The Role of Proton Pump Inhibitors in Reducing Laryngeal Injury During Prolonged Intubation

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ABSTRACT

Complete data sets were compiled of 32 patients following extubation with duration of intubation ranging from 1-17 days. 18/32 (56%) patients received intravenous PPI during intubation while 14/32 (44%) received H-2 blockers or no medication treatment. 100% of patients had some degree of laryngeal erythema while 87% had ulceration present. Vocal fold immobility was found in 44% (14/32) and granuloma formation was present in 53% (17/32).

Administration of PPI during intubation did not have a statistically significant association with reduced laryngeal injury for any of the recorded outcomes (vocal fold paresis/paralysis, vocal fold granuloma, laryngeal erythema, or laryngeal ulceration) Table 1. There also was no significant difference in vocal fold immobility with increased duration of intubation (p=0.3855).

An increase in degree of laryngeal erythema was found with longer duration of intubation, however the relationship was not statistically significant (p=0.0658).

With prolonged intubation, there were greater degrees of laryngeal ulceration (p=0.0184) and granuloma formation (p=0.0068) which were significant. For a 1 day increase in duration of intubation, there was a 31% increase in odds of granuloma formation.

INTRODUCTION

Laryngeal injuries following prolonged orotracheal intubation have been reported in multiple studies and include development of subglottic/laryngeal stenosis, glottic web, intubation granuloma, vocal fold immobility, and laryngeal erythema/ulceration.1,2 The mechanisms for developing these injuries are thought to occur secondary to several events: pressure-induced ischemic necrosis, traction and movement of the endotracheal tube, mucosal ulceration, presence of granulation tissue, and inflammatory effects of infection, sepsis, and decreased mucociliary clearance.1,2

Gastroesophageal reflux during intubation has been postulated to contribute to the inflammatory events leading to laryngeal injury.2,4 The presence of nasso/orogastric tube act as a stent for the upper and lower esophageal sphincters, leading to a free transit of gastric contents in the sedated and supine intensive care unit patient.2 These tubes also create mucosal ulceration due to pressure necrosis along the postcricoid region.2 Administration of H-2 blockers during prolonged intubation has been recommended to reduce the deleterious effects of gastroesophageal reflux on the larynx.2

These laryngeal pathologies can significantly affect a patient’s recovery and quality of life leading to dysphonia, dysphagia, aspiration, and need for tracheostomy or gastrostomy tube placement. The objectives of this study were to determine whether administration of proton pump inhibitor (PPI) during intubation reduces laryngeal injury compared to patients receiving H-2 blockers or no treatment.

METHODS AND MATERIALS

Adult patients orotracheally intubated for at least 24 hours in the medical intensive care unit at a tertiary academic medical center were recruited for participation in this study. Each subject underwent a video-recorded transnasal fiberoptic laryngoscopy exam 48 hours following extubation. Variables recorded include: patient’s age, diagnosis, gender, duration of intubation, size of endotracheal tube, and administration of PPI (esomeprazole), H-2 blocker (famotidine), or no gastroesophageal reflux medication treatment during intubation.

The laryngoscopy exams were individually reviewed by 3 blinded experts (2 laryngologists and 1 speech language pathologist). Findings recorded include: presence of vocal fold granuloma (yes/no), vocal fold immobility (yes/no), and laryngeal ulceration or erythema (graded on a 0-3 scale). For laryngeal erythema and ulceration, 0 was defined as no erythema/ulceration, 1 = 1-5 mm, 2 = 5-10 mm, and 3 = greater than 10 mm.

For laryngeal injury, the three reviewers’ scores were averaged for degree of laryngeal erythema and ulceration. For vocal fold immobility and granuloma, the three reviewers had to agree for a positive finding. Fisher’s exact test was utilized to examine significant relationships. Boxplots and multivariable logistic regression models were fit using PPI and duration of intubation as variables for developing laryngeal injury.

RESULTS

In this particular cohort of subjects, administration of proton pump inhibitor during intubation did not reduce laryngeal injury visualized following extubation. A larger study population with randomization to treatment modality (PPI versus H-2 blocker) may show a difference in outcomes in patients with prolonged intubation.

Degree of laryngeal erythema, ulceration, and granuloma formation are all increased with greater duration of intubation. With such high incidence of vocal fold immobility (44%) and granuloma formation (53%) following prolonged intubation, it may be indicated for all patients to undergo formal laryngoscopy examination following extubation.

REFERENCES