



## Research Article

# Gripping Technique for Endotracheal Tube- Beedi vs Cigarette Grip, which is better?

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### Abstract

**Objective:** To compare the efficacy of two manual grips for holding Endotracheal (ET) tube during confirmation, fixation and patient movement.

**Methods:** We conducted a prospective observational study of adult patients undergoing endotracheal intubation and intubated patients undergoing shifting in the Emergency Department (ED) of a tertiary level hospital. This was done over a period of 14 months from August 2020 to September 2021. The method of holding the ET tube manually using Cigarette grip (holding with index and middle finger) vs Beedi grip (holding with thumb and index finger) prior to fixation and during patient movement was the variable taken into account and displacement of the ET tube if any was noted as outcome.

**Results:** During the study period, a total of 134 intubations were done and among them 196 instances had intrahospital transfer from ED. Beedi grip method was used in 74 (55.2%) patients compared to cigarette grip for 60 (44.8%) patients during fixation of ET tube. The most common reason for intrahospital shifting was for radiological imaging 114 patients followed by intensive care shifting of 82 patients. None of the patients had complete dislodgement of ET tube but displacement was seen in 6 (10%) patients cigarette grip vs 2 (2.7%) patients beedi grip during fixation. During shifting 18 (20.5%) patients with cigarette grip had displacement of ET tube vs 4 (3.7%) patients with beedi grip.

**Conclusion:** In spite of ET intubations being a very common procedure, user variations exist regarding proper holding of the ET tube manually. The Beedi grip used for fine holding provides a more stable method of holding the ET tube as compared to the cigarette method.

**Keywords:** Endotracheal tube; Intubation; Emergency department; Intensive care

### Introduction

Rapid Sequence Intubation is a common procedure in the Emergency Department (ED). Once the decision to intubate the patient has been taken all the essential equipment are assembled and required drugs administered [1]. The patient is intubated after adequate relaxation is achieved. After the endotracheal (ET) tube has been placed endotracheally, a few further steps are performed

prior to fixing the tube - attaching the tube to a ventilating device, confirmation clinically by five-point auscultation after inflating the bulb and finally the procedure of fixing the tube. Once tube position is confirmed the tube is fixed with a commercial ET tube holder (15.6%), tape (44.8%) or twill (39.6%) [2].

During this time gap between tube placement and tube fixation the ET tube needs to be held firmly at the level of the lips to ensure that the movements during confirmation and fixation do not dislodge a correctly placed tube.

There are two commonly used techniques to hold the ET tube. One technique is to hold the ET tube firmly between thumb and index finger - Beedi Technique. The other technique is to hold the ET tube firmly between the index and the middle finger - cigarette technique. Each person who intubates has a personal preference of one or the other [3].

A beedi is a thin, Indian cigarette filled with tobacco flake and wrapped in a leaf tied with a string at one end. It is generally held by the thumb and index finger as this provides a stronger grip for the lesser diameter of the beedi compared to the cigarette grip between the index and middle finger [4].

In addition, whenever patient movement occurs as in shifting of patient from one cot/stretchers to another or while transporting the patient, the tube needs to be held manually, in spite of the various methods of tube fixation to ensure non displacement. The aim of the study was to assess and compare the efficacy of the two techniques.

## Materials and Methodology

**Study design and setting:** The study was performed based on direct observation of intubations in the ER with a preformed checklist. This was a randomised observational study. The study did not take into account the cause of intubation, the difficulty level or gender of patient and the user.

The method of holding the tube was based on individual user preference. The initial confirmation was based on a proper visualization of endotracheal tube placement on direct laryngoscopy by the intubating physician. Some of the procedures were not included in the study as the intubating physician was not able to clearly visualise the passing of the tube through the vocal cords.

Intubations in the ED were observed for a period of 14 months from August 2020 to September 2021. The intubations observed were based on availability of trained observers during the procedure. The procedures that were excluded were all paediatric intubations age less than 18 years.

