EAS Journal of Anaesthesiology and Critical Care
Abbreviated Key Title: EAS J Anesthesiol Crit Care
ISSN: 2663-094X (Print) & ISSN: 2663-676X (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-3 | Issue-6 | Nov-Dec-2021 | DOI: 10.36349/easjacc.2021.v03i06.008

Original Research Article

"Effectiveness of Ett Cuff Pressure Measurement Using Conventional Clinical Method and Implications for Practice, A Prospective Observational Study"

Dr. P. Ramesh Kumar[1], S. Suganya[2*]

[1]Assistant Professor, Department of Anaesthesiology, Government Mohan Kumaramangalam Medical College Hospital, Salem 636001, Tamilnadu
[2]Assistant professor, Department of Anaesthesiology, Government Erode Medical College & Hospital, Perundurai, Erode, Tamilnadu

Article History
Received: 15.01.2021
Accepted: 10.03.2021
Published: 31.12.2021

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: Endotracheal tube (ETT) cuff hyperinflation can cause inflammation of the endotracheal layer; ischemia or necrosis of the tracheal wall and under expansion increases the risk of lung aspiration, anesthetic gas leaks, and environmental pollution increase. Intubation is routinely performed during general anesthesia. Maintain proper cuff pressure when inflating the endotracheal tube (ETT) cuff, as serious adverse events can occur at both too high (positive) and low (negative) cuff pressures. It is important to do. In the present work an attempt had been made to evaluate the efficacy of ETT cuff pressure measurement using conventional clinical method of digital palpation of pilot balloon by comparing with instrumental method using standard cuff pressure manometer.

Keywords: Endotracheal tube (ETT) cuff, cuff pressure, BMI & general anaesthesia.

INTRODUCTION

Achieving ideal endotracheal tube cuff pressure is vital in patients undergoing surgeries under general anesthesia with endotracheal intubation. Over inflation can cause decreased tracheal perfusion pressure, and post intubation sore throat and under inflation can put the patient at risk of aspiration of oropharyngeal contents into airways. The efficiency of conventionally followed clinical method of digital palpation of pilot balloon in achieving the ideal cuff pressure is being intensely debated in recent times. Some of the recent studies have proved instrumental measurement to be more effective in achieving ideal cuff pressure of 20 to 30 cm of water. But there is paucity of studies on the subject on Indian population to guide evidence based anesthetic practice[1]. An important function of the endotracheal tube (ETT) cuff is to seal the airways and prevent leakage and aspiration of pharyngeal contents during ventilation into the trachea. The literature reports the catastrophic consequences of ETT cuff hyperinflation and underexpansion. Cuffed ETTs are often used by patients wearing ventilators to prevent gas leaks and aspiration. Excessive cuff pressure reduces tracheal capillary perfusion, and insufficient cuff pressure leads to pulmonary aspiration of the oropharyngeal contents[2]. The ETT cuff pressure should be within a range that ensures a given tidal volume ventilator and reduces the risk of aspiration of secretions that collect on the cuff without compromising tracheal perfusion. A 20-30 cm water column cuff pressure is recommended to prevent aspiration and ventilator-related pneumonia[3-5]. In the present work an attempt had been made to evaluate the efficacy of ETT cuff pressure measurement using conventional clinical method of digital palpation of pilot balloon by comparing with instrumental method using standard cuff pressure manometer.

MATERIALS AND METHODS

The study was a prospective observational study, conducted in the department of anesthesia, Government Mohan kumaramangalam medical college, Salem, which is a tertiary care teaching hospital. The study population included patients planned for surgeries under general anaesthesia with cuffed endotracheal tube. Patients with known laryngotracheal abnormalities were excluded from the study. The study was approved by institutional human ethics committee and informed written consent was obtained from all participants.

