

## Original Research Article

# Efficacy of intracuff dexamethasone in reducing the incidence of post-operative sore throat: an original article

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### ABSTRACT

**Background:** Postoperative sore throat is the most common and most distressing complaint of patients after general anaesthesia with cuffed endotracheal tube. By this study our aim was to assess the efficacy of intracuff dexamethasone in reducing the incidence of this distressing postoperative symptom.

**Methods:** Patients were divided into two groups D and N depending on cuff filling with dexamethasone and normal saline respectively. The cuff was prefilled with dexamethasone or normal saline one hour prior to intubation to allow time for cuff to be saturated following which the cuff was deflated. General anaesthesia was administered and patients were intubated, and cuff inflated with drug according to group allocated. Patients were assessed and graded for sore throat using VAS scale both at rest and with swallowing. Assessment was done one hour, six, 12 and 24hours post operatively. Presence of hoarseness of voice and cough was assessed on a 2-point scale 0=absent and 1=present, 24hrs after surgery.

**Results:** The incidence of sore throat at 24hours postoperative was reduced in group D than in group N. 4 patients (8%) in group D had sore throat while 27 patients (57%) in group N had sore throat at 24hours. This was statistically significant ( $p < 0.05$ ). The cough incidence was reduced in group D while there was no difference in incidence of hoarseness of voice between the two groups.

**Conclusions:** Intracuff dexamethasone decreases the incidence of postoperative sore throat when compared to intracuff normal saline. Dexamethasone also reduces postoperative cough incidence but does not reduce the incidence of hoarseness of voice.

**Keywords:** Cough, Dexamethasone, Intracuff, Normal saline, Postoperative, Sore throat

### INTRODUCTION

Postoperative sore throat is the most common and most distressing complaint of patients after general anaesthesia with cuffed endotracheal tube. About 80% of patients complain of sore throat after anaesthesia and surgery. Common causes include trauma to tonsillar pillars, pharynx and larynx, tracheal mucosal and ciliary damage and ulcerations from excessive cuff pressure.<sup>1</sup>

Postoperative sore throat can be prevented by the use of low intracuff pressure, smaller-sized and steroid coated endotracheal tubes, use of inhalational steroids and topical lidocaine.<sup>2</sup>

Dexamethasone is a potent synthetic glucocorticoid having anti-inflammatory and immunosuppressant

actions.<sup>3</sup> Oral dexamethasone is 26 times more potent than cortisol and 6 times more potent than prednisolone.<sup>4</sup> Dexamethasone is used for treatment of autoimmune diseases like rheumatoid arthritis and SLE.<sup>5</sup> It is also used for treatment of bronchial asthma.

Dexamethasone forms part of chemotherapy of various hematological malignancies like lymphoma, leukemias and plasma cell dyscrasias like multiple myeloma.<sup>6</sup> Dexamethasone is prescribed in adrenal insufficiency and Addison's disease patients not responding to prednisolone or methylprednisolone.<sup>7</sup> Dexamethasone is given to promote maturation of foetal lungs in pregnant women at risk of premature delivery.<sup>8</sup> Dexamethasone is also used in a diagnostic context, by virtue of its property to suppress the natural pituitary adrenal axis.

Dexamethasone is contraindicated in gastrointestinal ulceration, Cushing's syndrome, cardiac failure, severe hypertension, uncontrolled diabetes mellitus, disseminated tuberculosis, severe infections, pre-existing wide-angle glaucoma and osteoporosis.<sup>8</sup>

Preoperative dexamethasone has been reported to cause a reduction in the incidence of postoperative pain and edema following oral surgeries.<sup>9</sup>

The present study investigates the efficiency of cuff inflation with dexamethasone in reducing post-operative sore throat when compared with intracuff normal saline.

## METHODS

This was an observational multicentric study done in various hospitals across Kerala over a period of one year from April 2017 to March 2018.

The study population included 100 patients of ASA class I and II who underwent general anaesthesia with controlled ventilation with endotracheal intubation posted for elective surgeries of two to three hours duration. Patients with history of allergy to dexamethasone, predictors of difficult intubation, smokers, history of asthma or COPD and with preexisting sore throat or hoarseness of voice were excluded from the study.

