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ROLE OF DEXAMETHASONE IN REDUCING POSTEXTUBATION SORE THROAT, HOARSENESS OF VOICE AND COUGH AFTER GENERAL ANAESTHESIA

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Keywords:

Dexamethasone, Tracheal extubation, General anaesthesia

ISSN 0799-3757

http://caribjscitech.com/

ABSTRACT

Background-Postoperative sore throat, hoarseness and cough are common minor complications after extubation .We conducted a randomized, double blinded, placebo controlled study to evaluate the efficacy of intravenous(i.v) dexamethasone for reducing the incidence and severity of post operative sore throat, hoarseness and cough.

Aims-Our aim was to determine the effect of prophylactic administration of two doses (0.1 mg/ kg and 0.2 mg/. kg) of intravenous dexamethasone in reducing postoperative sore throat, hoarseness and cough in comparison with placebo.

Method-Study included 180 patients (n= 60) of ASA 1 & 2 underwent routine general surgical procedures. Before induction of general anesthesia, dexamethasone 0.1mg/kg (Group D1), 0.2mg/kg (Group D2), or 2ml normal saline (NS) placebo (Group P) were given IV. The patients were evaluated at 1 h, 6h and 24 h after tracheal extubation for sore throat, hoarseness and cough using a 4-point scale.

Result- We found that at 1 hr and at 6 hr after tracheal extubation, the incidence of postoperative sore throat and hoarseness, along with the severity of sore throat were lower in Group D2 and D1 compared with Group P (P less than 0.05) and at 24 hours after tracheal extubation, the incidence of these variables were comparable. There was no complication associated with the single dose of prophylactic administration of dexamethasone.

Conclusion- Although both 0.1 mg/kg and 0.2mg/kg dexamethasone effectively reduced the incidence and severity of sore throat, hoarseness and coughing at 1 hr and 6 hr after tracheal extubation compared with placebo but the dose of 0.2 mg/kg was more effective.

The sore throat, hoarseness and cough are minor but common sequel after tracheal extubation with reported incidences of 21–65%.[1,2] Although, these are minor complications, avoiding them is a major priority for the patients as it may contribute to their dissatisfaction**.** These may be caused by pharyngeal, laryngeal, or tracheal irritation and may occur even in the absence of endotracheal intubation but fortunately resolve within few days (2-3 days).

Dexamethasone is a very potent highly selective gluco-corticoid with analgesic, anti-inflammatory and antiemetic action. Preoperative dexamethasone has been reported to reduce the incidence of postoperative pain and swelling following oral surgeries.[3,4,5] With this background knowledge, a prospective, randomized, double-blind, placebo-controlled study was undertaken to test whether a reduction in the incidence and severity of postoperative sore throat , hoarseness and coughing could be achieved by preoperative administration of intravenous dexamethasone in patients receiving general anesthesia with endotracheal intubation. We gave dexamethasone in two doses, 0.1 &0.2 mg/kg .

Methods

This prospective, randomized, double-blind, placebo-controlled study was planned after approval from institutional review board and informed written consent We enrolled 180 patients of either sex of ASA class I and II, between 20-60 yr of age and weighing between 40–70 kg undergoing surgeries lasting 60-180 minutes. The patients with a history of recent respiratory tract infection, risk factors for aspiration, difficult intubation, obesity, diabetes mellitus, pregnancy, head and neck surgery, use of corticosteroids and any contraindication to corticosteroid medications were excluded. A junior doctor, not participating in postoperative patient evaluations, prepared the study drugs as a 4 mL clear solution in identical syringes. The randomized process and the identity of the study drugs were blinded from the patients, the participating anaesthesiologist during surgery, and the investigator who collected the postoperative data.

On the night before and on the morning of surgery patients received alprazolam 0.25-0.5 mg, per oral. After shifting the patient to operation theatre, standard monitors including pulse oximeter, non invasive blood pressure ,5 lead Electrocardiogram, were applied and baseline parameters were recorded. Patients were randomly allocated to receive an injection of either dexamethasone 0.1mg/kg (group-D1), 0.2mg/kg (group-D2) i.v. or an equivalent volume of normal saline(group P) just before induction of anesthesia. Randomization was based on computer-generated codes that were maintained in sealed envelopes. All the patients received a similar anaesthesia involving premedication with glycopyrrolate 0.2mg , midazolam 0.02mg/kg and Fentanyl 1-2 microgm/kg just before induction with thiopentone 5-7 mg/kg. Orotracheal intubation was facilitated by vecuronium 0.1 mg/kg with a single use endotracheal tube(ETT) (Romson pvt ltd).Male patients received either an 8 or 8.5 mm internal diameter (ID) ETT and female patients received either a 7 or 7.5-mm ID ETT. Laryngoscopy and intubation was performed by an experienced anesthesiologist using standard 3 or 4 Macintosh metal blades. The cuff was inflated just to the point of obtaining a seal in the presence of positive airway pressure. Intracuff pressure was adjusted every 30 minutes to maintain pressure 20-30 cm H2O by using a hand held cuff inflator with pressure gauge (SIMS, Portex Ltd., Germany) to limit nitrous oxide-related intracuff pressure increase. Anaesthesia was maintained with N2O:O2 (66%: 33%) ,isoflurane, fentanil and vecuronium. At the conclusion of surgery, Ondansetron 4mg was given and residual neuromuscular blockade was reversed with mixture of neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg. After oropharyngeal suctioning under direct vision, extubation was done when patients were able to maintain their airway and obey verbal command. Any episode of coughing or staining on the tube was recorded. Patients requiring more than three attempts at passage of an endotracheal tube were eliminated from the study.

