

ORIGINAL ARTICLE

Effect of cuff inflation pressure on the incidence of post-operative sore throat in patients undergoing laparoscopic surgery under GA using manometer versus conventional technique: An observational study

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Received: 24-09-2021

Accepted: 17-10-2021

How to cite this article:

Baktier T, Gupta A, Garg A, Arora N, Singh E, Parhi D. Effect of cuff inflation pressure on the incidence of post-operative sore throat in patients undergoing laparoscopic surgery under GA using manometer versus conventional technique: An observational study. Int J Adv Integ Med Sci 2021;6(3):32-35.

Source of Support: Nil,

Conflicts of Interest: None declared.

INTRODUCTION

Post-operative sore throat is a common complaint in patients receiving general anesthesia following orotracheal intubation, with reported incidences of 21–65%.^[1] Although the current treatments are not exactly effective and the symptoms ameliorate without any treatment, the management for preventing POST is still advised because it promotes the patient's satisfaction and affects the activities after discharge from the hospital. The endotracheal

Background: Post operative sore throat (POST) is an unpleasant and troublesome sequelae after endotracheal intubation. The present study compares the efficacy of cuff inflation pressure using manometer versus conventional technique on the incidence of post-operative sore throat under General Anaesthesia. **Methods:** 60 patients requiring intubation were randomly assigned into two groups : Group A measured ETTc pressure using manometer while Group B measured ETTc pressure by conventional technique. Patients were then followed up for post operative sore throat , hoarseness and cough. **Results:** The overall incidence of post operative sore throat was 33.3% versus 70% , hoarseness 10% versus 23.3% and cough 3.3% versus 6.7% in Group A and Group B respectively. Group A patients experienced a significant reduction in the incidence and severity, hoarseness and cough upto 24 h post operatively (p<0.001). **Conclusion:** Setting ETTc pressure to 25 cm H₂O directed by manometer reduces POST , hoarseness and cough significantly compared to conventional techniques .

KEY WORDS: Post operative sore throat, Endotracheal tube cuff pressure, General anaesthesia

tube (ETT) cuff's primary role is to seal the airway, preventing leaks and pharyngeal contents aspiration into the trachea during ventilation.^[2] Excessive ETT cuff inflation reduces blood flow to the tracheal mucosa, resulting in necrosis and ischemia. To ensure delivery of mechanical ventilation tidal volume while limiting the risk of aspiration that builds above the cuff without jeopardising tracheal perforation, keep the cuff pressure between 20 and 30 cm H₂O.^[2] As a result, we conducted this research to compare the incidence and severity of sore throat utilising cuff inflation guided by a manometer to traditional approaches.

Sample Size

Assuming 30% mean difference as significant with alpha level of 0.05 and power at 80%, sample size was taken as 60. The anonymity of patients was maintained.

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SUBJECTS AND METHODS

After receiving hospital ethical committee clearance and informed written consent from patients, this prospective, double-blinded, observational comparison study was conducted and the patients were randomly assigned into two groups: Group A measured ETT cuff pressure by manometer and Group B by conventional technique using a randomized computer generated sequence at the operating room on the day of surgery.

A standard general anaesthetic procedure was followed. An intravenous (IV) cannula was inserted in the operating room, and the patient was monitored with an electrocardiogram, a noninvasive blood pressure monitor, and a pulse-oximeter. A gentle laryngoscopy was used to intubate the patient using a disposable 7.5-mm internal diameter cuffed (low pressure and large volume) polyvinyl chloride ETT after induction with 1.5–2.5 mg/kg IV propofol. ETT cuffs were filled with the least amount of ambient air feasible to avoid an audible leak. If intubation took more than two attempts, the patient was removed from the study. Both intubation and cuff inflation were performed by anesthetists stationed in the operating room. Using a cuff inflator, the cuff pressure was measured and set to 25 cm H₂O in Group A. The anesthetist stationed in the theatre guided cuff inflation in Group B based on the absence of audible leak and probing of the pilot balloon. The patient was no longer a part of the study. O₂ in air (1:2) and isoflurane 0.5–1.5% intermittent positive-pressure breathing were used to maintain anesthesia. No nitrous oxide was provided to any of the patients. Extubation was achieved after gentle oropharyngeal suctioning under vision and the administration of IV neostigmine 0.05 mg/kg and glycopyrrolate 0.002 mg/kg to restore residual muscular relaxation. Nursing personnel in the Intensive Care Unit (ICU) were blinded to the technique and monitored and graded postoperative cough, sore throat, and hoarseness, with answers recorded at 0, 2, 4, 12, and 24 h. POST, cough, and hoarseness were rated on a scale of 0 to 3 on a preset category scale.

Statistical Analysis

Significance was assessed at 5% level of significance and a $P < 0.05$ was considered statistically significant.