After obtaining written informed consent, patients were divided into two groups D and N depending on cuff filling with dexamethasone and normal saline respectively. The cuff was prefilled with dexamethasone or normal saline one hour prior to intubation to allow time for cuff to be saturated following which the cuff was deflated.

General anaesthesia was induced after premedication with intra venous midazolam 0.02mg/kg IV, glycopyrrolate 0.2mg, ondansetron 0.1mg/kg IV and fentanyl 2-2.5mcg/kg and preoxygenation with 100% oxygen for 3minutes. Following Inj. lignocaine 1.5mg/kg IV, induction was done with Inj. Propofol 2mg/kg. After

confirming bag and mask ventilation, Inj. atracurium 0.5 mg/kg IV was given. Tracheal intubation was done using Soft Seal® cuffed sterile polyvinyl chloride ETT with standard HVLP (high volume-low pressure) cuff. According to the group allotted the cuff was inflated with dexamethasone 8mg/2ml or normal saline 2ml, monitoring the cuff pressure to 25cm of water. Patients were then maintained on N2O 50%: oxygen 50% mixture, sevoflurane and atracurium. Intraoperatively ECG, heart rate, NIBP, oxygen saturation and cuff pressure were monitored. Additional analgesia was provided with 1gram intravenous paracetamol.

At end of surgery, suctioning of secretions was done with direct laryngoscopy to avoid trauma to the tissues. Extubating was done after neuromuscular block was antagonized with neostigmine (0.05mg/kg) and glycopyrolate (0.01mg/kg) with the patient fully awake and obeying commands like hand grip and eye opening.

In the post anaesthesia care unit, patients were assessed and graded for sore throat using VAS scale with score of 0 no pain, 1-3 mild pain, 4-6 moderate pain and 7-10 severe pain. Assessment of sore throat was done both at rest and swallowing. Assessment was done one hour, six, 12 and 24hours post operatively. Presence of hoarseness of voice and cough was assessed on a 2-point scale 0= absent and 1= present. This was assessed 24hours after surgery.

## RESULTS

The 100 patients included in the study were similar with respect to age, sex, weight and duration of intubation ( $p > 0.05$ ). There were no incidences of failed or traumatic intubation in the study population.

The incidence of sore throat at 24hours postoperative was lower in group D than in group N. 4 patients (8%) in group D had sore throat while 27 patients (57%) in group N had sore throat at 24hours. This was statistically significant ( $p < 0.05$ ) (Table 1).

**Table 1: Incidence of sore throat at 24 hours postoperative.**

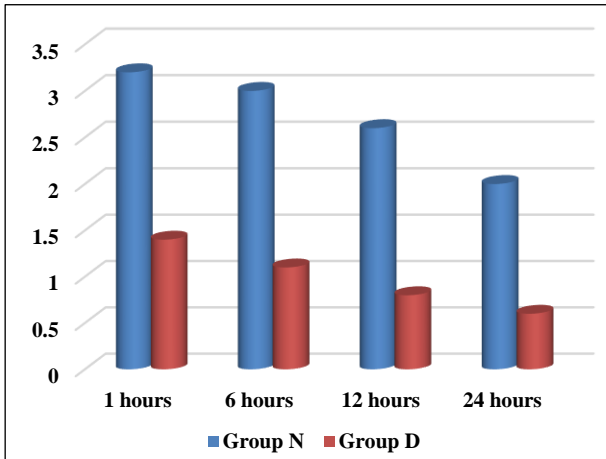
	Group D	Group N
No. of patients	4 (8%)	27 (57%)

There was a statistically significant ( $p < 0.05$ ) decrease in VAS score recorded at one, six, twelve and 24hours after surgery both at rest and with swallowing in group D than in group N (Table 2). The mean VAS score at rest in group D was 1.4,1.1,0.8,0.6 and with effort was 2.3,1.6,1.4,1.1.

The mean VAS score in group N at rest was 3.2,3.0,2.6,2.0 and with effort was 4.2,3.8,3.2,3.1 (Figure 1 and 2).