Trachea intubated with appropriate sized cuffed endotracheal tube. 10 ml syringe was used to inflate the cuff.After satisfactory inflation clinically by digital

***Corresponding Author:** S. Suganya

palpation of pilot baloon, the cuff pressure was measured using standard cuff pressure manometer. ETT cuff pressure of 20-30 cms of H_2O was set as standard and pressures outside this were adjusted to this range.

RESULTS

A total of 100 participants were included in the final analysis. The result were tabulated in table 1-11 and Fig.1-7.Normal cuff pressure was achieved only in 10% of participants, whereas remaining 90% had high cuff pressure (> 30 cm of water). This was highly statistically significant at a null value of 50% (p value < 0.001). None of participants had cuff pressure lower than 20. Among the participants, 8% each achieved pressure between 31 to 40 and 41 to 50. The proportion of participants achieving pressure between 51 to 60, 61 to 70, 71 to 80, 81 to 90 and above 90 were 25%, 23%, 16%, 8% and 2% respectively. The proportion of subjects achieving high cuff pressure has increased with increasing decadal age group, higher in males, but this association was statistically not significant. There was no association between higher cuff pressure and BMI.

CONCLUSIONS

The proportion of subjects achieving normal pressure with clinical method is very low, as in 9 out of 10 persons the cuff pressure was higher than recommended value. This phenomenon was observed across the age groups, gender and in different BMI categories. Hence it can be concluded that monitoring cuff pressure by instrumental method can be more effective in achieving ideal cuff pressure and minimizing the complications.

Table 1: Descriptive analysis of PRESSURE in study group (N=100)

PRESSURE	Frequency	Percentage
Normal	10	10.00%
High	90	90.00%

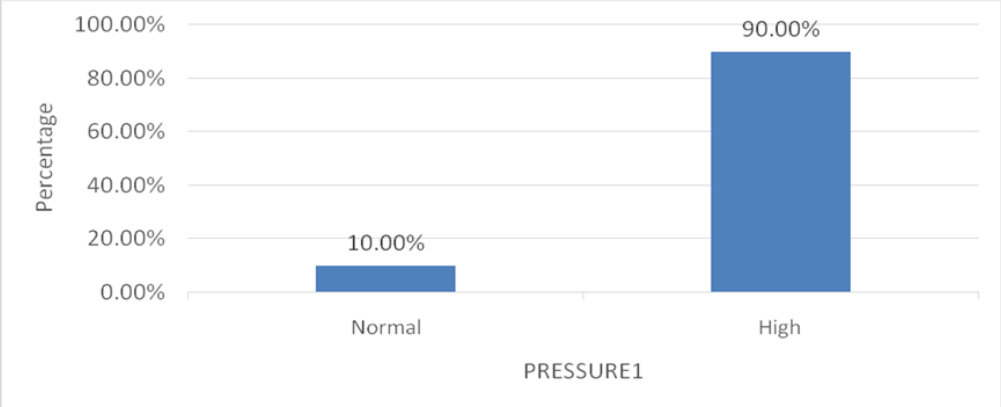

Fig.1: Bar Chart of PRESSUREdistribution in Study Group (N=100)

Table 2: Descriptive analysis of Age Group and SEX in study group (N=100)

Parameter	Frequency	Percent
I.Age Group		
Below 20	11	11.00%
22 to 39	42	42.00%
40 to 59	46	46.00%
Above 60	1	1.00%
II.SEX		
Male	52	52.00%
Female	48	48.00%

