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Original research article

A STUDY TO COMPARE THE COMPLICATIONS WHEN INTUBATION WITH WIRE ENFORCED SILICONE ENDOTRACHEAL TUBE THROUGH INTUBATING LARYNGEAL MASK AIRWAY AND POLYVINYL CHLORIDE TUBE THROUGH THE INTUBATING LARYNGEAL MASK AIRWAY

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Abstract

The aim of this study was to evaluate the problems associated with the insertion of a standard polyvinyl chloride (PVC) endotracheal (ET) tube using the intubating laryngeal mask airway (ILMA) and compare it with the convenience of inserting a silicone ET tube.

Keywords: Comparison, complications, wire enforced silicone endotracheal tube, polyvinyl chloride tube through the intubating laryngeal mask airway

Introduction

It is recommended to use a specialised silicone endotracheal tube with wire reinforcement for intubation through the LMA-FastrachTM. This tube possesses distinctive features including a linear arrangement, wire reinforcement, and the inclusion of a conical Touhy-like tip, which is less damaging compared to traditional endotracheal tubes. Nevertheless, the tube's tiny volume, high-pressure cuff hinders its suitability for extended usage, while also rendering it costly and less readily accessible. Additionally, the use of wire reinforcement can be problematic since it may impede breathing if the patient bites on the tube and causes distortion of the lumen. A typical Polyvinylchloride (PVC) endotracheal tube (ETT) is both disposable and cost-effective. It is readily accessible and features a high-volume low-pressure cuff, making it particularly ideal for sustained ventilation.

However, using a PVC endotracheal tube (ETT) raises concerns about reduced likelihood of entering the glottis and potential damage to the airway. This is because PVC ETTs are quite rigid and their tips point forward when emerging from the intubating laryngeal mask airway (ILMA). Warming the tube can help alleviate these issues to some extent. Notwithstanding these difficulties, the traditional PVC tube has

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been effectively utilised for tracheal intubation via the ILMA [1]. The objective of this study was to assess the complications of inserting a typical PVC endotracheal (ET) tube via the intubating laryngeal mask airway (ILMA) and compare it with the ease of inserting a silicone ET tube.

Materials and Methods

The study was a prospective study conducted on patients aged between 18-60 years, ASA grade I/II posted for elective surgeries under general anaesthesia in A. J. Institute of Medical Sciences, Mangalore between December 2013 and May 2015 chosen by randomized sampling method using the below set inclusion and exclusion criteria.

Inclusion Criteria

1. Patients belonging to ASA grade I and II scheduled for elective surgery under general anaesthesia.
2. Mallampatti grade I and II patients.
3. Patients of either sex, between the age group 18-60 years.
4. Interincissor distance more than 2 cms on pre-anesthetic assessment.
5. Thyro-mental distance greater than 6 cms.

Exclusion criteria

1. Patients belonging to ASA grade III or IV.
2. Patient refusal.
3. Patients with loose dentures.
4. Patients with enlarged thyroid gland.
5. Patients with hypertrophied tonsils (grade 3 and 4).
6. Patients with morbid obesity.
7. Patients with respiratory tract pathology.
8. Patients with previous upper gastrointestinal (GI) surgery like gastroeseophageal reflux disease or Hiatus Hernia.

Method of Collection of Data

Selection Criteria

Written informed consent was taken from patients, for willingness to participate in the study, for pre-anesthetic assessment, intubation and postoperative evaluation of any complications.

60 patients aged between 18-60 years posted for elective surgeries under general anaesthesia, in A. J. Institute of Medical sciences, Mangalore, were divided into two groups (Group I and Group II) of 30 patients each, by random sampling method.

- **Group I:** Were intubated using wire enforced silicone endotracheal tube through intubating laryngeal mask airway (LMA-Fastrach).
- **Group II:** Were intubated using Polyvinyl chloride tube through the intubating laryngeal mask airway (LMA-Fastrach).

In all patients the appropriate size LMA was used-

: Size 3-for patients weighing < 50 kgs.

: Size 4-for patients weighing between 50 and 70kgs.

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All patients were kept NPO overnight. Tablet Ranitdine 150 mgs was given on the previous night and the morning of surgery. In the operation theatre following monitors like pulse oximeter, noninvasive blood pressure, ECG leads and ETCO2 were connected. IV line secured and fluid DNS initiated. Patient was premedicated with Inj. Glycopyrrolate(0.005mcg/kg) IV and Inj. Fentany (1mcg/kg) IV. Patients were preoxygenated with 100% Oxygen for 3 minutes. Induced with Inj. Propofol (2 mg/kg) IV. and Inj. Vecuronium (0.1mg/kg) I.V.