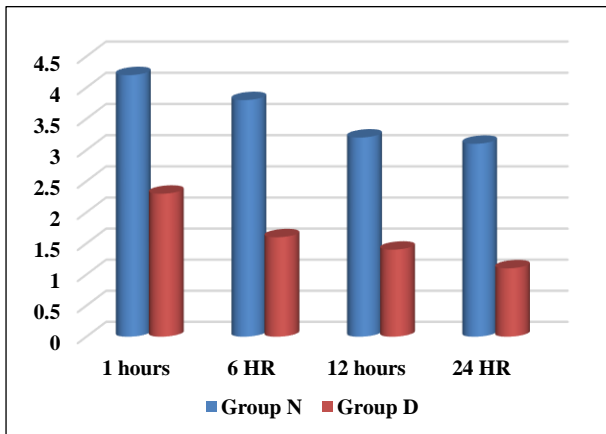
**Table 2: Comparison of VAS score at 1,6,12 and 24hours postoperative between two groups.**

Time	Group N		Group D	
	VAS rest	VAS effort	VAS rest	VAS effort
1 hour	3.2±1.1	4.2±1.4	1.4±0.3	2.3±0.7
6 hours	3.0±1.2	3.8±1.2	1.1±0.4	1.6±0.5
12 hours	2.6±0.9	3.2±1.1	0.8±0.3	1.4±0.8
24 hours	2.0±0.4	3.1±1.2	0.6±0.2	1.1±0.2



**Figure 1: Comparison of vas score at rest of two groups at various intervals.**

There was a statistically significant decrease in VAS score both at rest and with effort in group D (p<0.003).



**Figure 2: Comparison of vas scores of two groups with effort at intervals.**

The incidence of hoarseness of voice was lower in group D with 9 patients (24%) while in group N 12 (18%) patients suffered from hoarseness of voice (Table 3).

Chi- square statistic is 0.5425. p value is 0.4614 (p>0.05). Hence this difference was found to be not significant.

**Table 3: Comparison of hoarseness of voice 24 hours after intubation.**

	Present	Absent
Group N (n=50)	12 (24%)	38 (76%)
Group D (n=50)	9 (18%)	41 (82%)

There was also a difference in cough incidence 24hours after intubation. 21 patients (42%) in group N had cough while 8 patients (16%) in group D had cough (Table 4).

**Table 4: Comparison of cough incidence 24 hours after intubation.**

	Present	Absent
Group N (N=50)	21(42%)	29 (58%)
Group D (N=50)	8 (16%)	42(84%)

Chi-square statistic is 8.2079. p-value is 0.004171 (p<0.05). Hence there is a decrease in cough incidence in group D.

**DISCUSSION**

Sore throat and hoarseness are accepted complications of endotracheal tube intubation.<sup>10</sup> Various factors have been attributed to cause sore throat and hoarseness of voice. The sex of the patient, obesity, size of the endotracheal tube, presence of cuff, cuff pressure, traumatic intubation, site of surgery, position of the patient during surgery, suctioning preoperatively, use of nitrous oxide, anticholinergic agents, type of muscle relaxant are some of the factors affecting these complications.<sup>10</sup> Even though this is a minor complication of general anaesthesia, it can be very distressing to the patient resulting in patient dissatisfaction.<sup>11</sup> Numerous techniques and drugs have been studied in an attempt to reduce this problem. Drugs such as lignocaine, steroids like dexamethasone, budesonide, beclomethasone, an aesthetic agent like ketamine and NSAIDS have been studied to prevent this complication.<sup>12</sup>

The various measures adopted to prevent post-extubation reactions include use of endotracheal tubes with low intracuff pressure, and smaller-sized or steroid coated endotracheal tubes, applying topical lidocaine, and inhalation of steroids.<sup>12</sup> In present study authors inflated cuff using either normal saline or dexamethasone to identify which method is better at reducing postoperative sore throat, cough and hoarseness of voice.

In present study, confounding variables like age, sex, weight and duration of intubation were matched and the two groups were identical in these factors (Table 1). Our results show a significant reduction in sore throat in dexamethasone group compared to normal saline group. This was seen in one hour six, twelve and 24hours after surgery.

In a study by Saleem S et al, and Athar J et al, the incidence of post-operative sore throat following intubation and cuff filled with air and without administration of any drugs was 73%.<sup>13</sup> In present study the incidence of post-operative sore throat with dexamethasone was 8% and normal saline was 54%.