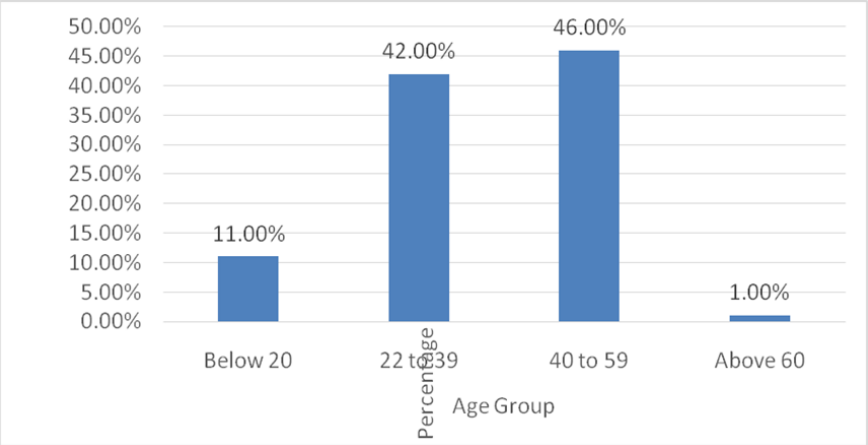

Fig.2: Bar chart of Age Group distribution in study group (N=100)

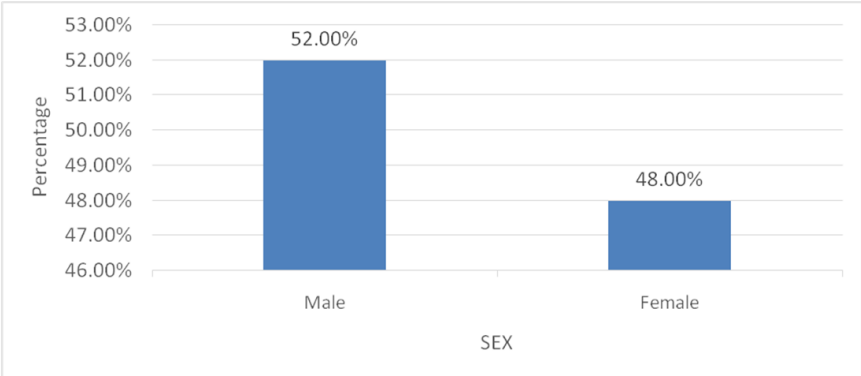

Fig.3: Bar chart of SEX distribution in study group (N=100)

Table 3: Descriptive analysis of PRESSURE2 in study group (N=100)

PRESSURE2	Frequency	Percent
20 to 30	10	10.00%
31 to 40	8	8.00%
41 to 50	8	8.00%
51 to 60	25	25.00%
61 to 70	23	23.00%
71 to 80	16	16.00%
81 to 90	8	8.00%
Above 91	2	2.00%

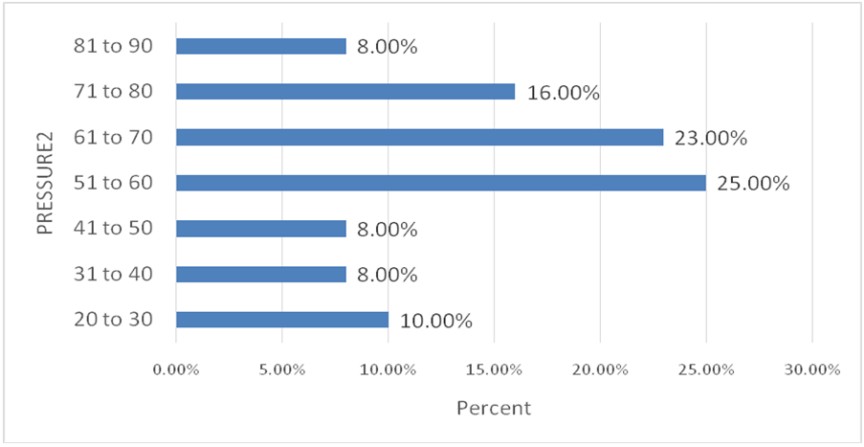

Fig.4: Bar Chart of PRESSURE 2 Distribution in Study Group (N=100)

Table 4: Descriptive analysis of Age and pressure in study Group (N=100)

Parameter	Mean±STD	Median	Min	Max	95% C.I.for EXP(B)	
					Lower	Upper
AGE	37 ± 11.34	38.00	16.00	62.00	34.75	39.25
PRESSURE	59.32 ± 17.39	60.00	26.00	100.00	55.87	62.77

