

## Comparison of “Just Seal” Vs “Stethoscope Guided” Cuff Inflation Method of Endotracheal Tube Cuff For Reduction of Post Operative Sore Throat

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### ABSTRACT

**Objective:** To compare the efficacy of “just seal” method of endotracheal tube cuff inflation with the “stethoscope guided” method for reduction of post-operative sore throat.

**Study Design:** Prospective observational study.

**Place and Duration of Study:** Main Operation Theatre, Combined Military Hospital Kohat, from Sep to Nov 2018.

**Methodology:** Forty-four patients were divided in two groups (just seal-group and stethoscope guided-group). Injection Propofol and Atracurium were used to induce general anaesthesia, and injection Nalbuphine was used as an analgesic. Endotracheal intubation with 7.5 internal diameter was done after 3 minutes of injecting Atracurium. In group-JS, the ETT cuff was inflated gradually till no leakage was heard. In group-SG, the ETT cuff was inflated slowly, and a stethoscope bell was placed over the thyroid lamina till harsh sounds stopped. Volume used to inflate the cuff, cuff pressure generated and complain of sore throat two hours after extubation were noted.

**Results:** The mean volume used to inflate the cuff was  $6.81 \pm 0.41$  ml and  $4.95 \pm 0.29$  ml for group-JS and SG, respectively ( $p < 0.001$ ). Mean pressure generated was  $34.90 \pm 4.48$  cmH<sub>2</sub>O and  $28.91 \pm 2.37$  cmH<sub>2</sub>O ( $p < 0.001$ ). Postoperative sore throat was observed in 54.55% (12/22) in JS-group and 18.18% (4/22) in SG-group ( $p = 0.012$ ).

**Conclusion:** Stethoscope guided technique for inflation of ETT cuff is more effective in reducing the frequency of post-operative sore throat.

**Keywords:** Endotracheal cuff, Just seal, Post-operative sore throat, Stethoscope guided.

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### INTRODUCTION

Many surgeries are performed under general anaesthesia daily around the globe. Despite developments of laryngeal mask airway (LMA) and I-gel the idea of safe anaesthesia still revolves around endotracheal intubation.<sup>1</sup> Though recent developments in anaesthesia have resulted in fewer complications, yet it is not free of complications and side effects. Some complications are not life-threatening, e.g., nausea, vomiting, post-operative sore throat etc. The frequency of post-operative sore throat ranges from 21-71.8%.<sup>2</sup> Multiple factors are associated with a post-operative sore throat, e.g., female gender, young age, traumatic tracheal intubation, prolonged intubation.<sup>3</sup> However, only a few of these can be changed, like ETT cuff pressure used to create a seal in the airway.<sup>4,5</sup> This seal helps prevent air leaks and pulmonary aspiration,<sup>6</sup> making controlled ventilation possible. The higher the pressure in the endotracheal cuff, the better would be the seal. However, this would come at a price as the pressure

cannot be raised above tracheal capillary blood pressure, approximately 48 cm H<sub>2</sub>O.<sup>7</sup> Moreover, increasing ETT cuff pressure above 30 cmH<sub>2</sub>O can compromise blood flow to tracheal mucosa or even stop it at a pressure of 50 cmH<sub>2</sub>O.<sup>8</sup>

The commonest causes of post-operative sore throat are high ETT cuff pressure and coughing at the time of emergence. Many studies have been conducted to see the frequency and severity of this post-operative sore throat. Some studies focused on using intra cuff Lignocaine (alkaline or non-alkaline) or Betamethasone gel. However, high ETT cuff pressure plays a very important role, which will not be decreased by applying these pharmacological measures, thus highlighting the need to focus on reducing ETT intra cuff pressures.

It was a general trend to palpate the pilot balloon to assess ETT cuff pressure. However, its reliability is questionable; instead “just seal” method has been preferred over this “palpatory method”.<sup>9</sup>

Recently, the “stethoscope guided” method of cuff inflation has been compared with the “just seal method”<sup>10</sup> and it has shown much promise. Therefore, this study was designed to see the efficacy of the

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“stethoscope guided” method in reducing cuff pressure generated and reducing post-operative sore throat.

**METHODOLOGY**

This prospective observational study was conducted at Combined Military Hospital Kohat, from September to November 2018. Permission was obtained from Hospital ethical committee. A total of 44 Patients were included in the study and divided into two groups: group-JS (Just seal) and group-SG (Stethoscope guided).

**Inclusion Criteria:** Male patients with ASA physical status I and II, age 20-40 years presenting for elective surgery, were include in the study.

**Exclusion Criteria:** Patients with anticipated difficult intubation, BMI more than 30, presenting for emergency surgery, or surgeries extending 90 minutes duration were excluded from the study.

General anaesthesia was administered with injection Propofol 2 mg/Kg, injection Atracurium 0.5 mg/kg. Analgesia was maintained with injection Nalbuphine 0.15 mg/Kg.<sup>11</sup> GA was maintained with 1.5% Isoflurane in 100% oxygen. Three minutes after injection of Atracurium, patients were intubated with 7.5 internal diameter endotracheal tube.<sup>12</sup> Cuff was then inflated, either with the “just seal” or “stethoscope guided” method. The cuff was inflated with 10 ml syringe slowly until no leakage was heard in the former. ETT pressure was then measured using a cuff inflator pressure gauge. Later, a stethoscope bell was used to auscultate breath sounds over the thyroid lamina. Harsh sounds indicated a leak around the tube. Cuff was then inflated with 10 ml syringe till harsh sounds finished.<sup>13</sup>

Volume used to inflate cuff and cuff pressure generated were noted down. Patients were asked about sore throat two hours after they were extubated. If they complained about the sore throat, they were labelled “Sore throat Present”.<sup>14</sup>

Statistical Package for Social Sciences (SPSS) version 20 was used for the data analysis. Quantitative variables were summarized as Mean ± SD and qualitative variables were summarized as frequency and percentages. Chi-square test was applied to find out the association. Independent sample t-test was applied to find the mean differences among the groups. The *p*-value of ≤0.05 was considered statistically significant.