After 3 minutes, when patient was fully relaxed an appropriate sized ILMA was inserted with cuff deflated, after which the cuff is inflated with air, up to 20ml for size 3and 30 ml for size 4. Correct placement is confirmed by the ability to ventilate without leak at an airway pressure of 20 mm Hg. Then cuff was inflated and a square wave capnograph tracing during gentle ventilation is noted. If patient could not be ventilated, adjustments like pulling the handle back towards the intubator (extension manoeuvre), withdrawal of the ILMA by 5 cms with the cuff inflated followed by reinsertion(up-down manoeuvre), ventilation commenced and the position of the ILMA adjusted until the optimal seal, as determined by audible leak with the expiratory valve closed was obtained (optimization manoeuvre), and flexing the neck and extending the head (head-neck manoeuvre), rotation in the sagittal plane, or lifting away from the posterior wall (Chandy manoeuver) were done.

Thereafter, a well-lubricated size 7.0, 7.5mm or 8.0 ID cuffed, WRS ETT or prewarmed PVC at 40 ^{o}C for 1 minute in sterile water, according to the group assignment, is passed through the metal tube of the ILMA. The tube was inserted till 16cm depth. It was then advanced gently in to the trachea without applying undue force, the cuff is inflated and the ETT connected to Bain circuit. Correct tube placement was confirmed by the presence of bilateral equal breath sounds on auscultation and capnography. The ILMA was then deflated and removed using the designed stabilizing rod to maintain the tube in place, which was then reconnected to the Bain circuit.

Patient is maintained on O_2+N_2O + Halothane (0.2%) + Inj. Vecuronium, intermittent IV bolus.

Post operatively patients were observed/monitored over 24 hours and any complications like sorethroat, horseness, airway trauma and esophageal intubation will be noted in every patient.

Parameters

Complications.

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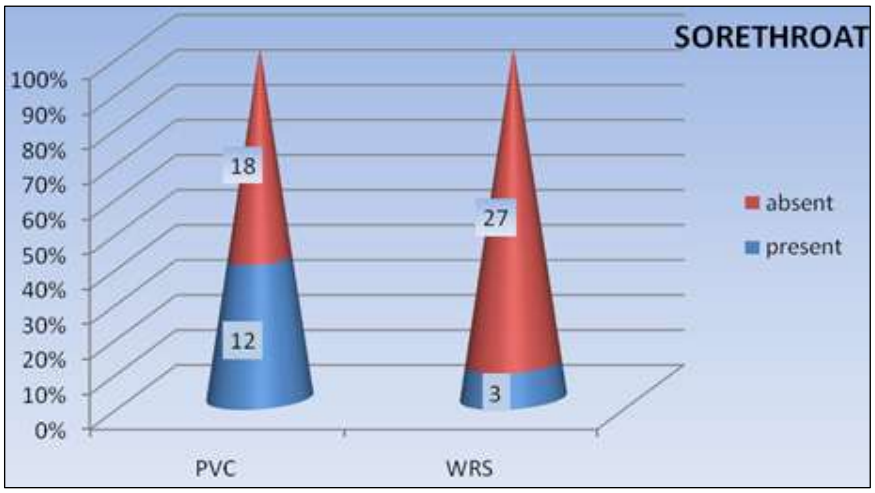
Results

Complications

Table 1: Sorethroat

			Sore throat		
			Absent	Present	Total
Tube type	PVC	Count	18	12	30
		% within Tube type	60.0%	40.0%	100.0%
	WRS	Count	27	3	30
		% within Tube type	90.0%	10.0%	100.0%
Total		Count	45	15	60
		% within Tube type	75.0%	25.0%	100.0%



Graph 1: Sorethroat

In the present study we found that there was statistically significant difference in the incidence of sore throat between the WRS and the PVC tube with a p value the chi-square test being 0.007.the incidence was lesser in the WRS group (3/30) as compared to the PVC group (12/30).

Table 2: Hoarsness of Voice

Crosstab

			Hoarseness	
			Absent	Total
Tube type	PVC	Count	30	30
		% within Tube type	100.0%	100.0%
	WRS	Count	30	30
		% within Tube type	100.0%	100.0%
Total		Count	60	60
		% within Tube type	100.0%	100.0%

