

## Determination of Legal Responsibility in Iatrogenic Tracheal and Laryngeal Stenosis

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**Objectives/Hypothesis:** Laryngotracheal stenosis usually occurs as a result of injury from endotracheal intubation or tracheostomy placement. With an estimated incidence of 1% to 22% after these procedures, chronic sequelae ranging from discomfort to devastating effects on quality of life, and even death, make this complication a potential litigation target. We examined federal and state court records for malpractice regarding laryngotracheal stenosis and examined characteristics influencing determination of liability.

**Study Design:** Retrospective analysis.

**Methods:** The Westlaw Next legal database (Thomson Reuters, New York, NY) was searched for pertinent federal and state malpractice cases and examined for several factors including alleged cause of malpractice, complications, case outcome, and specialty of the defendants.

**Results:** Twenty-three pertinent cases over 35 years were identified. Fourteen (60.9%) cases were decided in the physician's favor, with six plaintiff verdicts awarding an average of \$922,129 for malpractice, and three out-of-court settlements averaging \$441,600. Hospitals were the most frequently named defendants, and anesthesiologists were most commonly named physician defendants. Endotracheal intubations and tracheostomy history were frequent factors in these cases. Laryngeal lesions were more likely to result in payments, trending higher than those stemming from tracheal lesions.

**Conclusions:** Multiple cases mentioned previous intubation as a potential risk factor that may have led to laryngotracheal stenosis. Location of stenosis and requirement of reparative procedures may also influence outcomes. Cases not decided in the defendant's favor frequently included other extenuating circumstances, including severity of other injuries. Although the majority of cases were defendant decisions, the verdicts decided for the plaintiffs had considerable damages awarded.

**Key Words:** tracheal stenosis, laryngeal stenosis, medicolegal, medical malpractice, litigation.

**Level of Evidence:** NA

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### INTRODUCTION

Endotracheal intubation and tracheostomies are the most common causes of laryngotracheal stenosis.<sup>1</sup> The long-term incidence of this complication has been reported to be as high as 22% after either of these procedures, although only 1% to 2% of these stenoses are clinically relevant.<sup>1–3</sup> Pressure injury, usually through traumatic intubation or overinflated cuffs, causes decreased blood flow and consequent ischemia. This can damage tracheal cartilage, and subsequent healing can cause granulation and fibrous tis-

sue sufficient to cause permanent stenosis.<sup>1,4–6</sup> In cases resulting from tracheostomy procedures, mechanical forces at the stoma can also contribute to pressure necrosis.<sup>2</sup>

Tracheal stenosis treatment can entail various interventions, from dilatation to resection with end-to-end anastomosis.<sup>2,5</sup> This injury, however, can be difficult to manage under certain circumstances, especially with lesions located in the upper trachea and subglottic larynx.<sup>1,7</sup> Laryngeal stenosis is frequently confused with tracheal stenosis, although the etiology as well as management strategies can be similar.<sup>2,5,8</sup> Reconstructive options may be limited, especially with numerous stenoses or extensive lesions for which resection would leave too large a defect.

Chronic sequelae from both tracheal and laryngeal stenosis include respiratory difficulties that may necessitate repeated procedures or even permanent tracheostomy. Given the adverse health and quality-of-life issues that accompany these difficulties, there is potential for malpractice litigation. After a thorough search of the medical literature, we were unable to identify any examination of the medicolegal aspects of these injuries. Our objective was to examine malpractice cases, using accessible federal and state court records, to better characterize the frequency of such litigation and further elucidate factors that are taken into account in determining legal responsibility for these injuries.

