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Effectiveness of Twill Technique Vs Endotracheal Tube Holder on ETT Securement: A Comparative Study

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Abstract

Endotracheal intubation is an urgent procedure which is performed on patients who are unconscious and can't breathe by their own. Endotracheal Intubation keeps an airway open and helps to prevent chocking. When the patient is intubated, maintaining the endotracheal tube placement is essential. In case Endotracheal Tube is not secured, even basic nursing management can cause tubing slippage which is a major factor in causing airway trauma or injuries Aim: To assess the effect of Twill Technique vs Endotracheal Tube Holder on Endotracheal Tube Securement [ETTS] Outcomes among orally intubated patients admitted in ICUs. Methodology: A post-test only control group design (two experimental groups) was used to assess the effect of Twill Technique vs Endotracheal Tube Holder on Endotracheal Tube Securement [ETTS] Outcomes among orally intubated patients. Results: The findings showed that for general assessment, it was found that statistically significant results were found between two experimental groups in GCS on day 2 (p=0.017), in P/F ratio on day1 (p=0.004). But most of the observations were statistically non-significant. Conclusion: Hence, Endotracheal Tube Holder can be recommended for Endotracheal Tube security in clinical practice.

Keywords: Twill Technique, Endotracheal Tube Holder, Endotracheal Tube Securement [ETTS] Outcomes, orally intubated patients, nursing management

INTRODUCTION

It is very important that the position of ETT should be stable for several reasons ie. To ensure proper ventilation and continuous supply of oxygen and endotracheal tube movement within the trachea may cause tracheal injury or trauma, which is main source of discomfort to the patients added several clinical concerns with respect to patient safety when attempting to achieve a stable and secured endotracheal tube. These include avoiding the endotracheal tube from slipping, avoiding unintended extubating, and preserving the integrity of the skin on the face and neck. Endotracheal tubes should be placed between 2.5 and 4 cm above carina when assessed fiber optically [1–6]. Slippage is the extent of endotracheal tube movement within the stabilization technique. If the ETT migrates or shifts more than 1 cm, the endotracheal tube fixation needs to be replaced. To ensure Endotracheal tube stabilization and retain a clear airway and avoid complications, intensive care doctors have employed a variety of techniques. One of the biggest concerns is consequently to avoid endotracheal tube movement. There is several methods available to secure endotracheal tubes. The traditional methods are those using cloth tape or adhesive tape with several techniques existing for each. Endotracheal

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tube retaining devices available in stores are used much less frequently. Commercial fixation devices are recommended by the American Heart Association's 2005 guidelines as a solution that is as effective as taping or tying. It is recommended that unlike adhesive tape, the use of endotracheal tube fasteners to keep the tubes in place lowers the risk of outcomes that involves lip ulcers, facial skin tears, or ETT dislodgement. Several studies have given evidence that Endotracheal Tube Holder is very effective in the prevention of endotracheal tube dislodgement, lip ulcers and skin tears as compared to conventional method [7–10].

MATERIALS AND METHODOLOGY

In the present study quantitative research approach and Experimental design were used. The present study was conducted in various ICUs of a tertiary care hospital. The total sample was 20 orally intubated patients admitted in Intensive Care Units, out of which 10 were in experimental group 1 and 10 were in experimental group 2. Simple random sampling technique was used for data collection [11–14].

Description of research Tool

Tool was divided into three parts:

PART A: Patient's Profile

Which is further divided into two sections:

Section-I: Socio-demographic Profile: It includes 9 items to obtain information about age (in years), gender, habitat, educational status, religion, marital status, dietary habits, occupation and socio-economic status

Section-II: Clinical Profile

It includes 8 items to obtain information about diagnosis of the patient, day of hospitalization, indication for intubation, previous history of being intubated, way of admission of the patient in the hospital, Co-morbidities, height (in cm), weight (in kg).