## Selection of participants

Patients in the age group of 18 years and older who underwent endotracheal intubation in the ER were included in the study. The selection of candidates was based on the presence of a trained observer during the period of the procedure. As this was only an observational study the purpose of the study and the checklist was not revealed to the intubating physician or the team involved. This was done to avoid bias.

## Interventions

A preformed checklist was prepared to assess the displacement of the ET tube at the level of the angle of mouth.

Checking of tube position was also done by five-point auscultation, pulse oximetry and wave form capnography monitoring. Chest X ray was not utilised as a tool for assessing the displacement considering the time factor for the observation. Since all the displacements were corrected immediately, Chest X ray was not able to detect the displacements correctly. The displacement of the tube from the required position was noted according to the markings on the ET tube. Repeated checks were performed after intubation and during shifting of the patient.

## Methods and measurements

Data was collected using a uniform checklist. The check list took into consideration the grip used, the duration of holding and the fixation technique during intubation in ER as well as while shifting intubated patients of ER. The displacement of the tube if any was noted.

## Outcomes

The primary outcome was the length of displacement of the tube while holding by either grip. The displacements were classified into 5 categories based on the length of displacement as no displacement, minimal displacement (within 1 cm), mild displacement (1-2 cm) and moderate displacement (2-3 cm) and severe displacement (>3cm)

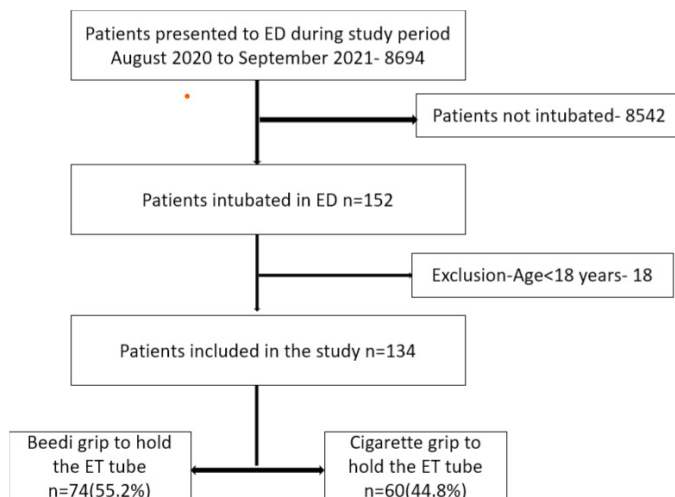
Secondary effects of the displacement like differences in pulse oximetry, auscultation and capnography were also noted.

## Analysis

Data were analysed with SPSS V.19. Continuous variables were presented as means (95% CIs) or medians (IQR; min-max) depending on normal distribution of the data. Categorical variables were presented as percentages. We used the modified Wald method (Agresti and Coull) to calculate 95% CI of proportions, and the Wilson method (without continuity correction) for 95% CI for difference between proportions. A Kruskal-Wallis H test, followed by a Mann-Whitney U test with Bonferroni correction, was used for testing continuous variables. A  $\chi^2$  test was used for significance of categorical data level of training, age groups). A Mann-Whitney U test was used for calculating significance displacement of ET tube. A logistic analysis was used for testing association between patient age and adverse events. A p value less than 0.05 was considered statistically significant.

## Results

During the study period 8694 patients presented to the ED of which 1294 patients were triaged to Priority 1 as per triage guidelines. Among them 152 patients had indication for intubation in ED. After applying the exclusion criteria, the final study cohort of 134 patients were recruited [Figure 1].



**Figure 1:** STROBE diagram.

### Demographic profile

Our study cohort had a mean age of 51.56 (SD 15.5) years with a male predominance (62.7%). The common comorbidities were diabetes mellitus 78(58.2%) and hypertension 39(29.1%). The baseline characteristics are shown in Table 1. The Beedi grip was the preferred grip for the users with a percentage of beedi grip being 55.2% and cigarette grip being 44.8%