In the postanaesthesia care unit, incidence of sore throat, hoarseness and cough were assessed at 1, 6 and 24 h. Severity of postextubation symptoms were graded on 4 point scale where 0 = No sore throat at all, 1 = Mild, complains of sore throat only on questioning, 2 = Moderate, complains of sore throat on his/her own, 3 =Severe, change of voice or hoarseness, associated with throat pain.(6,7) Postoperative analgesia was provided by opioids or NSAIDS as per protocol. All the observations were done by a resident who was unaware about group allocation.

Statistical analysis

Sample size calculation revealed that 53 patients per group would be required to detect a 50% reduction in the incidence of postoperative Sore throat, Hoarseness and Cough, assuming a 50% baseline incidence of sore throat after endotracheal intubation in the control group ($\alpha = 0.05$ and power 90%). To compensate for potential dropouts, we enrolled 60 patients in each group. One-way analysis of variance (ANOVA) and chi-square test for independence were used as appropriate .Results is expressed as mean ± SD. A value of p less than 0.05 was considered statistically significant.

Table-1 - Demographic data

- Data are as mean _ SD or number

variables	Group-P (n=60)	Group-D1 (n=60)	Group-D2 (n=60)	p-value
Age (yr)	36.23 ± 8.95	34.6 ± 9.97	36.68 ± 11.17	0.493
Sex (M/F)	24/36	22/38	16/44	0.278
Weight(kg)	55.9±4.79	54.82±5.24	54.4±6.95	0.340

- Data are as mean _ SD or number

Table-2 Variables associated with intubation

Variables	Group-P (n=60)	Group-D1 (n=60)	Group-D2 (n=60)	p-value
Size of ETT	7.48 ± 0.362	7.55 ± 0.409	7.55 ± 0.409	0.574
No of attempts of intubation (1/2/3)	36/24/0	35/25/0	42/16/2	0.106
Intubation difficulty encountered (Yes/No)	3/57	1/59	2/58	0.597
Duration of intubation(Min)	114.2±24.3	112.2 ± 18.3	115.8 ± 27.7	0.583
Coughing/straining before extubation (Yes/no)	5/55	4/56	2/58	0.507

Table-3Incidence of sore throat, hoarseness and cough At 1, 6 and 24 hr postextubation

Values are number of patients and percentile.

Variables	Group-P (n=60)	Group-D1 (n=60)	Group-D2 (n=60)	D1 vs D2	D1 vs P	D2 vs P
at 1 hr			10(16.7%)			
Sore throat	27(45%)	18(30%)	10(16.7%) 5 (8.5%)	0.084	0.089	0.0008
Hoarseness	17(28.3%)	13(21.7%)		0.639	0.527	0.189
Cough	12 (20%)	11(18.3%)		0.107	0.816	0.067
at 6 hr						
Sore throat	15 (25%)	12 (20%) 9 (15%)	6 (10%)	0.125	0.657	0.047
Hoarseness	12 (20%)		6 (10%)	0.408	0.471	0.125
Cough	5 (8.3%)	2 (3.33%)	0 (0.0%)	0.154	0.243	0.022
Incidence after 24 hr						
Sore throat	8 (13.3%)	4 (6.67%)	2 (3.33%)	0.475	1.00	0.242
Hoarseness	0 (0.0%)	0 (0.0%)	0 (0.0%)	0	0	0
Cough	3 (5%)	0 (0.0%)	0 (0.0%)	0	>0.05	>0.05

RESULTS

Of the 180 patients studied, no patients in either group were excluded from the data analysis. Patient characteristics were comparable with respect to age, sex, and weight among the three groups (**Table- I**).The number of patients requiring a third attempt at endotracheal intubation were similar in three groups. Variables associated with tracheal intubation are listed in **Table- 2** and the groups are comparable regarding number of intubation attempts, duration of intubation, size of ETT, intubation difficulty encountered, straining and coughing on the endotracheal tube. The incidence of sore throat (**Table-3**) at 1 hour in groups P, D1 and D2 was 27(45%), 18(30%) and 10(16.7%) respectively (D2 vs P, p = 0.0008). At 6 hour the incidence of sore throat in placebo, D1 and D2 were 15 (25.0%), 12(20.0%) & 6(10%) [D2 vs P, p-value=0.047], respectively. At 24 hour after extubation the incidence of sore throat was 8 (13.33%) in placebo, 4 (6.67%) in D1, 2 (3.33%) in D2. Table-3 shows that the incidence of sore throat was maximum in immediate postoperative period in all three groups and maximum in control group. In this study, the frequency of sore throat decreased from 6 h to 24 h postoperatively but still the frequency of sore throat is higher in group P as compared to D1 and D2.After 24 hr incidence of sore throat was comparable in all the three groups.