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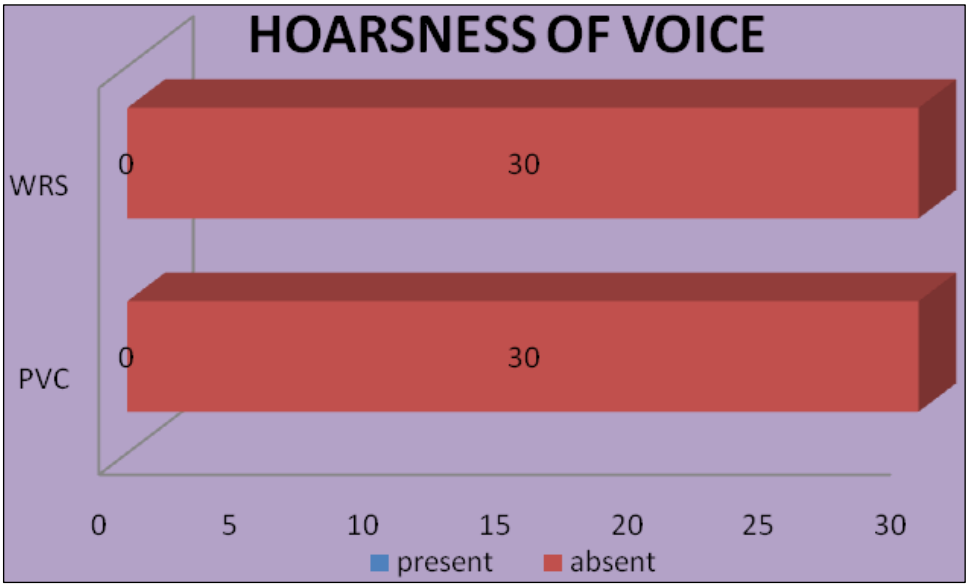

Graph 2: Hoarsness of Voice

In the present study we found that there was no statistically significant difference in the incidence of hoarseness of voice, as none of the patients in both groups had hoarseness of voice.

Table 3: Trauma

			Trauma		
			Absent	Present	Total
Tube type	PVC	Count	26	4	30
		% within Tube type	86.7%	13.3%	100.0%
	WRS	Count	29	1	30
		% within Tube type	96.7%	3.3%	100.0%
Total		Count	55	5	60
		% within Tube type	91.7%	8.3%	100.0%

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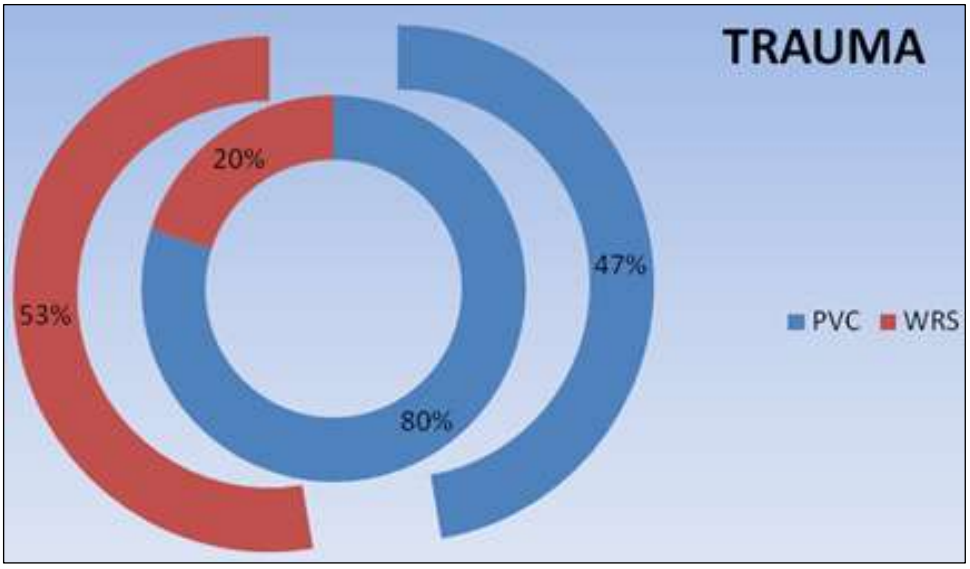


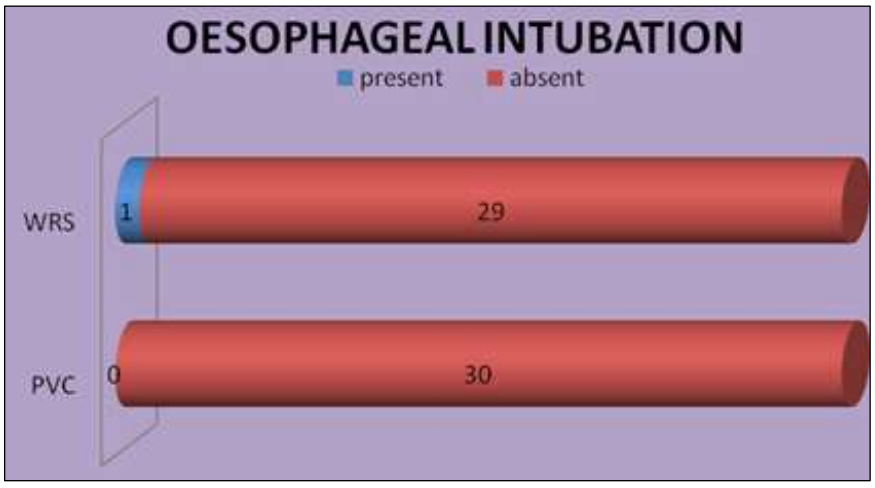
Graph 3: Trauma

In the present study we found that there was no statistically significant difference in the incidence of trauma between the WRS and the PVC tube with a p value the chi-square test being .151.

