Professor at Department of Physiology, Nepal Medical College, Kathmandu, Nepal.

Corresponding Author: Dr. Mahalaxmi Deuja

ABSTRACT

Objective- To compare the performance of the right and left sided double lumen tubes (DLTs) by evaluating the incidence and severity of hypoxemia, hypercapnia and high airway pressure.

Design - A prospective, randomized, comparative and interventional study.

Setting- university hospital thoracic surgery department.

Participants- Sixty patients were included in the study. They were allocated randomly into 2 groups. Right sided DLT group (N=30) and left sided DLT group (N=30). After induction of anesthesia patients were intubated with either right sided DLT or left sided DLT for one lung ventilation during thoracic surgical procedures. Cases with cardiac disease (EF<45%), CRF, Liver dysfunction and COPD were excluded in the study.

Measurements and Results - There were no cases with SpO₂ less than 90%, Etco₂>45mmHg and peak inspiratory pressure >35cmH₂o in both groups. There is no difference in SPO₂, slight elevation of ETCO₂ and FIO₂ in left sided but slight decrease in peak inspiratory pressure on right sided tubes than left sided tubes.

Conclusion- when intraoperative hypoxia, hypercapnia and high airway pressure are used as criteria, both tubes have equal performance level and safety.

Key words- lung isolation, equipment safety, anesthesia, intubation, thoracic surgical procedures.

INTRODUCTION

In clinical practice, during thoracic surgical procedure one lung is ventilated using double lumen endotracheal tube. The lungs are paired organ interconnected by bronchi and trachea that functions as single unit. However thoracic surgeon may require lung separation and one lung ventilation to perform certain surgical procedure and provide optimal surgical exposure. These

procedures are lobectomy, pneumonectomy, pleural decortication, bullectomy, bronchopulmonary lavage, esophagogastrectomy and mediastinal mass resections. Also used to prevent contamination of normal lung (eg infections, massive hemorrhage), video assisted thoracic surgeries. ^[1]

Three methods of lung separation- DLT placement, bronchial blocker and

single lumen endobronchial tube placement. [1] Among them double lumen tube placement is the most commonly used method for separating the lungs. [2] It is not only quicker than the other method also allows for access into an isolated lung, suctioning from the isolated lung and application of continuous positive airway pressure if required to improve oxygenation. Ventilation of either or both lungs can be easily achieved. Left-sided double-lumen endotracheal tubes should be the tube of choice for most cases in which lung isolation is required. A right-sided double-lumen endotracheal tube can be used effectively when a contraindication to placing a left-sided double-lumen endotracheal tube exists. [3] Flexible bronchoscopy is recommended to confirm correct placement of double-lumen tubes used for thoracic anesthesia. [4] Double lumen tube should not be placed in difficult airway, pediatric patients, airway lesion or tumor. Patients considered to have difficult airways during OLV are those who have distorted anatomy at the entrance of the mainstem bronchus. Such anomalies can be found by reviewing the chest radiographs and by reviewing the computer tomography scans of the chest regarding the mainstem bronchus diameter and anatomy, which can be distorted or compressed. [5]

MATERIALS AND METHODS

The study is approved by ethics committee of the medical university of Jilin. 60 patients undergoing elective thoracic surgery, esophageal surgery and mediastinal surgery included. Age less than 18 or more than 70 years old, patients with cardiac disease (EF<45%), CRF (Creatinine clearance <25ml/min), liver dysfunction (elevated liver enzymes) and COPD (FEV1/FVC falls below 70- 75 %), thoracic surgery within last 4 wks, previously diagnosed or suspected difficult airway patients were excluded from the study. [6] Sixty patients were allocated to the study by simple random method who are put in the list of surgery and fit for the criteria. Tube

types were selected according to the attending anesthesiologist's preference generally left sided tube for right sided surgery and right sided tube for left sided surgery. [7] Then after the patients were allocated into following two groups.

R for right sided double lumen tube (N=30)

L for left sided double lumen tube (N=30)

The size of the tube is determined according to the height and sex of the patient.

A woman shorter than 160cm should be intubated with 35fr tube.