RESULTS

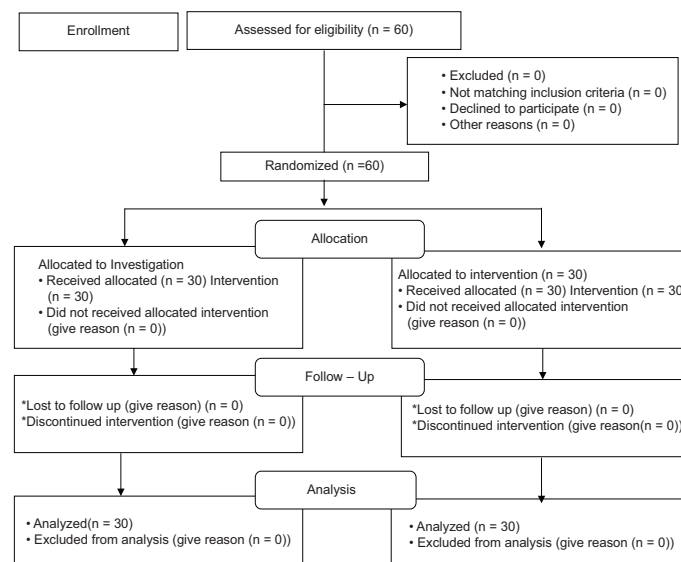
A total of 60 people were enrolled in this study. In terms of demographics, both groups had a similar distribution of patients. The quickest surgery took 120 min, and the most time-consuming procedure took 360 min. The incidence of sore throat was recorded at 0, 2, 4, 12, and 24 h. Ten patients (33.3%) in Group A had a sore throat, whereas 21 patients (70%) in Group B did. This is statistically significant with a P value of 0.001 [Tables 1 and 2]. Three patients (10%) in Group A and seven (23.3%) in Group B experienced hoarseness of voice, although the difference was not statistically significant ($P = 0.165$) [Table 3]. When the incidence of cough was compared between the groups, only one patient in Group A (3.3%) had cough in the postoperative period, but two patients in Group B (6.7%) had cough. Statistically, this was also not significant [Table 4]. At all time periods, the incidence of sore throat was greater in Group B than in Group A, and this difference was statistically significant. None of the patients in either group got a significant sore throat. The incidence of hoarseness of voice was also examined at 0, 2, 4, 12, and 24 h after surgery. Furthermore, in Group A, the incidence of hoarseness was lower than in Group B. This was not, however, determined to be statistically significant at any point in time. Three patients in Group B and two patients in Group A reported cough. In addition, there was no statistically significant difference in the incidence of cough between the two groups.

Category Scale Score for Assessment of Sore Throat/Hoarseness/Cough

Grade Severity

0. No sore throat/hoarseness/cough
1. Minimal - Patient answered in the affirmative when asked.
2. Moderate - Patient complained on her own.
3. Severe - Patient in obvious distress.

Consort Diagram



DISCUSSION

A common, unpleasant, and distressing scenario observed after tracheal intubation is post-operative sore throat, cough, and

Table 1: Comparison of incidence of sore throat, hoarseness, and cough

Incidence	Classification	Groups		P-value
		Group A (n=30)	Group B (n=30)	
		No (%)	No (%)	
Sore Throat	Yes	10 (33.3)	21 (70)	<0.001*
	No	20 (66.7)	9 (30)	
Hoarseness	Yes	3 (10)	7 (23.3)	0.165#
	No	27 (90)	23 (76.7)	
Cough	Yes	1 (3.3)	2 (6.7)	0.553#
	No	29 (96.7)	28 (93.3)	

*statistically significant, #statistically not significant

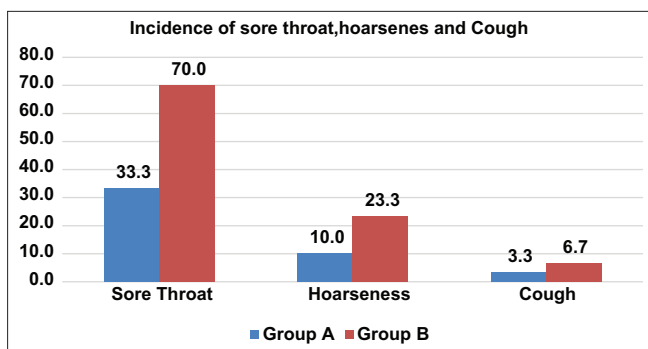


Table 2: Comparison of sore throat with groups in different time period

Time (in h)	Severity	Groups		P-value
		Group A (n=30)	Group B (n=30)	
		No(%)	No(%)	
0 h	Nil	20 (66.7)	9 (30)	<0.001*
	Mild	8 (26.6)	16 (53.3)	
	Moderate	2 (6.7)	5 (16.7)	
2 h	Nil	21 (70)	9 (30)	<0.001*
	Mild	8 (26.7)	15 (50)	
	Moderate	1 (3.3)	6 (20)	
4 h	Nil	22 (73.3)	10 (33.3)	<0.001*
	Mild	8 (26.7)	16 (53.4)	
	Moderate	0 (0)	4 (13.3)	
12 h	Nil	23 (76.7)	10 (33.3)	<0.001*
	Mild	7 (23.3)	17 (56.7)	
	Moderate	0 (0)	3 (10)	
24 h	Nil	25 (83.3)	10 (33.3)	<0.001*
	Mild	5 (16.7)	18 (60)	
	Moderate	0 (0)	2 (6.7)	