PART B: General Assessment

It includes three items

- GCS

Best response	9-15
Comatose client	4-8
Totally unresponsive	3

- ETT cuff pressure

  Normal 22-32 mmHg

- P/F ratio

  Normal ≥400

PARTC: *Endotracheal Tube Securement [ETTS] Outcomes*

Which is further divided into three sections:

Section-I: Modified Endotracheal Tube [ETT] Slippage Scale and number of resecurements
It includes

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- Endotracheal Tube [ETT] depth at the lip line (in cm)
- Endotracheal Tube [ETT] slippage in outward direction (in cm)

Which is divided into 4 categories

Slippage Range (in cm)

No slippage 0-0.5 cm

Mild slippage 0.6-1 cm

Moderate slippage 1.1-cm

Severe slippage 2.1-5 cm

- Endotracheal Tube [ETT] position in mouth (Right side, Left side and middle)
- Number of re-securement (in a day)

Section-II: Modified Oral Assessment Guide (OAG) Scale for lip ulcers and oral mucosa
It includes two subscales i.e. for lip ulcers and for oral mucosa

- For lip ulcers

Score 1-smooth, pink

Score 2-dry or Cracked

Score3-ulcerated or bleeding

- For oral mucosa

Score 1-pink and moist

Score 2-reddened or coated, no ulcers

Score 3-ulcers with or without bleeding

Two sub scale scores of Modified Oral Assessment Guide (OAG) Scale are summed to obtain overall assessment score 2 to 6

2-normal

3 to 4-moderate alterations

5 to 6-severe alterations

Section-III: Modified Facial Skin Integrity Score Tool
It includes 3 subscales i.e. For dryness, for redness and for breakdown of facial skin

For Dryness
Score 1-no dryness
Score 2-dry skin and visible scaling score 3-cracked

For Redness
Score 1-not present
Score 2-visible redness (<50% of face surface) score 3-visible redness (≥50% of face surface)

For Breakdown
Score 1-not present
Score 2-confined to small area Score 3-confined to large area

Three sub scale scores of Modified Facial Skin Integrity Score tool are summed to obtain overall assessment score 3 to 9

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3–Healthy skin condition
4 to 6-Moderate skin reaction 7 to 9-Severe skin reaction

RESULTS

- As per Socio-demographic profile, the two groups i.e. experimental group$_1$ and experimental group$_2$ were statistically identical ($p>0.05$) age, gender, habitat, educational status, religion, marital status, dietary habits, occupation and socio-economic status of the orally intubated patients.
- Mean age±SD of experimental group$_1$ was 40.70±19.95, and in experimental group$_2$ was 57.10±14.24 and majorities were males.
- As per their Clinical Profile, the two groups i.e. experimental group$_1$ and experimental group$_2$ were statistically identical ($p>0.05$) as per their clinical profile which includes days of hospitalization, indication of intubation, previous history of being intubated, way of admission in hospital, co-morbidities, height (cm) and weight (kg) of the orally intubated patients.
- In experimental group$_1$, maximum patients (20%) each were having nephrological problem, neurological problem, respiratory problem and metabolic and endocrine problem and in experimental group$_2$, maximum patients (30%) were having neurological problem.
- In both groups i.e. in experimental group$_1$ and experimental group$_2$ maximum patients (70%) were having day of hospitalization between 1-5 days.
- In both experimental group$_1$ and experimental group$_2$, in majority of patients indication of intubation was respiratory distress 70% and 80% respectively.
- In both groups i.e. in experimental group$_1$ and experimental group$_2$ maximum patients (90%) were not previously intubated and in experimental group$_1$ 50% patients were having co-morbidities and in experimental group$_2$ maximum patients (90%) were having co-morbidities.

Table 1 depicts frequency and percentage distribution of orally intubated patients among experimental group$_1$ and experimental group$_2$ according to ETT position from day 1 to day 6.

