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Patient Reported Hoarseness and Loss of Voice at Post-Operative Day One in Outpatient Surgery: a 5-year Continuous Case Series.

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Abstract

Introduction: Hoarseness and loss of voice are common complaints after general anesthesia. They are important markers of both patient satisfaction and patient safety. Vocal changes can represent irritation, and trauma to the glottis. As hoarseness, transient loss of voice, permanent loss of voice area caused by glottic injury, it may be reasonable to consider them as a spectrum of symptom progression related to increasing underlying injury to glottic structures.

In most cases this injury is transient. In some cases, glottic injury can be longer lasting or even permanent. Premiant loss of voice is a rare but well described major complication after anesthesia. Little is known about transient loss of voice.

It is well known that minor events in anesthesia occur at a higher rate than major events. Monitoring for minor events or near misses is a common risk management methodology used to reduce the incidence of major events hits in other high-risk industries.

Establishing the incidence of each symptom of glottic injury from minor to major may be important in developing a systematic risk management approach to reducing the risk vocal changes after anesthesia.

This aim of this study of hoarseness and transient loss of voice after anesthesia is threefold: 1) understand the incidence, 2) investigate risk factors, and 3) and to contemplate how these understandings might be integrated into a spectrum of harm amenable to a systematic risk management approach to lower the risk of permanent vocal changes after anesthesia.

Methods: The electronic medical records (EMR) of 18,905 of consecutive out-patient surgery cases were reviewed for self-reported hoarseness and loss of voice at postoperative day one.

Results: Overall rates for hoarseness and loss of voice for any case was 15.01% and 2.67% respectively. DL was used to intubate in 7135 cases. The overall rates of hoarseness and loss of voice for DL were: 14.86% and 2.8% respectively.

VL with a standard stylet was used to intubate in 7135 cases. The rates of hoarseness and loss of voice for VL with a standard stylet were 16.57% and 3.33% respectively.

FOS was used to intubate 61 cases. The rates of hoarseness and loss of voice for FOS were 19.67% and 3.28% respectively.

VLS + TCI was used to intubate 21 cases. The rates of hoarseness and loss of voice for VL + TCI were 4.67% and 0.00% respectively.

Conclusions: Self-reported hoarseness and loss of voice rates were found to be common at postoperative day one after out-patient surgery. Both hoarseness and loss of voice increased in a stepwise fashion with increasing number of intubation attempts. Compared to DL, VL was associated with a higher rate of both hoarseness and loss of voice.

Compared to DL, VL with a non-dynamic stylet, and FOS, the rate of hoarseness and loss of voice was lower in those patients intubated with The TCI articulating introducer than in those intubated with VLS + a non-dynamic stylet.

Multiple intubation attempts and non-non dynamic stylets may be risk factors for hoarseness and loss of voice after out-patient surgery.

Introduction

Transient vocal changes are a common complaint after general anesthesia. (1)(2)(3) These are commonly classified as minor complications in the anesthesia literature. Occurrence of minor events has been significantly linked to patient dissatisfaction with the overall anesthesia experience. (4)

Vocal changes they can represent irritation, or injury to the glottis. (5) As hoarseness, transient loss of voice, permanent loss of voice area caused by glottic injury, it may be reasonable to consider them as a spectrum of symptom progression related to increasing underlying injury to glottic structures.

In most cases this injury is transient. In some cases, glottic injury can be longer lasting or even permanent. The incidence of hoarseness has been reported ranging from 14.4% - 60%. (4) premiant loss of voice is a rare but well described major complication after anesthesia. (5) Little is known about transient loss of voice.

It is well known that minor events in anesthesia occur at a higher rate than major events. (6) Monitoring for minor events or near misses is a common risk management methodology used to reduce the incidence of major events hits in other high-risk industries.

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This study was approved by the University of Utah institutional review board.

Methods

Retrospective, case controlled, consecutive case series.

The electronic medical records (EMR) of 18,905 of consecutive out-patient surgery cases were reviewed for hoarseness and loss of voice at postoperative day one.

Every patient who has out-patient surgery at the University of Utah hospital system receives a follow up call by a nurse on post-operative day one after out-patient surgery. As part of this call, each patient is asked if 'did you have hoarseness?'; 'did you lose your voice?' The answers are recorded as either, yes or no in the EMR.

A database was built for each case containing the airway note, pre-operative anesthesia note, and nursing call back note.

This database was queried for:

1) presence or absence of hoarseness and/or loss of voice,

2) airway technique used to manage the airway,

3) number of attempts to intubate.

