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The Effect of Endotracheal Tube Cuff Pressure Control on Postoperative Sore Throat in Faciomaxillary Surgeries

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Abstract

Background: Sore throat is a common problem following general anesthesia and intubation. It has been found to correlate with increased endotracheal tube (ETT) cuff pressure. In this study, we assessed the incidence and severity of sore throat in patients who had their ETT cuff pressure monitored and compared them with patients in whom the adequacy of cuff inflation was assessed only by clinical methods.

Material and Methods: Forty-eight ASA I and II patients in the age group of 18-60 years, posted for faciomaxillary surgeries were randomly divided into two groups. In Group 1, the adequacy of inflation of ETT cuff was checked by palpating the sternal notch and auscultating with a stethoscope to rule out leak. In Group 2, ETT cuff pressure was adjusted to 25 cm H_2O using a cuff manometer. Postoperatively, sore throat was assessed using a 10 point scale at 1 hour, 6 hours and 24 hours of surgery.

Results: There was no statistically significant difference in the incidence of sore throat between the groups. The sore throat scores recorded after one hour of surgery were significantly higher in Group 1 compared to Group 2 (median score 4 in Group 1 vs 2 in Group 2, P=0.008). There was no statistically significant difference in the sore throat scores recorded after 6 and 24 hours of surgery in both the groups.

Conclusion: Endotracheal tube cuff pressure has to be routinely monitored and kept in the optimal range of 20-30 cm H_2O to minimize postoperative complications like sore throat.

Keywords: General anesthesia; Cuff pressure; Faciomaxillary surgeries; Sore throat.

Introduction

Sore throat is a common complaint following general anesthesia with endotracheal intubation. The incidence of sore throat after intubation varies from 30% to 55%.[1] The use of cuffed endotracheal tubes protects from aspiration of gastic contents. Inadequate inflation of cuff can cause aspiration while overinflation can cause complications like ischemia, granulation, ulceration and stenosis of trachea[2,3] and these conditions can present as cough, sore throat and blood streaked expectoration. Postoperative sore throat has been found to correlate with increased cuff pressure.[3] The acceptable cuff pressure has been found to be 20-30 cm of H_2O.[4]

Clinically, the adequacy of cuff inflation is determined by gradually inflating the cuff to a sealing pressure until no leak is heard at the mouth and also by palpating the sternal notch for gurgling noise. The bell of the sthethoscope could also be used to auscultate at the sternal notch for presence of harsh breath sounds around the endotracheal tube (ETT). As a more objective method, a cuff manometer could be used to determine the cuff pressure and thereby the adequacy of cuff inflation.[5]

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In this study, sore throat was evaluated post operatively in one group of patients who had their ETT cuff inflation checked by clinical methods and compared with another group who had their cuff pressures checked by a cuff manometer, following faciomaxillary surgeries.

Material and Methods

A prospective randomized controlled trial was undertaken in Saveetha university, Kanchipuram district, Tamilnadu. Patients in the age group of 18-60 years, who belonged to ASA status I and II and posted for faciomaxillary surgeries were included in the study. Informed consent was obtained from all patients and institutional ethics committee clearance was obtained before starting the study. Pregnant ladies, patients with ASA status III and above and patients with oral cancer were excluded from the study. A total of 48 patients were chosen based on the inclusion and exclusion criteria at the power of 90. The patients were randomly divided in to two groups using computer generated random numbers. In Group 1, ETT cuff inflation was checked by clinical methods while in Group 2, cuff pressure was adjusted with a cuff manometer (Portex). One day before surgery, the patients were explained how to rate the severity of postoperative sore throat (POST) by using a 10 point score:[6]

0 = no sore throat,

1–3 = mild sore throat (complains of sore throat only on asking),

4–7 = moderate sore throat (complains of sore throat on his/her own),

8–10 = severe sore throat (change of voice or hoarseness, associated with throat pain).

After shifting the patients in to the operating room, an 18G intravenous cannula was placed for administration of fluids. Standard monitors like electrocardiogram (ECG), non invasive blood pressure (NIBP), pulse oximetry (SpO_2) and capnography ($ETCO_2$) were connected. Anesthesia was induced with intravenous fentanyl 2 mcg/Kg, propofol 2 mg/Kg and vecuronium 0.1 mg/Kg. Direct laryngoscopy was done and nasal intubation was performed with an appropriate sized Polyvinyl chloride nasal RAE endotracheal tube (7.5 mm in males, 7.0 mm in females). In Group 1, after endotracheal intubation, cuff was gradually inflated in one ml increments until there was no palpable air leak in the sternal notch and no leak was audible on auscultation with the bell of a stethoscope. In Group 2, after intubation, ETT cuff was inflated in one ml increments until the cuff manometer showed a reading of 25 cm H_2O. After securing the airway, a throat pack was kept in all patients. Anesthesia was maintained with 1 MAC sevoflurane in air- oxygen mixture and intermittent intravenous boluses of vecuronium and fentanyl. Nitrous oxide was avoided in both the groups. The duration of surgery was recorded. At the end of surgery, throat pack was removed. Patients were reversed with neostigmine 0.05 mg/Kg and glycopyrrolate 0.01 mg/Kg and trachea was extubated. Postoperatively, the patients were questioned about the presence of sore throat at 1, 6 and 24 hours after surgery and appropriate scores were recorded.

Statistical Analysis

The parametric data like age, height, weight and duration of surgery were expressed as mean and standard deviation and analyzed using student t test. The sex distribution and incidence of sore throat were compared using Chi square test. The sore throat scores after 1, 6 and 24 hours in the groups were expressed as median and interquartile range and analyzed using Mann Whitney test. P value < 0.05 was considered statistically significant.

Results

The two groups were comparable in terms of age, sex, height and weight. There was no significant difference in the duration of surgery between the two groups (P>0.05, Tables 1 & 2). Two patients in Group 1 and one patient in Group 2 did not complain of any sore throat while all other patients had some degree of sore throat. There was no statistically significant difference in the incidence of sore throat between the groups (Table 3). The sore throat scores recorded after one hour of surgery were significantly higher in Group 1 compared to Group 2 (median score 4 in Group 1 vs 2 in Group 2, P=0.008). There was no statistically significant difference in the sore throat scores recorded after 6 and 24 hours of surgery in both the groups (Table 4).

Table 1: Demographic data and duration of surgery

Parameters	Group	N	Mean	Std deviation	P value
Age (years)	1	24	39.95	9.58	0.538
	2	24	38.25	9.5	
Height (cm)	1	24	162.12	7.69	0.943
	2	24	161.95	8.31	
Weight (Kg)	1	24	71.79	9.57	0.793
	2	24	71	11.12	

Duration of Surgery (minutes)	1	24	120.83	47.54	0.759
	2	24	117.08	35.56	

Table 2: Sex distribution

Group	Sex	N	Percentage	P value
1	Males	14	58.3	0.562
	Females	10	41.7	
2	Males	12	50	
	Females	12	50	

Table 3: Incidence of Sore Throat

	Group 1 (N=24)	Group 2 (N=24)	P value
No. of patients with Sore throat	22	23	0.547
Percentage	91.66	95.83	

Table 4: Comparison of Sore Throat Scores

	Group	N	Median	Interquartile range	P value
ST 1 hr	1	24	4.0	2.00-5.75	0.008
	2	24	2.0	1.00-4.00	
ST 6 hrs	1	24	2.0	1.25-4.00	0.117
	2	24	2.0	1.00-2.00	
ST 24 hrs	1	24	0.0	0.00-1.00	0.511
	2	24	0.0	0.00-1.00	

ST- Sore throat

Discussion

Sore throat is a common complaint following general anesthesia and endotracheal intubation. High volume- low pressure cuffs can exert high pressure on the tracheal mucosa if overinflated and can contribute to postoperative sore throat.[7] When the ETT cuff pressure exceeds 30 mmHg, blood flow to the trachea decreases significantly and at pressures of 50 mm Hg and above, ischemic injury to the tracheal mucosa occurs.[8]

In our study, the incidence of sore throat was comparable in both the groups. However we found that the sore throat scores after one hour of surgery were significantly higher in the group in which the ETT cuff pressures were adjusted by clinical methods, reflecting a higher degree of severity of symptoms in Group 1. At 6 and 24 hours, the sore throat scores were comparable. Our findings were partly similar to the observations made by Liu[9] et al. who found that the incidence and severity of sore throat was higher in patients in whom cuff pressure was not monitored compared to patients in whom cuff pressure was monitored.

In a study conducted by Borhazowal[5] et al., the authors reported that the cuff pressures and incidence of sore throat were significantly higher in the group in which cuff leak was checked by palpation compared to the group in which auscultation method was used. This again shows the drawback associated with one of the clinical methods of cuff inflation.

In our study, we performed nasotracheal intubation in all patients and placed a throat pack in all of them. Pharyngeal packing has been found to be associated with sore throat in some studies.[10] This could have contributed to the comparable incidence of sore throat in both the groups in our study.

In a study conducted by Sengupta[3] et al., the authors measured cuff pressures one hour after inflating the ETT cuff by clinical methods. They reported that 50% of patients had cuff pressures measuring 30 cm H_2O and above while 27% had values in excess of 40 cm H_2O. In our study, we did not measure the cuff pressures in Group 1 but the increased severity of sore throat in the first hour could have been due to increased cuff pressure. The reduction in severity of sore throat at later hours could have been due to natural healing.

Limitations

We could have measured the cuff pressures at the end of surgery in Group 1 to see how effective the cuff inflation method was. We could have also done a bronchoscopic examination in all patients to assess tracheal mucosal damage.

Conclusion

We advocate the routine use of cuff manometer to maintain the endotrachaeal cuff pressures in the recommended range of 20-30 cm H_2O to minimize postoperative sore throat and ensure better patient satisfaction.

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