- As per General Assessment, statistically significant result was found between experiment group$_1$ and experiment group$_2$ in GCS on day 2 ($p=0.017$) and there was no statistically significant difference in GCS on day 1 ($p= 0.270$), day 3 (0.270), day 4 (0.214), day 5 (0.819) and day 6 (0.717).
- There was statistical difference between the experimental group$_1$ and experimental group$_2$ in P/F ratio on day 1 ($p=0.004$) and there was no statistical difference between the experimental group$_1$ and experimental group$_2$ in P/F ratio in observations from day 2 to day 3 ($p>0.05$).
- On day 1,in experimental group$_1$, Mean± SD of ETT depth at lip line in cm was 22.05 ± 1.46 and in experimental group$_2$, Mean ± SD was 22.20 ± 0.79.On day2, in experimentally group$_1$, Mean ± SD was 22.50 ± 0.82 and in experimental group$_2$, Mean ± SD was 22.20 ± 0.79.On day 3, in experimental group$_1$, Mean ± SD was 22.40 ± 1.07 and in experimental group $_2$, Mean ± SD was 22.25 ± 0.86.On day 4, in experimental group$_1$, Mean±SD was 22.30±1.49 and in experimental group$_2$, Mean±SD was 22.30±0.67. On day 5, in experimental group$_1$, Mean±SD was 22.10±0.99 and in experimental group$_2$, Mean ± SD was 22.36 ± 0.80.On day 6, in experimental group$_1$, Mean ± SD was 22.20 ± 1.03 and in experimental group$_2$, Mean ± SD was 22.40 ± 0.81.

Table 2 depicts frequency and percentage distribution of orally intubated patients among experimental group$_1$ and experimental group$_2$ according No. of resecurements of ETT from day1 today 6

- In experimental group$_1$, maximum patients were having ETT slippage in outward direction (in cm) between 0-0.5 cm in all observations from day 1 to day 6 and in experimental group$_2$, majority of patients were having ETT slippage in outward direction (in cm) between 0-0.5 cm on day 1 and day 4.On day 2, 40% of the patients were having ETT slippage between 0-0.5 cm and 40% were having ETT slippage between 0.6-1 cm. On day 3, maximum patients were having

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ETT slippage between 0.6-1 cm. On day 5 and day 6, 50% each patients were having ETT slippage between 0-0.5 cm and 50% each were having ETT slippage between 0.6-1 cm.

Table 1. Comparison of orally intubated patients among experimental group$_1$ and experimental group$_2$ according to ETT position from day 1 to day 6.

N=20

ETT position	**Experimental group$_1$ n_1=10 f(%)**	**Experimental group$_2$ n_2=10 f (%)**	**χ^2 Statistics**
Day 1			
Right side	8 (80.0)	8 (80.0)	4.000
Left side	2 (20.0)	0 (00.0)	df = 2 p=0.135^{NS}
Middle	0 (00.0)	2 (20.0)	
Day 2			
Right side	8 (80.0)	8 (80.0)	4.000
Left side	2 (20.0)	0 (00.0)	df = 2 p=0.135^{NS}
Middle	0 (00.0)	2 (20.0)	
Day 3			
Right side	9 (90.0)	8 (80.0)	3.059
Left side	1 (10.0)	0 (00.0)	df = 2 p=0.217^{NS}
Middle	0 (00.0	2 (20.0)	
Day 4			
Right side	8 (80.0)	8 (80.0)	4.000
Left side	2 (20.0)	0 (00.0)	df = 2 p=0.135^{NS}
Middle	0 (00.0)	2 (20.0)	
Day 5			
Right side	8 (80.0)	8 (80.0)	4.000
Left side	2 (20.0)	0 (00.0)	df = 2 p=0.135^{NS}
Middle	0 (00.0)	2 (20.0)	
Day 6			
Right side	8 (80.0)	8 (80.0)	4.000
Left side	2 (20.0)	0 (00.0)	df = 2 p=0.135^{NS}
Middle	0 (00.0)	2 (20.0)	

*Significant, NS=Non-Significant

Table 2. Comparison of orally intubated patients among experimental group$_1$ and experimental group 2 according no. of resecurements of ETT from day 1 to day 6.