Characteristics		n= 134	Beedi grip n=74(%)	Cigarette grip n=60(%)
Mean age (SD)		51.56(15.5)	51.94(16.4)	50.75(15.4)
Male		84(62.7)	48(64.9)	36(60)
Female		50(37.3)	26(35.1)	24(40)
Co morbidities	Diabetes	78(58.2)	32(43.2)	46(76.7)
	Hypertension	39(29.1)	21(28.4)	18(30)
	Chronic kidney disease	30(22.4)	18(24.3)	12(20)
	Bronchial asthma	11(8.2)	7(9.5)	4(6.7)
	Coronary artery disease	10(7.5)	4(5.4)	6(10)

**Table 1:** Baseline characteristics of intubated patient.

The most common method to fix ET tube was using tape 64%, twill 22% and ET holder 14%. In both groups ET tube holders significantly reduced displacements in patients being shifted when compared to the other methods of ET tube fixation. The preferred method of ET fixation is using tape (Table 2).

Characteristics	n=134	Beedi grip n=74(%)	Cigarette grip n=60(%)
Tape	89(66.4)	48(64.9)	41(68.3)
Twill	30(22.4)	19(25.7)	11(18.3)
ET Holder	15(11.2)	7(9.4)	8(13.4)

**Table 2:** Methods of fixing ET tube.

There was a total of 24 displacements of the ET tube. Displacement was lesser during initial intubation (8 patients) and greater during shifting and transportation of the patient (16 patients). Major displacements were more pronounced in the cigarette group. The displacements were promptly recognized and corrected.

	ET tube displacement					
	No	Number of displacements	Minimal <1 cm	Mild (1-2 cm)	Moderate (2-3 cm)	Severe (> 3cm)
Beedi grip (n=74)	72	2	0	1	1	0
Cigarette grip (n=60)	54	6	1	2	2	1

**Table 3:** Displacement during initial fixation of ET tube.

The most common reason for shifting was for radiological imaging followed by shifting to intensive care units. The most common reason for intrahospital shifting was for radiological imaging 114 patients followed by intensive care shifting of 82 patients many patients had multiple shifting. During shifting 18 (20.5%) patients with cigarette grip had displacement of ET tube vs 4 (3.7%) patients with beedi grip. Displacement was more during shifting and it is seen common while using cigarette grip [Table 4]

n=196	ET tube displacement					
	No	Number of displacements	Minimal <1 cm	Mild (1-2 cm)	Moderate (2-3 cm)	Severe (> 3cm)
Beedi grip (n=108)	104	4	2	1	1	0
Cigarette grip (n=88)	70	18	8	5	3	2

**Table 4:** Displacement during shifting of patients.

The incidence of minor to severe displacements was higher in the cigarette grip as compared to the beedi grip. A change in pulse oximetry, auscultation and wave form capnography was seen in only 2 observations with severe displacement. Reintubation was not required but manual readjustment was done for all displacements as soon as displacement was noted.

## Discussion

The tube displacements were classified according to the degree of displacements. The statistics for the ET tube fixation technique is comparable with other studies having similar fixation methods [5,6].

Though complete dislodgement of the tube was not observed significant displacement beyond 3 cms were noticed in the cigarette grip compared to the beedi grip. A rate of complete dislodgement varied from 7% to 16% [7,8] found in other studies but in our study, there was no complete dislodgement stating importance of manual grip.

There is no data available on the grip used for holding the ET tube manually.

For both grips increased displacement was noted in patient shifting. Number of intra hospital transfers is significant requiring

constant reassessment and verification. The need for proper holding of the ET tube is imperative during fixation and shifting. Manual holding of the tube provides further stabilization of the tube and prevents complete dislodgement.

## Conclusion

In spite of Endotracheal intubations being a very common procedure, user variations exist regarding proper holding of the ET tube manually. Complete dislodgement of the tube was not recorded but significant displacement in depth of insertion of the ET tube was noted in the reported outcomes. This study suggests that a Beedi grip provides a more secure method of holding the ET tube before and during fixation and patient movement compared to the Cigarette grip.

**Authors disclaimer:** Author or co-authors of this study doesn't endorse any form of smoking as we firmly believe it is injurious to health and mind evidenced by science. Instances were used for good understanding and only for academic purpose.

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