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Title:

**Effect of Nebulized Budesonide and Intravenous Dexamethasone
on Tracheal Tube Cuff Leak in Intubated Patients Admitted to
Intensive Care Unit**

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Abstract

Introduction: Tracheal intubation is a common action in intensive care unit, but it may cause laryngeal edema or laryngotracheal injury which leads to edema. Cuff-leak test is done in order to define the upper airway patency. Considering this point that laryngeal edema would be treated by anti-inflammatory agents, our aim was to evaluate the impact of nebulized budesonide on ICU patients' relief and comparison of nebulized budesonide efficacy with dexamethasone.

Materials and Methods: In our clinical trial, 270 intubated patients from ICU was randomly selected and divided into three groups (each group was included 90 persons): intravenous dexamethasone, nebulized budesonide, and controls. All the patients were monitored in 0, 12, 24, 36, and 48 h of starting follow up. Hemodynamic parameters and cuff-leak ratio were measured and data was analyzed by SPSS (ver. 20).

Results: Our findings revealed that dexamethasone and budesonide treatment approaches was beneficial for increasing of cuff-leak volume ($p < 0.001$). Furthermore, superiority of mentioned methods was significantly found ($p < 0.001$). Moreover, hemodynamic parameters were not altered and it was in normal range in both dexamethasone and budesonide groups ($p > 0.05$).

Conclusion: Our findings demonstrated that use of budesonide and dexamethasone is beneficial in intubated ICU patients and these approaches can reduce the tracheal intubation complications. Also, budesonide could be a trustworthy substitute treatment strategy instead of intravenous dexamethasone.

Keywords: Tracheal intubation, laryngeal edema, Nebulized budesonide, Intravenous dexamethasone, cuff-leak ratio

References

1. Darmon JY, Rauss A, Dreyfuss D, Bleichner G, Elkharrat D, Schlemmer B, Tenailon A, Brun-Buisson C, Huet Y. Evaluation of risk factors for laryngeal edema after tracheal extubation in adults and its prevention by dexamethasone. A placebo-controlled, double-blind, multicenter study. *Anesthesiology*. 1992 Aug;77(2):245-51.
2. Jordan WS, Graves CL, Elwyn RA. New Therapy for Postintubation Laryngeal Tracheitis in Children Edema and. *Jama*. 1970 Apr 27;212(4):585-8.
3. Lee CH, Peng MJ, Wu CL. Dexamethasone to prevent postextubation airway obstruction in adults: a prospective, randomized, double-blind, placebo-controlled study. *Critical Care*. 2007 Jul 2;11(4):1.
4. Cheng KC, Zhang H. Intravenous injection of methylprednisolone reduces the incidence of postextubation stridor in intensive care unit patients. *Critical care medicine*. 2007 May 1;35(5):1443.
5. Wittekamp BH, van Mook WN, Tjan DH, Zwaveling JH, Bergmans DC. Clinical review: post-extubation laryngeal edema and extubation failure in critically ill adult patients. *Critical Care*. 2009 Dec 1;13(6):1.
6. Meade MO, Guyatt GH, Cook DJ, Sinuff T, Butler R. Trials of corticosteroids to prevent postextubation airway complications. *CHEST Journal*. 2001 Dec 1;120(6_suppl):464S-8S.
7. Chung YH, Chao TY, Chiu CT, Lin MC. The cuff-leak test is a simple tool to verify severe laryngeal edema in patients undergoing long-term mechanical ventilation. *Critical care medicine*. 2006 Feb 1;34(2):409-14.
8. Miller RL, Cole RP. Association between reduced cuff leak volume and postextubation stridor. *CHEST Journal*. 1996 Oct 1;110(4):1035-40

9. Jaber S, Chanques G, Matecki S, Ramonatxo M, Vergne C, Souche B, Perrigault PF, Eledjam JJ. Post-extubation stridor in intensive care unit patients. *Intensive care medicine*. 2003 Jan 1;29(1):69-74.
10. Sandhu RS, Pasquale MD, Miller K, Wasser TE. Measurement of endotracheal tube cuff leak to predict postextubation stridor and need for reintubation. *Journal of the American College of Surgeons*. 2000 Jun 30;190(6):682-7.
11. Donnelly WH. Histopathology of endotracheal intubation. An autopsy study of 99 cases. *Archives of pathology*. 1969 Nov;88(5):511.
12. Biller HF, Bone RC, Harvey JE, Ogura JH. Laryngeal edema: an experimental study. *Survey of Anesthesiology*. 1972 Apr 1;16(2):125.
13. Markovitz BP, Randolph AG, Khemani RG. Corticosteroids for the prevention and treatment of post-extubation stridor in neonates, children and adults. *The Cochrane database of systematic reviews*. 2008 Apr 16(2):CD001000.
14. Markovitz BP, Randolph AG. Corticosteroids for the prevention of rein- tubation and postextubation stridor in pediatric patients: a meta-analysis. *PediatrCrit Care Med* 2002;3:223-6.
15. Sinha A, Jayashree M, Singhi S. Aerosolized L-epinephrine vs budesonide for post-extubation stridor: A randomized controlled trial. *Indian pediatrics*. 2010 Apr 1;47(4):317-22.
16. Ryrfeldt Å, Andersson P, Edsbäcker S, Tönnesson M, Davies D, Pauwels R. Pharmacokinetics and metabolism of budesonide, a selective glucocorticoid. *European journal of respiratory diseases. Supplement*. 1981 Dec;122:86-95.
17. Vestbo J, Sørensen T, Lange P, Brix A, Torre P, Viskum K. Long-term effect of inhaled budesonide in mild and moderate chronic obstructive pulmonary disease: a randomised controlled trial. *The Lancet*. 1999 May 29;353(9167):1819-23.
18. Pauwels RA, Pedersen S, Busse WW, Tan WC, Chen YZ, Ohlsson SV, Ullman A, Lamm CJ, O'Byrne PM. Early intervention with budesonide in mild persistent asthma: a randomised, double-blind trial. *The Lancet*. 2003 Mar 29;361(9363):1071-6.
19. Epstein SK. Corticosteroids to prevent postextubation upper airway obstruction: the evidence mounts. *Critical Care*. 2007 Aug 14;11(4):156.