N=20

No. of resecurements	**Experimental group$_1$ n_1=10 f(%)**	**Experimental group$_2$ n_2=10 f(%)**	**χ^2 Statistics**
Day 1			
No resecurement	0 (00.0)	10 (100.0)	20.000
1 time	4 (40.0)	0 (00.0)	df=2
2 times	6 (60.0)	0 (00.0)	p=0.000*
3 times	0 (00.0)	0 (00.0)	
Day 2			
No resecurement	0 (00.0)	9 (90.0)	17.333
1 time	2 (20.0)	1 (10.0)	df=3
2 times	3 (30.0)	0 (00.0)	p=0.001*
3 times	5 (50.0)	0 (00.0)	
Day 3			
No resecurement	0 (00.0)	9 (90.0)	17.333
1 time	2 (20.0)	1 (10.0)	df=3

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No. of resecurements	Experimental group$_1$ n_1=10 f(%)	Experimental group$_2$ n_2=10 f(%)	χ^2 Statistics
2 times	4 (40.0)	0 (00.0)	p=0.001*
3 times	4 (40.0)	0 (00.0)	
Day 4			
No resecurement	0 (00.0)	9 (90.0)	17.333
1 time	2 (20.0)	1 (10.0)	df=3
2 times	5 (50.0)	0 (00.0)	p=0.001*
3 times	3 (30.0)	0 (00.0)	
Day 5			
No resecurement	0 (00.0)	6 (60.0)	13.143
1 time	3 (30.0)	4 (40.0)	df=3
2 times	5 (50.0)	0 (00.0)	p=0.004*
3 times	2 (20.0)	0 (00.0)	
Day 6			
No resecurement	0 (00.0)	8 (80.0)	16.000
1 time	2 (20.0)	2 (20.0)	df=2
2 times	8 (80.0)	0 (00.0)	p=0.000*
3 times	0 (00.0)	0 (00.0)	

*significant, NS =Non-Significant

Table 3. Comparison of orally intubated patients among experimental group $_1$ and experimental group$_2$ according to Lip ulcers and oral mucosa ulcers from day 1 to day 6

N=20

Lip Ulcers and Oral Mucosa Ulcers	Experimental group$_1$ n_1=10 f(%)	Experimental group$_2$ n_2=10 f(%)	χ^2 Statistics
Day 1 Normal Moderate alteration Severe alteration	 9 (90.0) 1 (10.0) 0 (00.0)	 10 (100.0) 0 (00.0) 0 (00.0)	1.053 df = 1 p=0.305^{NS}
Day 2 Normal Moderate alteration Severe alteration	 9 (90.0) 1 (10.0) 0 (00.0)	 10 (100.0) 0 (00.0) 0 (00.0)	1.053 df = 1 p=0.305^{NS}
Day 3 Normal Moderate alteration Severe alteration	 5 (50.0) 5 (50.0) 0 (00.0)	 9 (90.0) 1 (10.0) 0 (00).0	3.810 df = 1 p=0.051^{NS}
Day 4 Normal Moderate alteration Severe alteration	 4 (40.0) 6 (60.0) 0 (00.0)	 7 (70.0) 3 (30.0) 0 (00.0)	1.818 df = 1 p=0.178^{NS}
Day 5 Normal Moderate alteration Severe alteration	 1 (10.0) 8 (80.0) 1 (10.0)	 5 (50.0) 5 (50.0) 0 (00.0)	4.359 df = 2 p=0.113^{NS}
Day 6 Normal Moderate alteration Severe alteration	 1 (10.0) 8 (80.0) 1 (10.0)	 4 (40.0) 6 (60.0) 0 (00.0)	3.086 df = 2 p=0.214^{NS}

*Significant, NS=Non-Significant Table 3 depicts frequency and percentage distribution of orally intubated patients among experimental group$_1$ and experimental group$_2$ according to Lip ulcers and oral mucosa ulcers from day 1 to day 6.