*statistically significant

hoarseness of voice, which is thought to be caused by irritation of the tracheal mucosa caused by various factors leading to an inflammatory response, though the mediators are still unknown.^[3] Sore throat is a common moderate side effect of general anaesthesia in the postoperative period.^[2] Although the symptoms go away on their own without treatment, preventive action to lessen their frequency and intensity is recommended to improve postanesthesia care quality. An inflated endotracheal cuff is used to prevent gas leaks during positive-pressure breathing and aspiration of food or stomach acid. Long-term overinflation of the cuff, on the other hand, can result in mucosal injury. By altering the perfusion of the tracheal mucosa, excessive inflation for long periods of time may produce ischemic necrosis, tracheal rupture, trachea esophageal fistula, or laryngeal nerve palsy.^[4] As a result, it is recommended that the cuff pressure be kept between 20 and 30 cm H₂O.^[5] The usual method of inflating the cuff is

Table 3: Comparison of hoarseness with groups in different time period

Time (in h)	Severity	Groups		P-value
		Group A (n=30)	Group B (n=30)	
		No (%)	No (%)	
0 h	Nil	27 (90)	24 (80)	0.145#
	Mild	2 (6.7)	5 (16.7)	
	Moderate	1 (3.3)	1 (3.3)	
2 h	Nil	28 (93.3)	25 (83.3)	0.421#
	Mild	2 (6.7)	5 (16.7)	
	Moderate	0 (0)	0 (0)	
4 h	Nil	29 (96.7)	26 (86.7)	0.350#
	Mild	1 (3.3)	4 (13.3)	
	Moderate	0 (0)	0 (0)	
12 h	Nil	29 (96.7)	28 (93.3)	0.553#
	Mild	1 (3.3)	2 (6.7)	
	Moderate	0 (0)	0 (0)	
24 h	Nil	30 (100)	29 (96.7)	0.313#
	Mild	0 (0)	1 (3.3)	
	Moderate	0 (0)	0 (0)	

#statistically not significant

Table 4: Comparison of cough with groups in different time period

Time (in h)	Severity	Groups		P-value
		Group A (n=30)	Group B (n=30)	
		No (%)	No (%)	
0 h	Nil	29 (96.7)	28 (93.3)	0.553#
	Mild	1 (3.3)	2 (6.7)	
	Moderate	0 (0)	0 (0)	
2 h	Nil	30 (100)	29 (96.7)	0.313#
	Mild	0 (0)	1 (3.3)	
	Moderate	0 (0)	0 (0)	

#statistically not significant

to keep it on until a seal is achieved by palpating for leaks in the suprasternal notch during positive-pressure ventilation or palpating the pilot balloon.^[3] In contrast, blind inflation frequently results in cuff overinflation, resulting in increased post-operative respiratory morbidity.^[5,6] I compared the incidence of sore throat when cuff pressure (25 mmHg) was measured with a cuff manometer vs inflating the cuff without measuring cuff pressure. The incidence of sore throat was observed to be considerably higher in the latter group. A cuff pressure manometer should be used to improve patient comfort and reduce difficulties associated with cuff overinflation. Using a manometer to monitor cuff pressure reduced the prevalence and severity of POST in neurosurgical patients, according to Archana *et al.*^[6] POST was also less common in Group A than it was in Group B in our study (33.3% vs. 70%). The incidence of postoperative hoarseness was also decreased. The incidence of sore throat in the latter group was found to be significantly higher. For enhanced patient comfort and to reduce issues linked with cuff over inflation, a cuff pressure manometer should be used. Archana *et al.*^[6] observed that using a manometer to monitor cuff pressure reduced the occurrence and severity of POST in neurosurgical patients. In our study, the incidence of POST in Group A was also lower than in Group B. (33.3% vs. 70%). There was also a lower incidence of postoperative hoarseness.

In a study by Trivedi *et al.*,^[7] routine cuff pressure monitoring were found to reduce endotracheal intubation-related complications. Rather than depending on subjective judgement, they advised utilizing a rudimentary manometer to guide cuff induction. He noticed that even anesthesiologists with more than 5 years of teaching experience couldn't get the endotracheal cuff to the proper pressure. The cuff is more likely to be overinflated when standard procedures are applied. Cuff pressure was only measured at the time of intubation; no measurements were taken during or after surgery to evaluate if it remained consistent.

When compared to the pilot balloon palpation approach, reducing the ETT cuff pressure to 25 cm H₂O reduces POST, hoarseness, and cough, according to Nagappan *et al.*^[8]

Similarly, Khan *et al.* claimed that instrumental cuff pressure monitoring is simple, affordable, and reliable when compared

to traditional ETT cuff inflation and balloon pressure monitoring.^[2]

The results could have been influenced by the fact that intubation was performed by people with varying levels of experience.

CONCLUSIONS

When cuff inflation is controlled by a manometer, POST is considerably minimised. As a result, all operating rooms and ICU where endotracheal intubations are performed should include cuff pressure manometers.

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