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Determining the role of nasolaryngoscopy in the initial evaluation for upper airway injury in patients with facial burns

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ABSTRACT

Background: Upper airway injuries can be fatal in burn patients if not recognized, a scenario that causes a significant amount of anxiety for physicians providing initial assessment of burn patients. Early elective intubation is often performed; sometimes unnecessarily. However, some providers employ nasolaryngoscopy for patients presenting with facial burns or signs/symptoms of upper airway injury in order to assess the need for intubation, but this practice is not considered standard of care and may also be unnecessary. Evidence is currently lacking about the utility of nasolaryngoscopy as an adjuvant assessment during evaluation of potential upper airway burn injuries. The objective of this study was to determine if nasolaryngoscopy provides additional information to the history and physical in making the decision to electively intubate patients with facial burns.

Methods: This study was a retrospective analysis of all patients who underwent fiberoptic nasolaryngoscopy after facial burn injury to evaluate for upper airway injury associated with burns over a 2 year period at a regional burn center. During this time period, all patients who presented with facial burns, soot, or carbonaceous sputum underwent nasolaryngoscopy to look for upper airway injury regardless of mechanism of injury. Patients intubated prior to arrival were excluded from the study. Patients were considered to have signs/symptoms of airway injury (symptomatic) if they presented with dyspnea, tachypnea, hypoxia, or significant burns to buccal mucosa. Procedure notes were used to determine if supraglottic/glottic injury (erythema or edema) was present on nasolaryngoscopy. Presence of pathologic changes and whether they led to intubation were evaluated in the asymptomatic and the symptomatic groups of patients. Select individual records were inspected further to help determine if the nasolaryngoscopy findings altered management plans and if intubation was ultimately necessary based upon the presence or absence of a cuff leak and the duration of intubation.

Results: Twenty-two patients were symptomatic upon presentation, 14 of which had positive findings on laryngoscopy and 7 (50%) were intubated. One-hundred and eighty-eight patients were asymptomatic, 58 (31%) of which had either erythema or edema or carbonaceous debris on nasolaryngoscopy, and only 2 (1%) were intubated. These patients were both extubated

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within two days. None of the 130 asymptomatic patients with negative nasolaryngoscopy were intubated.

Conclusions: This study showed disparity between signs and symptoms of airway injury and nasolaryngoscopy findings. Asymptomatic patients showed pathologic changes in 30% of scopes, but this finding only changed management 1% of the time. Furthermore, the two patients in this group were extubated quickly, suggesting they may have been suitable for observation without intubation. These results indicate that the presence of erythema or edema is of questionable clinical significance in asymptomatic patients and nasolaryngoscopy is of limited benefit in this group. Only 50% of the symptomatic patients with airway injury evident on nasolaryngoscopy were actually intubated, also bringing into question the significance of the pathologic changes in this group. However, negative nasolaryngoscopy may have had some benefit in preventing intubation in a few, select symptomatic patients. This study suggests that a thorough history and physical is the best tool to identify patients at higher risk of upper airway injury who need intubation, but this should be further studied in prospective trials to determine the definitive role of nasolaryngoscopy.

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1. Introduction

Airway burn injuries are present in 15.6% of hospital burn admissions every year in the United States [1] with approximately 47% of patients admitted to burn units having burns to the face and neck [2]. Upper airway burns constitute a unique subset of patients presenting with inhalation injury which encompasses supraglottic thermal injury, subglottic chemical injury and systemic toxicity associated with inhalation of products of combustion. Any subcategory of inhalation injury may ultimately benefit from intubation for proper management; however, the supraglottic nature of upper airway burns is of particular concern when it comes to the early establishment of a definitive airway before the onset of swelling. Because of the increased difficulty in intubating burn patients with upper airway swelling compared to the trauma population early elective intubation is often performed. Many physicians who are responsible for the initial stabilization and triage of patients presenting with facial burns are faced with the decision of whether or not to intubate, often with the prospect of transferring the patient to another facility which can be hours away. These factors certainly contribute to the number of patients who are unnecessarily intubated for what would otherwise be an innocuous facial burn [3,4]. This can be problematic as endotracheal intubation is not without complications; occasionally, patients undergo induction and are then unable to be ventilated or intubated, for anatomic reasons or otherwise, leading to catastrophic loss of airway. Additionally, providers may find it difficult to wean patients from the ventilator who have pre-existing lung diseases such as COPD [5].

Historical factors and physical examination findings have been the primary screening tool for the assessment of the need for intubation; however, the findings that have been cited as being associated with upper airway injury are nonspecific and may encompass a set of patients with facial burns that do not actually have upper airway injury. Therefore, some providers utilize fiberoptic nasolaryngoscopy in an attempt to determine which patients need intubation. Several authors have investigated the utility of nasolaryngoscopy in the assessment of burn patients; however, there is no evidence to support its routine use as a screening tool for upper airway injury in the asymptomatic patient presenting with facial burns [6,7]. The relative paucity of information in the scientific literature addressing this problem only leads to the continuation of dogmatic practices and further confounds the decision making of those on the front lines. In this paper we examine the utility of routine screening fiberoptic nasolaryngoscopy in evaluating for upper airway injury in all patients presenting with facial burns.

2. Methods

This study was an IRB approved, single institution, retrospective chart review of all patients undergoing fiberoptic nasolaryngoscopy for evaluation of upper airway burn injuries. Historically all patients presenting to our hospital, a regional burn referral center, with facial burns or the presence of other factors associated with upper airway burn injury were evaluated for upper airway injury with awake fiberoptic nasolaryngoscopy while undergoing initial evaluation in the emergency department. A query of our internal database (Tracs v6.0) was performed for the specific ICD-9 procedure code 3142, associated with fiberoptic nasolaryngoscopy. Every patient between with the listed procedure code between October 2012 and September 2015 were initially captured. Each record was inspected and patients intubated prior to arrival or undergoing fiberoptic nasolaryngoscopy for reasons other than evaluation of potential burn injury were excluded. Data collected included basic demographic data, historical details of the burn, initial physical examination findings, findings on nasolaryngoscopy, intubation status and outcome variables such as mortality. All of the historical details and physical examination findings were chosen because of their relation, either historically or as evidenced by the literature, with the occurrence of upper airway burn injuries and associated need for intubation. Many of them are used as justification for intubation by those providing the initial assessment of patients with facial burns. The primary outcome variable

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