A woman taller than 160cm should be intubated with 37 fr tube.

A man shorter than 170cm should be intubated with 39 fr tube.

A man taller than 170 cm should be intubated with 41 fr tube.

Interventional details

Patients were placed in supine position. IV access established and appropriate size Foleys catheter is placed. Standard monitoring were included as pulse oximetry, non invasive blood pressure sometimes invasive, and electrocardiography (ECG). Other parameter that were included in the study were heart rate (HR), end tidal capnography (ETCO₂), tidal volumes, frequency of respiration, minute volume, peak pressure and FIO₂. All patient underwent DLT intubation after induction of anesthesia by using intravenous drugs. Intubation was done by anesthesiology residents under supervision of attending anesthesiologist using DLTs manufactured by Mallinckrodt medical. After placement the patient is positioned laterally on the operating room table. The tube is again checked to validate the tube is not dislodged.

Once data recording is finished it is tabulated in Microsoft excel and statistical analysis done using SPSS 17. Continuous data is compared by using a student t test and categorical data is compared by using Chi Square tests. In all test of significance, a P value of <0.05 is considered to be significant.

RESULTS

Sixty patients recruited in the study with 30 patient in group R and 30 patient in group L.

Table 1: Comparison between right & left sided DLTs

	Right sided DLTs	left sided DLTs	p value
Number	30	30	
M/F	20/10	19/11	0.78
Age (yrs)	46.1±15.95	51.17±15.76	0.22
Height(cm)	166.83±6.7	166.83±7.19	1.0
Weight(kg)	59.67±10.44	62.47±10.23	0.29
Duration of anesthesia (mins)	183±75.6	247.2±94.2	0.05

Data are reported as mean ±SD and compared by t testing or compared by Chi-square analysis.

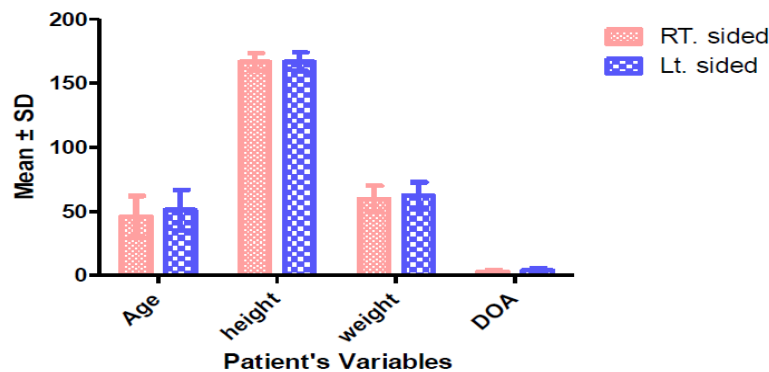


Figure 1: Demographic variables for right and left sided tube types

Table 2 shows the side of surgical procedure, the incidence of hypoxia, hypercapnia and high peak airways pressures for both right and left sided DLTs.

	Right DLT (n=30)	left DLT (n=30)	p value
Side of surgery relative to DLT			0.64
Ipsilateral	3	2	
Contra lateral	27	28	
Cases with SPO ₂ <90%	none	none	
Mean lowest SPO ₂ ±SD	98.66± 1.81	98.22±1.65	0.33
Cases with ETCO ₂ >45mmHg	none	none	
Mean highest ETCO ₂ ± SD	31.92±3.45	32.85±3.73	0.33
Cases with PIP >35cmH ₂ O	none	none	
Mean high PIP ±SD	22.52±4.37	21.62±3.72	0.39
FIO ₂	0.64±0.13	0.70±0.16	0.109

Note- values of continuous data are reported as mean ±SD and compared by T testing. Categorical data were compared by using Chi Square analysis.