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Table 4. Comparison of orally intubated patients among experimental group 1 and experimental group 2 according to Facial skin integrity from day 1 to day 6

N=20

Facial skin integrity	Experimental group $_1$ n_1=10 f(%)	Experimental group$_2$ n_2=10 f(%)	χ^2 Statistics
Day 1			
Healthy skin condition Moderate skin condition	10 (100.0) 0 (00.0)	10 (100.0) 0 (00.0)	NA
Severe skin condition	0 (00.0)	0 (00.0)	
Day 2			
Healthy skin condition Moderate skin condition	10 (100.0) 0 (00.0)	10 (100.0) 0 (00.0)	NA
Severe skin condition	0 (00.0)	0 (00.0)	
Day 3			
Healthy skin condition Moderate skin condition	10 (100.0) 0 (00.0)	10 (100.0) 0 (00.0)	NA
Severe skin condition	0 (00.0)	0 (00.0)	
Day 4 Healthy skin condition Moderate skin condition Severe skin condition	 7 (70.0) 3 (30.0) 0 (00.0)	 10 (100.0) 0 (00.0) 0 (00.0)	3.529 df = 1 p=0.060^{NS}
Day 5 Healthy skin condition Moderate skin condition Severe skin condition	 4 (40.0) 6 (60.0) 0 (00.0)	 8 (80.0) 2 (20.0) 0 (00.0)	3.333 df = 1 p=0.068^{NS}
Day 6 Healthy skin condition Moderate skin condition Severe skin condition	 3 (30.0) 7 (70.0) 0 (00.0)	 7 (70.0) 3 (30.0) 0 (00.0)	3.200 df = 1 p=0.074^{NS}

*Significant, NS=Non-Significant

Table 4 depicts frequency and percentage distribution of orally intubated patients among experimental group 1 and experimental group 2 according to Facial skin integrity from day 1 to day 6. There was statistically significant difference found between experimental group$_1$ and experimental group$_2$ ($p>0.05$) in number of resecurements in all observations from day 1 to day 6. Day 1 ($p=0.000$), day 2 ($p=0.001$), day 3 ($p=0.001$), day 4 ($p=0.001$), day 5 ($p=0.004$) and day 6 ($p=0.000$).

DISCUSSION

Endotracheal intubation is frequently a life-saving treatment used on persons who are comatose or unable to breathe. Endotracheal Intubation keeps the airway patent and helps to prevent suffocation. Once the patient has been intubated, it is crucial to keep the endotracheal tube in position. Even routine nursing care can result in tube slippage when endotracheal tubes are improperly secured, which is a primary contributor in developing airway trauma. Thus, avoiding Endotracheal Tube Movement is of the utmost priority. There is convincing evidence that immobilization of the head is important, other measures that are important are the vigilance of medical staff, adequate sedation of the patient and strong fixation of endotracheal tube. So, there are numerous methods available to secure endotracheal tubes. The traditional methods are those using cloth tape or adhesive tape with several techniques existing for each and commercially made endotracheal tube holding devices for Endotracheal Tube Securement in critical care areas [15–21].

CONCLUSION

The findings revealed that for General Assessment, it was concluded that statistically significant result was found between experimental group 1 and experimental group 2 ($p<0.05$) in GCS on day 2

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(p=0.017), in P/F ratio on day1 (p=0.004). But most of the observations were statistically non-significant. Also, statistical non-significant result was found in ETT cuff pressure in all observations from day 1 to day 6 (p>0.05). Thus, null hypothesis was accepted. Also, for Endotracheal Tube Securement [ETTS] Outcomes, statistically significant result was found between experimental $group_1$ and experimental $group_2$ in number of resecurements in all observations from day 1 to day 6 (p<0.05). Hence, Endotracheal Tube Holder can be recommended for Endotracheal Tube securement in clinical practice.

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