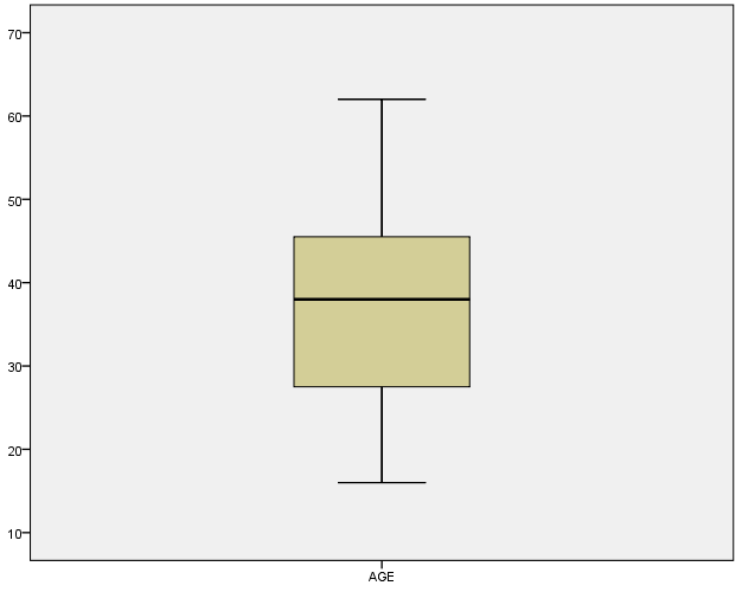

Fig.6: Descriptive analysis of Age and pressure in study Group (N=100)

Table 5: Association of PRESSURE1 with SEX of study population (N=100)

SEX	PRESSURE1			
	Normal	High	Chi square	P-value
Male	4 (7.692%)	48 (92.30%)	0.641	0.42
Female	6 (12.5%)	42 (87.5%)		

Table 6: Association of PRESSURE1 with Age Group of study population (N=100)

Age Group	PRESSURE1			
	Normal	High	Chi square	P-value
Below 20	0 (0%)	11 (100%)	1.817	0.61
22 to 39	4 (9.523%)	38 (90.47%)		
40 to 59	6 (13.04%)	40 (86.95%)		
Above 60	0 (0%)	1 (100%)		

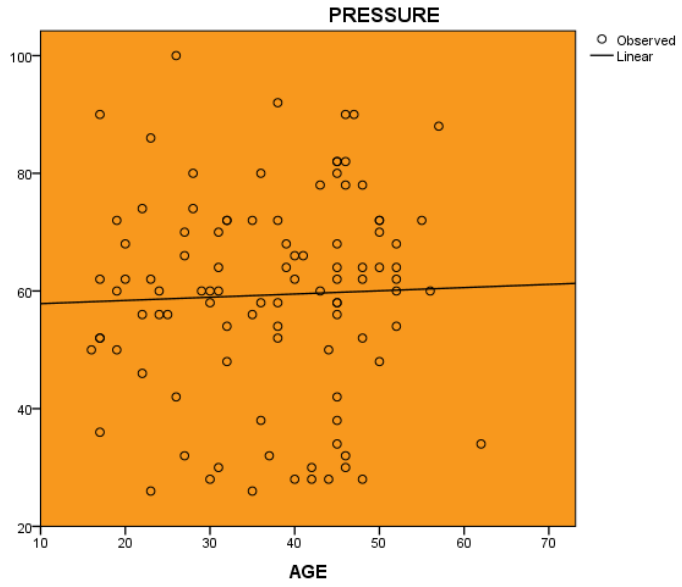

Fig.6: Correlation between age and cuff pressure in study population

Table.7 comparative coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
AGE	.055	.155	.036	.353	.725
(Constant)	57.299	5.989		9.568	.000

Table 8: Descriptive analysis of BMI

BMI category	Frequency	Percent
<25	50	50.0
25 to 29.99	45	45.0
30 and above	5	5.0
Total	100	100.0