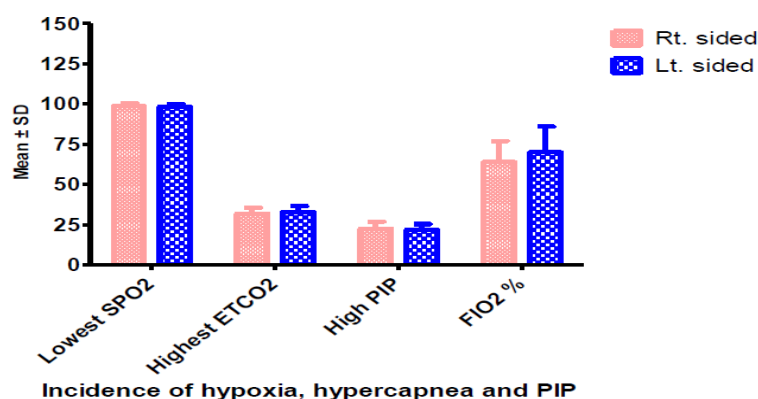


Figure 2

DISCUSSIONS

In the previous studies done by Ehrenfeld JM, Walsh J, Sandberg, Warren

in 2003 and found that right sided and left sided Mallinckrodt double lumen tube have identical clinical performance. [8]

Ehrenfeld JM, Mulvoy, Warren, Sandberg again retrospectively did the study in 2010 in Massachusetts general hospital, Boston on the topic on performance comparison of double lumen tube among infrequent users also found that both tube types have equal performance level and safety.

The present data suggest that there is no significant difference between the clinical performances of right versus left sided DLTs. Due to lower margin of safety and difficulty to place and maintain the tubes, routine use of right sided tubes is not common. In my study, pt receiving left sided DLTs were older than right sided DLTs but not significantly different to have problems and not reflected in the DLT performance data. Significant hypoxia and hypercapnia is not seen in my result. There is no significant evidence to suggest that right sided DLTs are any less effective for surgery on the contralateral side.

The comparable rates of hypoxemia suggested that the clinical performance of two tube types is similar. The most important bias is observation bias itself, which consciously or unconsciously leads the clinician under observation to alter their performance or actions because we were aware that they are subjects of study.

The data presented in this study are consistent with the studies done before which were described in literature review. In this study we found that left and right sided DLTs have same performance and safety level where intraoperative hypoxemia, hypercapnia and high inspiratory airway pressure are used as criteria. So it is suggested that both right and left sided DLTs have similar routine clinical characteristics when used contralateral to the surgery.

CONCLUSION

Conclusion of the study for further users of the DLTs are both tubes can be used for surgeries requiring double lumen tubes. But for beginners right sided double lumen tube insertion is easier and less chance of malposition provided that upper lobe is well ventilated. So bronchoscopy examination is important.

ACKNOWLEDGEMENT

Patients of thoracic surgery department of Jilin University, first hospital, China.

Conflict of interest: None

REFERENCES

1. Morgan and Mikhail's Clinical Anesthesiology, 5th Edition 488-489.
2. Ehrenfeld JM, Walsh JL, Sandberg WS. Right and left-sided mallinckrodt double-lumen tubes have identical clinical performance. *Anesth Analg* 2008; 106(6): 1847-52
3. Campos JH. Lung isolation techniques. *Anesthesiol Clin North America*. 2001 Sep;19(3):455-74. Review.
4. <https://www.ncbi.nlm.nih.gov/pubmed/21802958#> (accessed on 18th Jan 2018)
5. https://www.mcgill.ca/anesthesia/files/anesthesia/wk_2b_slinger_17_isolation_with_diff_aw.pdf
6. https://www.mcgill.ca/anesthesia/files/anesthesia/wk_2b_slinger_17_isolation_with_diff_aw.pdf (accessed on 18th Jan 2018)
7. Ehrenfeld JM. Performance Comparison of Right- and Left-Sided Double-Lumen Tubes Among Infrequent Users. <https://plu.mx/plum/a/?doi=10.1053/j.jvca.2009.09.007>
8. Ehrenfeld JM, Walsh JL, Sandberg WS. Right- and left-sided Mallinckrodt double-lumen tubes have identical clinical performance. *Anesth Analg* 2008; 106(6): 1847-52.

How to cite this article: Deuja M, Singh S. Comparison of the performance of the right and left sided double lumen tubes for one lung ventilation during thoracic surgery in Chinese population. *International Journal of Research and Review*. 2018; 5(1):68-71.