20. Stauffer JL, Olson DE, Petty TL. Complications and consequences of endotracheal intubation and tracheotomy. A prospective study of 150 critically ill adult patients. *Am J Med.* 1981;70(1):65-76.
21. Kastanos N, Estopa Miro R, Marin Perez A, Xaubet Mir A, Agusti Vidal A. Laryngotracheal injury due to endotracheal intubation: incidence, evolution, and predisposing factors. A prospective long-term study. *Crit Care Med.* 1983;11(5):362-7.
22. McHardy FE, Chung F. Postoperative sore throat: cause, prevention and treatment. *Anaesthesia.* 1999;54(5):444-53.
23. Biro P, Seifert B, Pasch T. Complaints of sore throat after tracheal intubation: a prospective evaluation. *Eur J Anaesthesiol.* 2005;22(4):307-11.
24. Porter NE, Sidou V, Husson J. Postoperative sore throat: incidence and severity after the use of lidocaine, saline, or air to inflate the endotracheal tube cuff. *AANA J.* 1999;67(1):49-52.
25. Higgins PP, Chung F, Mezei G. Postoperative sore throat after ambulatory surgery. *Br J Anaesthesia.* 2002;88(4):582-4.
26. François B, Bellissant E, Gissot V, Desachy A, Normand S, Boulain T, Brenet O, Preux PM, Vignon P, Association des Réanimateurs du Centre-Ouest (ARCO). 12-h pretreatment with methylprednisolone versus placebo for prevention of postextubation laryngeal oedema: a randomised double-blind trial. *The Lancet.* 2007 Apr 6;369(9567):1083-9.
27. Wang C, Tsai Y, Huang C, Wu Y, Ye M, Chou H, Shu S, Lin M. The role of the cuff leak test in predicting the effects of corticosteroid treatment on postextubation stridor. *Chang Gung medical journal.* 2007 Jan;30(1):53.
28. Young D, Watkinson P. Preventing postextubation airway complications in adults. *BMJ.* 2008 Oct 20;337(7678):a1565.
29. Ho LI, Harn HJ, Lien TC, Hu PY, Wang JH. Postextubation laryngeal edema in adults risk factor evaluation and prevention by hydrocortisone. *Intensive care medicine.* 1996 Sep 1;22(9):933-6.
30. Tellez DW, Galvis AG, Storgion SA, Amer HN, Hoseyni M, Deakers TW. Dexamethasone in the prevention of postextubation stridor in children. *The Journal of pediatrics.* 1991 Feb 1;118(2):289-94.

31. Hawkins DB, Crockett DM, Shum TK. Corticosteroids in airway management. *Otolaryngology--Head and Neck Surgery*. 1983 Dec 1;91(6):593-6.
32. Kashefi P, Abbasi A, Abbasi M, Davoodi L, Abbasi S. Comparison of the efficacy of nebulized budesonide and intravenous dexamethasone administration before extubation in prevention of post-extubation complications among patients admitted in intensive care unit. *Advanced Biomedical Research*. 2015 Jan 1;4(1):11.
33. Abbasi S, Moradi S, Talakoub R, Kashefi P, Koushki AM. Effect of nebulized budesonide in preventing postextubation complications in critically patients: a prospective, randomized, double-blind, placebo-controlled study. *Advanced biomedical research*. 2014 Jan 1;3(1):182.
34. Ramsey III M. Noninvasive automatic determination of mean arterial pressure. *Medical and Biological Engineering and Computing*. 1979 Jan 1;17(1):11-8.
35. Baloch RN, Jakhrani NK, Lal A, Mehmood N. Role of dexamethasone for prevention of post-extubation airway obstruction in critically ill adult patients. *Journal of Surgery Pakistan (International)*. 2010 Jan;15(1):3.
36. Kriner EJ, Shafazand S, Colice GL. The endotracheal tube cuff-leak test as a predictor for postextubation stridor. *Respiratory care*. 2005 Dec 1;50(12):1632-8.
37. Roberts RJ, Welch SM, Devlin JW. Corticosteroids for prevention of postextubation laryngeal edema in adults. *Annals of Pharmacotherapy*. 2008 May 1;42(5):686-91.
38. Esteban A, Alia I, Tobin MJ, Gil A, Gordo F, Vallverdu I, Blanch L, Bonet A, Vazquez A, de PABLO RA, Torres A. Effect of spontaneous breathing trial duration on outcome of attempts to discontinue mechanical ventilation. *American journal of respiratory and critical care medicine*. 1999 Feb 1;159(2):512-8.
39. Gil B, Frutos-Vivar F, Esteban A. Deleterious effects of reintubation of mechanically ventilated patients. *Clinical Pulmonary Medicine*. 2003 Jul 1;10(4):226-30.