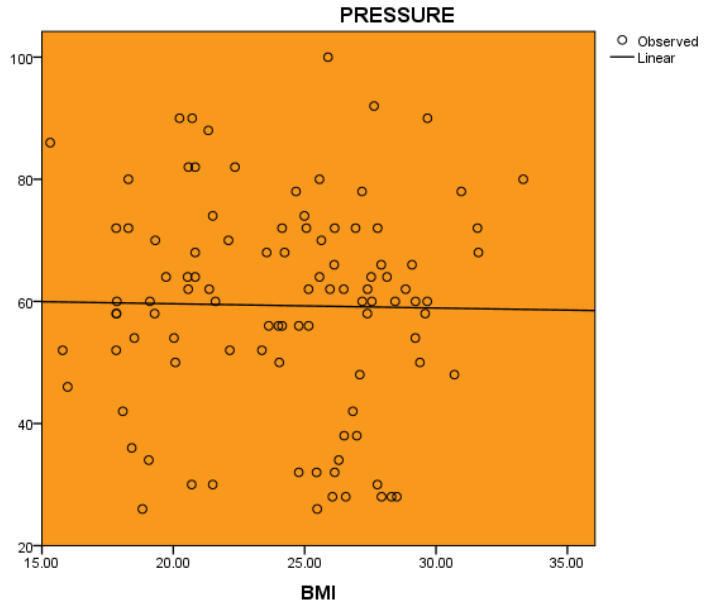

Fig.7: Correlation between BMI and cuff pressure

Table 9: Comparative coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
BMI	-.069	.423	-.017	-.164	.870
(Constant)	60.994	10.357		5.889	.000

Table 10: Association between BMI and cuff pressure

PRESSURE2	**Body mass idex**		
	<25	**25 to 29.99**	**30 and above**
31 to 40	6 (12%)	12 (26.66%)	0 (0%)
41 to 50	4 (8%)	3 (6.666%)	1 (20%)
51 to 60	16 (32%)	9 (20%)	0 (0%)
61 to 70	10 (20%)	12 (26.66%)	1 (20%)
71 to 80	7 (14%)	6 (13.33%)	3 (60%)
81 to 90	7 (14%)	1 (2.222%)	0 (0%)
Above 91	0 (0%)	2 (4.444%)	0 (0%)

Table 11: Association between BMI and cuff pressure

PRESSURE1	**Body mass idex**		
	<25	**25 to 29.99**	**30 and above**
Normal	3 (6%)	7 (15.55%)	0 (0%)
High	47 (94%)	38 (84.44%)	5 (100%)

REFERENCE

1. Wan-Chu Hung *etal*. Evaluation of Endotracheal Tube Cuff Pressure and the Use of Three Cuff Inflation Syringe Devices in Dogs. Front. Vet. Sci., 2020.
2. Mueen Ullah Khan *etal*. Measurement of endotracheal tube cuff pressure: Instrumental versus conventional method. Saudi J Anaesth. 2016; 10(4): 428–431.
3. American Thoracic Society; Infectious Diseases Society of America. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. *Am J Respir Crit Care Med*. 2005;171:388–416.
4. Safdar N, Dezfulian C, Collard HR, Saint S. Clinical and economic consequences of ventilator-associated pneumonia: A systematic review. *Crit Care Med*. 2005;33:2184–93.
5. Rubes D, Klein AA, Lips M, Rulisek J, Kopecky P, Blaha J, et al. The effect of adjusting tracheal tube cuff pressure during deep hypothermic circulatory arrest: A randomised trial. *Eur J Anaesthesiol*. 2014;31:452–6.

Cite this article: P. Ramesh Kumar & S. Suganya (2021). "Effectiveness of Ett Cuff Pressure Measurement Using Conventional Clinical Method and Implications for Practice, A Prospective Observational Study". *EAS J Anesthesiol Crit Care, 3*(6), 139-144.