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## A study to observe the endotracheal tube cuff pressure during percutaneous dilatational tracheostomy

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### Abstract

**Aim:** The present study was undertaken to observe the endotracheal tube cuff pressure by manual and automated methods during percutaneous dilatational tracheostomy.

**Materials and Methods:** The study recruited 60 patients of the age group of 30-60 years 20 and 50 yrs of ASA grade I/II and MPG I/II. Informed consent was obtained from all the participants and confidentiality of data was maintained. Patients with severe complications were excluded from the study. After recruiting, patients were divided into two groups with 30 participants in each group. Group 1 cuff pressure was monitored manually and group 2 cuff pressure was monitored automatically.

**Results:** Demographic data was not significantly different between the groups. There was no air leak from side of ETTc. Airway pressure was significantly high in group 1. No significant difference was observed in tidal volume in both groups. P value for baseline pressure is 0.7504. P value for pressure set up after monitoring cuff is 0.4271. P value for pressure set up after monitoring cuff after one hour is 0.2885. P value for pressure set up after monitoring cuff after two hours is 0.2095. By conventional criteria, this difference is considered to be not statistically significant.

**Conclusion:** The study results confirm that both manual and automated methods are equally effective in the maintenance of respiratory functions. Further detailed studies are necessary in this area.

**Keywords:** Endotracheal tube, cuff pressure, tracheostomy

### Introduction

Tracheostomy is age old technique which can be performed surgically or percutaneously. Percutaneous technique has little more advantageous than the manual method [1]. Because this method is preferred to be performed bedside patients. Endo tracheal tube is most common practice in critical care setting to deliver anesthesia and to maintain the respiratory functions of the patients [2]. Cuffed tube usage ensures further safety in delivering the appropriate pressure and also ensures further safety of the technique. At the same time, monitoring and regulating the pressure of cuff also important [3]. It can be performed both manual and automated methods. Both methods have its advantages and disadvantages. However, there are very few studies that compared these two methods. Hence, the present study was undertaken to observe the endotracheal tube cuff pressure by manual and automated methods during percutaneous dilatational tracheostomy.

### Materials and methods

**Study design:** Observational study

**Sampling method:** Convenient sampling

**Study population:** The study recruited 60 patients of the age group of 30-60 years 20 and 50 yrs of ASA grade I/II and MPG I/II. Informed consent was obtained from all the participants and confidentiality of data was maintained. Patients with severe complications were excluded from the study. After recruiting, patients were divided into two groups with 30 participants in each group. Group 1 cuff pressure was monitored manually and group 2 cuff pressure was monitored automatically.

**Data collection:** All participants underwent thorough physical examination. All measurements were performed using standard methods in the literature [3-6].

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**Ethical considerations:** The study proposal was approved by the institutional ethics committee after satisfying the queries adequately. The study followed all the guidelines as per the ICMR guidelines. Written informed consent was obtained from all the parents of the participants before the commencement of the study. Information related to the patients was kept confidential.

**Data analysis:** The statistical software SPSS 18.0 version was used to analyze the data. The significance of difference was tested using the student t test. The probability value less than 0.05 were considered significant.

## Results

Table no 1 presents the demographic data of participants. The two-tailed P value equals 0.2778 for age. By conventional criteria, this difference is considered to be not statistically significant. The P value for weight parameter is 0.5704. By conventional criteria, this difference is considered to be not statistically significant. The P value for height parameter is 0.0601. By conventional criteria, this difference is considered to be not quite statistically significant. Table 2 presents the respiratory parameters of participants. There was no air leak from side of ETTc. Airway pressure was significantly high in group 1. No significant difference was observed in tidal volume in both groups. EtCo<sub>2</sub> was significantly different between the groups. P value for baseline pressure is 0.7504. By conventional criteria, this difference is considered to be not statistically significant. P value for pressure set up after monitoring cuff is 0.4271. By conventional criteria, this difference is considered to be not statistically significant. P value for pressure set up after monitoring cuff after one hour is 0.2885. By conventional criteria, this difference is considered to be not statistically significant. P value for pressure set up after monitoring cuff after two hours is 0.2095. By conventional criteria, this difference is considered to be not statistically significant.

**Table 1:** Demographic data of participants

Refractive error	Group 1 (n=30)	Group 2 (n=30)	P value
Age (years)	52±8	50±6	0.2778
Gender (M:F)	12:18	14:16	
Weight (kg)	62±5.3	61±8	0.5704
Height (cm)	154±12.76	160±11.44	0.0601

Data was presented as mean and SD

**Table 2:** Respiratory parameters of participants

Parameters	Group 1 (n=30)	Group 2 (n=30)	P value
EtCo <sub>2</sub>	30±2.344	32±3.43	0.0107*
Tidal volume	482±24.44	470±40.33	0.1687
Airway pressure	18±0.244	17.6±0.622	0.0018*
Air leak from side of ETTc	Nil	Nil	

Data was presented as mean and SD. (\*P value less than 0.05 was significant)

**Table 3:** ETTc pressure in both the groups

Pressure (cm of H <sub>2</sub> O)	Group 1 (n=30)	Group 2 (n=30)	P value
Baseline pressure	52±11.55	51±12.66	0.7504
After cuff pressure monitor	26±10.43	24±8.88	0.4271
After 1 hr	27±7.62	25±6.82	0.2885
After 2 hours	27±6.32	25±5.88	0.2095

Data was presented as mean and SD. (\*P value less than 0.05 was significant)

## Discussion

The present study was undertaken to observe the endotracheal tube cuff pressure by manual and automated methods during percutaneous dilatational tracheostomy. Demographic data was not significantly different between the groups. There was no air leak from side of ETTc.

P value for baseline pressure is 0.7504. P value for pressure set up after monitoring cuff is 0.4271. Tidal volume was not significantly different between groups. P value for pressure set up after monitoring cuff after one hour is 0.2885. P value for pressure set up after monitoring cuff after two hours is 0.2095. By conventional criteria, this difference is considered to be not statistically significant.

In critical care setting, there is a strong need to maintain the cuff pressure to maintain smooth respiratory functions [7]. The available methods are manual and automated methods for this task. There was studies individually conducted on each of these methods but the studies comparing these methods are lacking [8]. There exist studies supporting that manual method has high accuracy [9, 10]. At the same time there are studies supporting automated methods also [11, 12]. The study compared these two methods and assessed the effectiveness. Both methods were found to be equally effective.

## Conclusion

The study results confirm that both manual and automated methods are equally effective in the maintenance of respiratory functions. Further detailed studies are necessary in this area.

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**Conflicts of interest:** None declared

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