Hoarseness defined as change in quality of voice. The incidence of hoarseness (**Table-3**) in our study in three groups at 1 hour in group P- 17 (28.3%) , D1- 13 (21.7%) & D2- 10 (16.67%), and at 6 hour in placebo group-12 (20.0%), D1- 9 (15.0%) & D2- 6 (10.0%), respectively were recorded. No statistically significant values were seen when three groups compared regarding intensity and severity of hoarseness at 1 hour and 6 hour .No case of hoarseness were reported at 24 hour. In all the cases, severity of hoarseness was decreasing from 1 to 24 hour.

We observed that the incidence of coughing (**Table-3)** at 1 hour in group-placebo, D1 and D2 was 12 (20.0%), 11 (18.7%) & 5 (8.3%) and at 6 hour after extubation was 5(8.3%), 2(3.3%) & 0 (0.0%) respectively. Statistically significant values were seen when group-P and group-D2 [p=0.022] were compared regarding intensity and severity of coughing at 6 hour. After 24 hour of extubation, only 3 (5%) cases were complaining of infrequent episodes of coughing that were not explained by any of factor we studied. Coughing was of mild grade in all three groups. No statistically significant results were found for coughing when three groups compared at 1 hour and 24 hour.

DISCUSSION

The results of this study showed that the incidence of sore throat, hoarseness and coughing was high in all the patients immediately after extubation being maximum in placebo group P. Dexamethasone in both doses (0.1 mg/kg and 0.2mg/kg) effectively reduced the incidence of sore throat, hoarseness and coughing at 1 hr and 6 hr after tracheal extubation compared with placebo but 0.2 mg/kg dose was more effective than 0.1 mg/kg dose although this does not reach statistical significance (p=D1 vs D2). With time the incidence of all these symptoms reduced reaching to almost similar level in all the groups at 24 hr (p>0.05).It shows that postextubation, the incidence and severity of sore throat, hoarseness and coughing was self limiting and no need of any additional treatment. The frequency of adverse effects during 24 hr observation period was comparable in the three groups. We performed our assessment only at these time point since the mean duration of sore throat 16±11 hrs.

Our findings are similar to that reported by Park et al(2008)(8) showing significant reduction in the incidence and severity of postoperative sore throat and hoarseness in with higher dose of dexamethasone (0.2mg/kg) compared to lower dose (0.1mg/kg) and control group in first 24hour. The confounding factor may be the use of double lumen tube in thoracic surgery responsible for higher incidence than our study. Park et al in 2010 also found decrease in incidence and severity of Postoperative sore throat in patients receiving prophylactic dexamethasone (10 mg) 30 minutes before intubation.[9] The potential mechanism is probably based on the anti-inflammatory activity of dexamethasone which includes inhibition of leukocyte migration and stabilization of cell membrane integrity.

Thomas and Beevi studied the use of dexamethasone on postoperative sore throat using single lumen tube. In his study dexamethasone group showed higher incidence of postoperative sore throat (20%) than in our study (10%) in first 24 hour period which might be because lower dose (8mg) of dexamethasone used by them. They did not include hoarseness and cough in their study.[10]. There was not any significant difference in sore throat,hoarseness and cough after 24 hrs postoperatively in all the three groups.[8,9,10]

Corticosteroids are capable of reducing the synthesis of inflammatory mediators, prostaglandins and leucotrienes by inhibiting phospholipase A2 by protein annexins, taking several hours and by the inhibition of cyclo-oxygenase-2 during inflammation.[11] Dexamethasone is among the most potent corticosteroids available, with a biologic half-life of 36–72 h. Dexamethasone has been used for airway symptoms after tracheal intubation in clinical practice. Prophylactic administration of multiple doses of dexamethasone is effective in reducing the incidence post extubation edema in patients whose tracheas were intubated for more than 48 h.[12]A single dose of dexamethasone is not considered as harmful. On long-term administration, corticosteroids is associated with adverse events, such as glucose intolerance, susceptibility to infections, delayed wound healing, adrenal suppression, peptic ulcer, and electrolyte imbalance and avascular necrosis of joints.[5] During our follow up period, we did not observe any complications associated with the single use of dexamethasone (0.2 mg/kg). Major limitation of our study may be that intubation done by different anaesthetist. Our study did not have a large enough patient sample size to assess safety of the drug on short follow-up period for 24 h.

Conclusion-We concluded that a prophylactic single dose of 0.2 mg/kg dexamethasone given before intubation is more effective than 0.1mg/kg in reducing the incidence and severity of sore throat, hoarseness and coughing after tracheal extubation without any apparent side effects of single dose of dexamethasone.

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