Table 4: Oesophageal Intubation

Crosstab

			Esophageal intubation		
			Absent	Present	Total
Tube type	PVC	Count	30	0	30
		% within Tube type	100.0%	0.0%	100.0%
	WRS	Count	29	1	30
		% within Tube type	96.7%	3.3%	100.0%
Total		Count	59	1	60
		% within Tube type	98.3%	1.7%	100.0%



Graph 4: Oesophageal Intubation

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In the present study. There was 1 patient in the WRS group who had esophageal intubation, whereas no patient in the PVC group had esophageal intubation.

Discussion

There was no notable disparity between the two groups regarding saturation levels during the process.

In our current investigation, we discovered a statistically significant disparity in the occurrence of sore throat between the WRS and the PVC tube. The incidence was lower in the WRS group, with a rate of 10% (3/30), compared to the PVC group, which had a rate of 40% (12/30). According to Shah *et al*. [2], the occurrence of sore throat was 21.42% with PVC tube and 6.89% with WRS tube. Kundra *et al*. [3] found that 12% of patients experienced a painful throat when using a PVC tube, while 8% experienced a sore throat when using a WRS tube.

The prevalence of trauma in the present investigation was 13.3% for PVC tubes and 3.3% for WRS tubes. This finding is consistent with the research conducted by Kundra *et al*. [3], which reported a trauma incidence of 14% and 8% among the PVC and WRS groups, respectively. The occurrence rate of the incidence, which was around 3% in both groups, was reduced in the trial conducted by Sharma *et al*. [4] due to the utilisation of up to six manoeuvres for ILMA insertion. In Shah *et al.'s* study, the PVC and WRS groups had trauma incidences of 17.85% and 6.89%, respectively, which were similar to our study.

In our current investigation, we discovered that there was no occurrence of hoarseness of voice, since none of the patients in either group reported experiencing it.

The current study saw a minimal number of esophageal intubations. Specifically, just one patient (3.3%) in the WRS group experienced esophageal intubation, whereas no patients in the PVC group did. The study conducted by Sharma *et al*. [4] found that the rate of Esophageal intubation was 1.8% in both groups. However, Kundra *et al*. [3] reported a considerably higher incidence of esophageal intubation with the LAT (29.7%) compared to the PVCT and FTST (1.8% and 7.4% respectively). The ILMA tube has a higher occurrence of oesophageal intubation. The list [5, 6, 7].

Our investigation has a limited number of constraints. One issue was the absence of blinding due to the impracticality of concealing the tubes when inserting them through the ILMA. The study was relevant to people who had normal airways. The establishment of a satisfactory mask-larynx connection was achieved through clinical means rather than using a fiberoptic view. Utilising a fiberoptic bronchoscope during intubation efforts could have provided a more precise understanding of the specific causes of failure or the higher number of attempts made.

Conclusion

There was no significant difference between the two groups.

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References

1. Brandt L. The first reported oral intubation of the human trachea. Anesthesia & Analgesia. 1987;66(11):1198-1199.
2. Greenland KB, Edwards MJ, Hutton NJ, Challis VJ, Irwin MG, Sleigh JW. Changes in airway configuration with different head and neck positions using magnetic resonance imaging of normal airways: a new concept with possible clinical applications. Br J Anaesth. 2010 Nov;105(5):683-90. Epub 2010 Sep 15. Lee LC. Two curves theory does not clearly explain laryngoscopy and intubation. Br J Anaesth. 2011 Jun;106(6):909-10; author reply 910-1. PubMed PMID:
3. Varon J, Fromm RE. Airway Management. In Varon J(ed): Practical Guide to the Care of the Critically Ill Patient. 1st Ed, St. Louis; Mosby-Year Book, Inc, 1994, pp. 321-339.
4. Booth, John B. Tracheostomy and tracheal intubation in military history. Journal of the Royal Society of Medicine. 2000;93(7):380.
5. Van Heurn, Ernest LW, Peter RG Brink. Historical Article The history of percutaneous tracheotomy. The Journal of laryngology and otology. 1996;110:723-726.
6. Sittig, Steven E, Pringnitz JE. Tracheostomy: evolution of an airway. Aarc Times. 2001;25(2):48-51.
7. Robinson, Daniel H, Alexander H. Toledo. Historical development of modern anesthesia. Journal of Investigative Surgery. 2012;25(3):141-149.