Statistics: A Chi Squared test was used to determine statistical significance hoarseness and loss of voice as a function of each variable.

Results (See Table 1.)

Overall rates for hoarseness and loss of voice for any case was 15.01% and 2.67% respectively. DL was used to intubate in 7135 cases. The overall rates of hoarseness and loss of voice for DL were: 14.86% and 2.8% respectively.

VL with a standard stylet was used to intubate in 7135 cases. The rates of hoarseness and loss of voice for VL with a standard stylet were 16.57% and 3.33% respectively.

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	All cases	DL	VLS + Standard Stylet	FOS	VLS +TCI	1 attempt	2 attempts	3 attempts	4 attempts	5 or more attempts
Hoarseness n (%)	2371/18905 (15.01)	1060/7135 (14.86)	204/1231 (16.57)	12/61 (19.67)	1/21 (4.76)	2045/16193 (12.62)	153/1036 (14.77)	35/186 (20.83)	3/15 (20.00)	½ (50)
Loss of Voice n (%)	504/18905 (2.67)	200/7135 (2.8)	41/1231 (3.33)	2/61 (3.28)	0/21 (0.00)	414/16193 (2.55)	33/1036 (3.19)	8/168 (4.76)	2/15 (13.33)	½ (50)
p value	.19	.19	.15	.10	-					

Table 1. Hoarseness and loss of voice with different intubation techniques.

Discussion

Our study demonstrates hoarseness and loss of voice after general anesthesia are common. Vocal changes are important as they can signal glottic trauma during intubation. The vocal cords are delicate structures normally protected from contact with any substance but air. During general anesthesia, this protection is removed to facilitate placement of an ETT into the trachea.

Our study demonstrates a consistent increase in frequency when comparing the rate of hoarseness to loss for each intubation technique studied. This is important as it indicates that these complications may be represent an increasing rate of trauma experienced in the course of endotracheal intubation.

Transient and permanent injury to the glottis is well described, however the frequency of these injuries is unknown. In-addition the mechanism of injury form endotracheal tube placement is not well understood. Several mechanisms have been proposed, ETT diameter, length of placement, ETT cuff pressure, and direct blunt trauma when placing the ETT, introducer, or stylet.

There is a clear, progressive increase in vocal changes with each intubation attempt demonstrated in our data. The rate of increase with each attempt points to direct blunt trauma as an important mechanism and determinant of degree of trauma during the placement of the ETT. This correlation with increasing risk of vocal complications is consistent with observed increases in complication with multiple attempts in general. (7)(8) As vocal changes indicate trauma to the glottis, this may be an important safety benchmark to follow as trauma to the glottis can create a ‘cannot intubate, cannot ventilate’ situation putting the patient at risk for catastrophic complications or even death. (9)

Vocal changes are also important form the point of view of patient experience. Both hoarseness and loss of voice may contribute to lower patient satisfaction via pain, diminished ability to communicate, and loss workdays and income. (1) Admittedly these factors have not been measured, however we hold them to be self-evident.

We find it interesting that vocal change complications occur at a higher frequency with VL than with DL. We speculate that this may be due to challenges of tracheal access that are known to be present with VL. (10) While VL improves visualization of the glottis via allowing indirect visualization around the primary curve of the airway, tracheal access can be challenging to smoothly achieve round the same corner. (11)(12) Current stylets are rigid or malleable and lack dynamic navigational capability. As the two curves of the airway remain intact when using VL, and these curves are directionally opposed with an inflection point at the glottis, full tracheal access requires force on the glottis or anterior trachea to redirect non dynamic introducers and stylets posteriorly down the trachea. An increased rate of vocal changes and tissue injury have been found with non-dynamic stylets. (13)(14)

The Total Control Introducer (TCI) is an introducer with dynamic navigational capabilities. It is able to articulate anteriorly to first navigate the primary curve of the trachea, and posteriorly to navigate through the glottis and into the trachea. It is designed to place less force on the glottis during tracheal access during VL assisted intubation. We found a trend to a decreased rate of vocal change complications with the use of a TCI introducer. This is important as use of dynamic stylets and introducers may represent a strategy to improve patient satisfaction and reduce patient risk in terms of glottic complications.

Conclusion

Self-reported hoarseness and loss of voice rates were found to be common at postoperative day one after out-patient surgery. Both hoarseness and loss of voice increased in a stepwise fashion with increasing number of intubation attempts. Compared to DL, VL was associated with a higher rate of both hoarseness and loss of voice.

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