**RESULTS**

Forty-four patients were selected for the study and divided into two groups. The mean volume used

to inflate the cuff was 6.81 ± 0.41 ml and 4.95 ± 0.29 ml in group-JS and group-SG, respectively (*p*<0.001). Mean pressure generated was 34.90 ± 4.48 cmH2O and 28.91 ± 2.37 cmH2O in group-JS and group-SG, respectively (*p*<0.001) as shown in Table-I. Post-operative sore throat was observed in 54.55% patients (12/22) of JS-group and 18.18% (4/22) patients of SG-group (*p*=0.012) as shown in the Table-II.

**Table-I: Comparison of age, volume used and pressure generated between the groups.**

Parameters	Group JS (Just Seal)	Group SG (Stethoscope Guided)	<i>p</i> -value
Age (years)	30.22 ± 4.7	30.13 ± 4.2	0.946
Volume used (ml)	6.81 ± 0.41	4.95 ± 0.29	<0.001
Pressure Generated (cmH2O)	34.90 ± 4.48	28.91 ± 2.37	<0.001

**Table-II: Comparison of post operative sore throat between the groups.**

Post Operative Sore Throat	GROUP JS (Just Seal)	GROUP SG (Stethoscope Guided)	<i>p</i> -value
Present	12	4	0.012
Absent	10	18	

**DISCUSSION**

Our study was conducted on 44 patients. The difference between the two groups regarding the volume of air used, the pressure generated, and the frequency of post operative sore throat was statistically significant. For example, the volume of air used in the JS-group was 6.81 ± 0.41ml. This showed that the variation was 0.41 ml. whereas the volume of air used in the SG-group was 4.95 ± 0.29ml. This showed that the variation was 0.29 ml from the mean value. This gave us a clue that the control over air injection was better in the stethoscope-guided technique. Similarly, we see the case of pressure generated; 34.90 ± 4.48 cmH2O for the JS group and 28.91 ± 2.37 cmH2O for the SG group. Moreover, post operative sore throat in the SG group has a statistically lower frequency. The utility of a stethoscope to confirm the correct placement of the endotracheal tube is well-known. Finhold *et al*, used this method to measure endotracheal tube leak pressures in swine.<sup>14</sup> Using a stethoscope is a non-invasive and simple procedure that can be carried out at any place.

Previous studies have found a difference in the incidence of the sore throat between men and women.<sup>15,16</sup> Similarly, some studies have shown that the incidence of post operative sore throat was higher in the

age group of 18-30 years (18.3%) and 30-40 years (26.2%), but it was <5% in patients aged >50 years.<sup>17</sup>

In a study by Rahmani *et al.*<sup>18</sup> they compared the pilot balloon palpatory method with a fixed volume of 10 ml for inflating the cuff, and the result demonstrated a cuff pressure of  $118.15 \pm 22.15$  cmH<sub>2</sub>O and  $44.96 \pm 21.77$  cmH<sub>2</sub>O respectively. Though results show a significant difference between the two methods, in favour of the fixed volume method, the pressure generated was much higher when compared with pressures generated in our study.

The first study comparing stethoscope guided inflation with just seal method was conducted by Kumar and Hirsch.<sup>19</sup> They conducted their study on 50 patients, divided into two groups. They found that the frequency of endotracheal cuff pressure above 30 cmH<sub>2</sub>O was 64% in the just seal group, whereas no cuff pressure was recorded above 30 cmH<sub>2</sub>O in the stethoscope guided group.

Our results were in accordance with the results presented by Borhazowal *et al.*<sup>7</sup> They conducted their study on 100 patients, and the volume of air used was  $6.79 \pm 1.09$  ml for the "Just seal" group and  $4.95 \pm 0.44$  ml for the stethoscope guided group. Pressures generated in the endotracheal cuff were  $38.80 \pm 5.93$  cmH<sub>2</sub>O for the just seal group and  $29.64 \pm 1.84$  cmH<sub>2</sub>O for the stethoscope guided group. There was a statistically significant difference between the two groups. The difference between the two groups regarding postoperative sore throat was also significant.

Totonchi *et al.*<sup>9</sup> demonstrated the efficacy of using a stethoscope for limiting excess air volume. However, they called it the "Minimal occlusive volume technique". The main difference regarding technique was that they placed the stethoscope over a suprasternal notch rather than placing it over the thyroid lamina. However, the principle they used was the same; they inflated the cuff gradually to the point when respiratory sounds ceased.

Our study demonstrated the superiority of the stethoscope guided inflation technique over just seal technique. The volume of air required to inflate the cuff, the pressures generated, and the frequency of postoperative sore throat were significantly less in the guided method of the stethoscope. It is a simple and non-invasive technique that can help improve anaesthesia quality. It can be adopted as a routine in all the setups, particularly with no access to cuff inflator pressure gauge.

## CONCLUSION

Stethoscope guided technique for inflation of ETT cuff is more effective in reducing the frequency of post-operative sore throat.

**Conflict of Interest:** None.

## Authors' Contribution

SARAS: Conception design data collection, AQAS: Intellectual, SAN: Interpretation & data analysis.

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