In clinical trials by Raffiei M et al, patients were randomly allocated into three groups where normal saline, lidocaine and dexamethasone was used to inflate cuff. The three drugs were not significantly different in attenuating post-extubation reactions such as hoarseness, sore throat, and laryngospasm.<sup>14</sup> This is in contrast to present study which showed dexamethasone to be better than normal saline in reducing sore throat. Authors could conclude that dexamethasone and normal saline does not differ in reducing hoarseness of voice ( $p>0.05$ ) while dexamethasone is better than normal saline in reducing incidence of postoperative cough ( $p<0.05$ ).

A study by Lee AR et al, shows that gargle with 0.05% dexamethasone solution is effective in lowering the severity of post-operative sore throat, and endotracheal tube soaking with 0.05% dexamethasone solution is effective in lowering the incidence and severity of post-operative sore throat.<sup>15</sup> Corticosteroids like dexamethasone reduces oedema by arresting the emigration of leukocytes as well as the migration of plasma components, by increasing the stability of cellular membranes limits cellular engorgement.<sup>16</sup> Furthermore, these drugs inhibit hydrolysis around cells, hamper the release of lysozymes from granulocytes and phagocytes and also hinder fibrosis by blocking the proliferation of fibroblasts.<sup>17</sup> It was concluded that the local action of dexamethasone was effective in reducing post-operative sore throat. The same conclusion could be drawn from present study that when cuff is filled with dexamethasone and authors give time for the membrane to get saturated with the drug, it can produce a decrease in local inflammation produced due to cuff pressure on tracheal mucosa.

Another conclusion made in present study was the decrease in incidence of cough ( $p<0.05$ ) in dexamethasone group as compared to normal saline group with incidences of 8% and 42% respectively. However, there was no statistically significant difference in incidence of hoarseness of voice between the two groups ( $p>0.05$ ). The incidence of hoarseness of voice in dexamethasone group was 18% and normal saline group was 24%. A study by Park SH et al concluded that prophylactic intravenous dexamethasone 0.1 and 0.2mg/kg significantly reduced the incidence of postoperative sore throat and dexamethasone 0.2mg/kg decreased the incidence of hoarseness.<sup>18</sup>

In the study by Raffiei M et al, they concluded that lidocaine was more effective on cough incidence while dexamethasone had better efficacy in reducing cough

severity and both were more effective than normal saline. This is in accordance with present study.<sup>14</sup>

A study by Soumya MV et al, concluded that inflation of the cuff of an endotracheal tube with lignocaine or dexamethasone results in a significant decrease in the post extubation sore throat, hoarseness, cough when compared to inflation of the cuff with normal saline.<sup>19</sup> Dexamethasone has lesser incidence of cough, sore throat, hoarseness compared to lignocaine but not statistically significant and Dexamethasone can be used as effective alternative to lignocaine to reduce post extubation response. Our conclusions also support the same.

Studies have been done using intravenous dexamethasone to reduce postoperative sore throat. A study by Bagchi D et al, intravenous injection of 0.2mg/kg dexamethasone reduced the incidence of post-operative sore throat from 44% to 14%.<sup>20</sup> present study showed that dexamethasone in cuff can decrease the incidence of post-operative sore throat to 8%.

A study by Thomas S et al, concluded that intravenously administered dexamethasone before intubation reduces postoperative sore throat.<sup>21</sup> Similar results were obtained by Haider HS et al, in their trial.<sup>22</sup> The key effect of the using of liquid to inflate cuff is that it keeps endotracheal cuff pressure low throughout surgery by preventing further cuff inflation by nitrous oxide diffusion. Dexamethasone not only prevents nitrous oxide diffusion but by being a potent corticosteroid reduces levels of mediators of inflammation such as prostaglandins and leukotrienes and thus decreases oedema and inflammation.<sup>23</sup> Dexamethasone diffuses through the endotracheal tube cuff, acting on the tracheal mucosa in contact with it, thus reducing the inflammatory process occurring in the tracheal mucosa.

## CONCLUSION

It is noteworthy to observe that when endotracheal tube cuff is inflated with dexamethasone, the incidence of post-operative sore throat and cough is reduced but not hoarseness of voice. Further studies are needed in this direction before this becomes standardized and accepted as a routine one.

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