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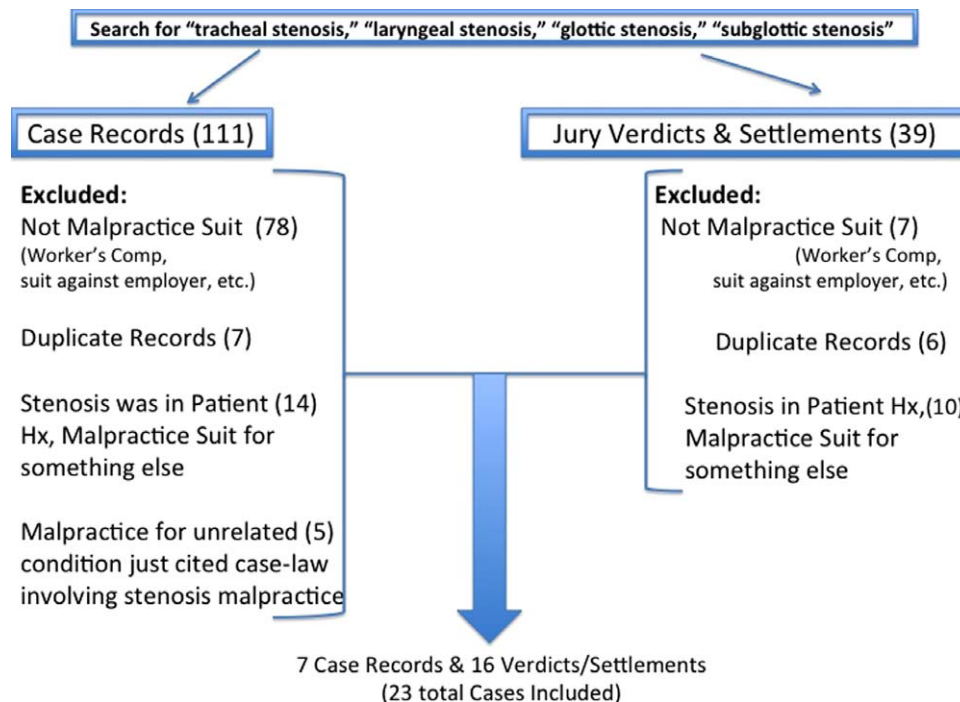


Fig. 1. Search methodology using the Westlaw legal base. Patient Hx=patient past medical history. Search conducted August to October 2012. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]

## MATERIALS AND METHODS

Federal and state court records regarding malpractice litigation for “tracheal stenosis,” “laryngeal stenosis,” “subglottic stenosis,” and “glottic stenosis” were examined using the Westlaw Next legal database (Thomson Reuters, New York, NY). This database has been previously used for medicolegal examination of topics in otolaryngology, such as hearing loss,<sup>9</sup> corticosteroid use,<sup>10</sup> facial nerve injury,<sup>11</sup> facial plastic surgery procedures,<sup>12</sup> and sinonasal disease.<sup>13</sup> Out of 150 search results from these terms, 23 cases were ultimately included in this analysis, after excluding nonrelevant court records (methodology shown in Fig. 1). Jury verdict and settlement reports (right side of Fig. 1) are contributed voluntarily by legal professionals to help anticipate future outcomes and award totals.<sup>10</sup> Characteristics in these cases, including the alleged malpractice, subsequent complications, case outcome, specialty of involved physicians, and patient demographic information, were recorded. Because of the heterogeneity and varying types of information within each court document, some cases were more detailed than others. All data were collected between August and October 2012.

## RESULTS

Common factors responsible for alleged malpractice in the 23 cases identified are detailed in Table I, with 14 cases of malpractice allegedly stemming from endotracheal intubations. All nine plaintiffs with laryngeal lesions had a history of endotracheal intubation. As noted in the methods, court files were heterogeneous, containing different pieces of information for each case. Several cases mentioned prior history of intubation as a possible risk factor for tracheal stenosis in the plaintiff, although there was no explicit mention of elevated cuff pressures as the inciting event of the injury.

The majority of cases (60.9%) were decided in the physician’s favor (Fig. 2). The average verdict award,

\$922,129 (range, \$334,280 to \$1.9 million), was substantially higher than the average of the three out-of-court settlements (\$441,600). Hospitals were the most frequently named defendants (13 cases), followed by anesthesiologists (9 cases) and various other specialties and entities (Fig. 3).

The average patient age was 43.8 years (range, newborn to 78 years), and the most common reported comorbidities were coronary artery disease (17.4%) and pulmonary disease (13.0%). Several cases did not have comments about past medical history or comorbidities.

The location of stenosis had an impact on case outcome as well as damages awarded. Ten of 14 (71.4%) cases related to tracheal lesions were decided in the physician’s favor, compared to only four of nine (44.4%) cases involving laryngeal lesions. In cases resulting in a payment

TABLE I.  
Common Alleged Factors in Laryngeal and Tracheal Stenosis Malpractice Suits.

Factors	No. of Cases
Endotracheal Intubations	14
Tracheostomy episode in question/prior history	8
Traumatic Intubation	6
Lack of informed consent	5
Misdiagnosis of disease process	2
Worsening of preexisting stenosis	2
Presented to ED with respiratory distress	2
Presented with asthmatic episode	2
Extended ICU stay with multiple intubations	3

ED=emergency department; ICU=intensive care unit.

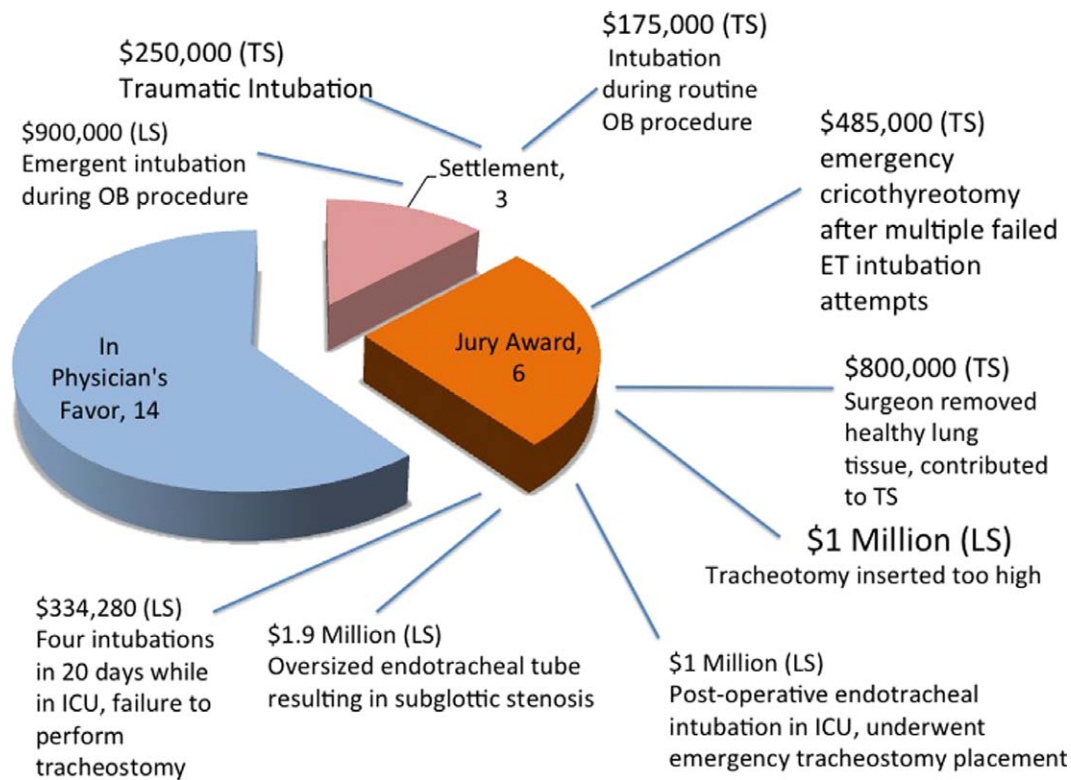


Fig. 2. Outcomes of malpractice litigation related to laryngeal and tracheal stenosis. ET=endotracheal; ICU=intensive care unit; LS=laryngeal stenosis; OB=obstetric; TS=tracheal stenosis. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]

(settlements and damages awarded), laryngeal stenosis plaintiffs received an average of \$1,029,554 versus \$427,500 for tracheal stenosis plaintiffs, although this did not reach statistical significance (Student *t* test, *P*=.09).

Plaintiffs brought suits in courts under the following jurisdictions: New York (n=5), federal court (n=3), Florida (n=3), Illinois (n=3), Ohio (n=2), California (n=2), Pennsylvania (n=1), Missouri (n=1), Louisiana

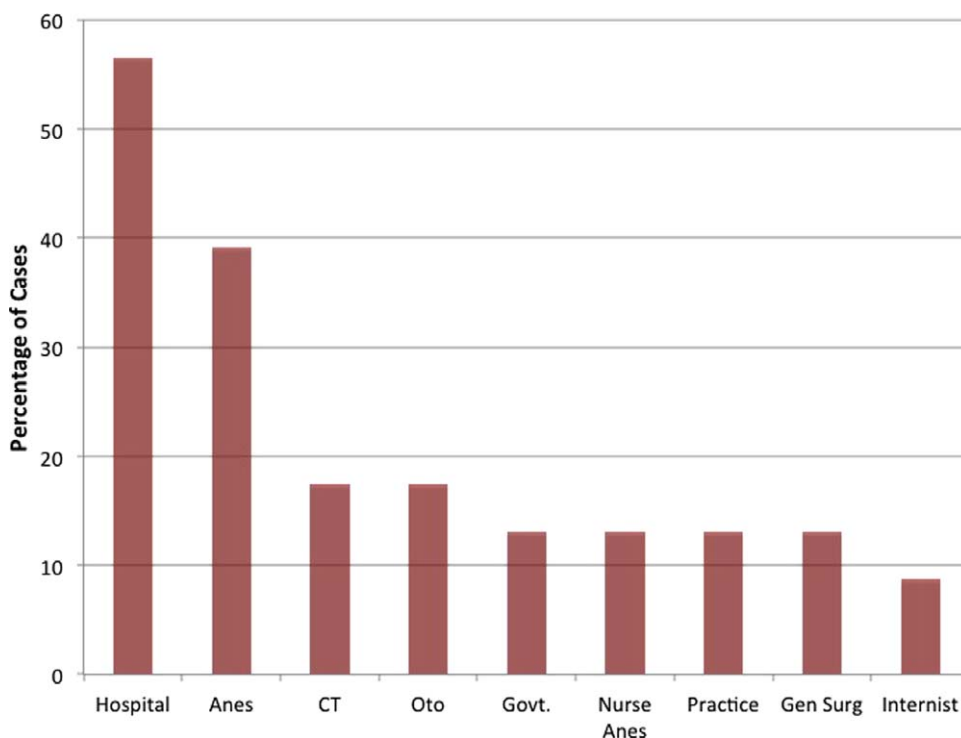


Fig. 3. Defendants named in malpractice litigation related to tracheal stenosis. Anes=anesthesiologists; CT=cardiothoracic surgeons; Oto=otolaryngologists; Govt=governments; Nurse Anes=nurse anesthetists; Practice=physician practice group; Gen Surg=general surgery. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]

TABLE II.  
Specialty of Medical Expert Witnesses.

Plaintiff (No.)	Defendant (No.)
Anesthesiology (5)	Anesthesiology (4)
Otolaryngology (3)	Otolaryngology (2)
Pulmonology (2)	Neonatology (2)
Critical care	Critical care
Neonatology	Pulmonology
Cardiothoracic surgery	Internal medicine
Pediatrics	Pediatrics
Obstetrics and gynecology	Obstetrics and gynecology
Family medicine	

(n=1), Washington, DC, (n=1), and Kansas (n=1). The years of the decisions included ranged from 1975 to 2010; only eight of the included cases occurred before 1994. The specialties of expert witnesses are listed in Table II.

## DISCUSSION

Patients with tracheal or laryngeal stenosis frequently have subclinical disease. Those who are symptomatic, however, can have complaints ranging from periodic discomfort to severe respiratory difficulties with devastating effects on quality of life and potential death from respiratory compromise. Taking into account subclinical disease, several authors have reported the incidence to be as high as over 20% following both tracheostomy procedures and endotracheal intubation. Given that anesthesia is administered 40 million times annually in the United States as per the American Society of Anesthesiologists, endotracheal intubation is commonly performed. It is important for practitioners in a wide variety of specialties to understand the risks associated with endotracheal intubation and tracheostomies. Studying litigation experience can help practitioners enhance patient safety and avoid liability.

Fourteen of the 23 cases (60.9%) included in this analysis were ruled for in favor of the defendants. The recurring theme in these 14 cases was that the airway management patients received was absolutely necessary. In cases where court documents acknowledge that mistakes were made, defendants were not automatically found negligent. