EDITORIAL

Should We Scope? Or is there a Scope for the Probe?

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Inhalational injury is seen in up to 20% of patients with burn injuries. Of these 20–30% of patients develop upper airway obstruction.[1] Fiberoptic bronchoscopy (FOB) done within a few hours of burns has been used in the assessment of the extent of smoke inhalational injury. Smoke inhalation in burn patients increases morbidity as well as the possibility of mortality. The involvement of the lungs could be caused by pneumonia, acute respiratory distresss syndrome (ARDS), septicemia, and subsequent respiratory failure. Respiratory tract involvement secondary to smoke inhalation is suspected when the percentage of burns is >40% of the total body surface area, burns involving the face, unconscious patients, and fire in a closed space. The gold standard for diagnosis is FOB. It has diagnostic as well as therapeutic roles. Removal of inflammatory secretions, mucous or carbon soot which can potentially block airways can be cleared during bronchoscopy. Fiberoptic bronchoscopy is better for predicting the risk of pneumonia and length of ICU and hospital stay than a chest X-ray and computed tomography (CT) scan, abbreviated injury score (AIS) documented through FOB at the time of admission can be used to predict these outcomes in severe burns patients.[2]

Change of voice, swallowing difficulty, and breathing difficulty suggest possible airway injury in these patients. Swelling around oral commissure, oral mucosal ulceration, sediments, or burnt hair in nares are the signs which warrant airway evaluation. Fiberoptic laryngoscopy is a part of the initial survey for the evaluation of upper airway injury as per the American Burn Association-Advanced Burn Life Support Protocol. If edema or mucosal injury is found during laryngoscopy, then further assessment should be carried out by FOB to grade inhalational injury. If performed too early, then there can be false-negative reports during bronchoscopy.[1] In a study by Kanchwala et al.[3] clinical findings showed nasal vibrissae well correlated with FOB evidence of smoke inhalational injury. The upper airway usually prevents heat transfer to lower airways and it is uncommon to find edema at the level or below the level of vocal cords. Patients without vocal cord edema are less likely to require intubation. Absence of oropharyngeal region involvement during burns need not necessarily mean that vocal cord or below vocal cord region is not involved. Only doing fiberoptic laryngoscopy may not be sufficient. In children, supraglottic airway obstructions are more common compared to adults. Swelling of oral mucosa or trachea can develop as early as half an hour and can result in necrosis of mucosa over half a day to 1 day. Exposure to clinical manifestation can take up to 3–4 days in most of the significant burn injuries.[4]

Bagley et al.[5] highlighted the importance of preintubation assessment in burn patients as they found that 37% of patients who were intubated in preburn centers could come off the ventilator within 48 hours, raising a question about the need for intubation in such patients. As intubation comes with an increased need for suction, risk of dislodgement, and difficulty in fixing the endotracheal tube in facial burns—avoiding intubation or considering early front of neck airway would be more appropriate. This needs early assessment of patients with flexible laryngoscopy/flexible bronchoscopy or point-of-care ultrasound (POCUS).

Smoke inhalational injury is secondary to thermal injury as well as chemical mediator-related injury. An increase in inflammatory mediator release and vasodilation secondary to an increase in blood flow to the mucosa due to a hyperdynamic state results in mucosal edema within a few hours of injury. Morbidity and mortality associated with smoke inhalational injury is very high. Flexible bronchoscopy is not only diagnostic but also can be used for intubation in case of difficulty in intubation. If edema sets in and the airway is obscured intubation may not be possible. Cannot intubate and ventilate situation should be avoided with an early assessment with an FOB.[6]

Ultrasound (USG) is noninvasive and can be repeated easily. Upper airway anatomy can be defined well using ultrasonography. Ultrasound can also avoid intubation in a few patients who would have otherwise needed intubation for flexible bronchoscopy. But ultrasound is operator-dependent, and time-consuming if fine measurements are needed to be done and needs enough hands-on training. In an emergency setting, it also can help to identify and mark cricothyroid membrane which is otherwise difficult to find clinically, in case of need for front of neck airway.[7]

A recent study by Mallick et al.[8] described how POCUS can be used to identify difficult airways in the ICU setting. It showed that various measurements using USG neck could help us to identify difficult airways as compared to direct laryngoscopy. Kameda and Fujita[9] assessed tracheal wall hypoechogenicity to describe airway edema in a burns patient and subsequently also found that findings correlated well with CT findings.

Burns patients with inhalational injury were assessed by Garg et al.[10] in A prospective observational study. Findings of

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ultrasound examination of the airway were correlated with fiber optic bronchoscopy. The study was conducted in a tertiary care hospital burns intensive care unit. An airway ultrasound was performed among 51 patients. Vocal cord edema and multiple other measurements were done before FOB. Ultrasonographic findings were correlated with the severity which was documented with bronchoscopy. Airway edema documented with ultrasound correlated in 85.2% of patients when FOB was performed. A positive predictive value of nearly 91% and a negative predictive value of around 72% was found. Nasal cavity singing was seen in 84.2% of patients, a clinical finding very close to fiberoptic bronchoscopic findings. Larger pre-epiglottic space depth in the vocal cord edema group was another significant finding in this study. The author also attempted to look into the influence of interarytenoid distance, epiglottis to the midpoint of vocal cord distance in predicting difficult airway in burns patients, however, values were statistically insignificant. Observer bias was avoided as one person who was trained in airway ultrasound for at least 3 years performed USG for all patients and another person did FOB. The blinding part also was taken care of where the person who did the FOB was not aware of USG findings.

The study has a few drawbacks as well. The sample size is small. The performance of USG among very sick patients is not practical if there is an imminent threat to the airway. Multiple measurements have been mentioned in the study which is not easy to perform in sick patients, however, we should appreciate the effort put in by the authors for the study. Time gap between USG neck to fiber optic bronchoscopy is not mentioned. The mean duration after burns is mentioned as 20.21 ± 8.23 hours. As seen in prior studies vocal cord edema can set in as early as 3–48 hours. As the study was conducted in a tertiary care center assessment delay is likely secondary to the time taken for referral.

Airway ultrasonography training can help in identifying threatened airways in burn patients without subjecting them to invasive fiberoptic endoscopy even in small centers. Even early referral or early intubation decisions can be taken regarding airway securement. Since there is a lack of prior data regarding the use of USG in critically ill burn patients to assess the airway, the present study stands unique. A larger study with a larger number of patients would probably throw more light into the use of USG in identifying airway in critically ill patients with smoke inhalational injury.

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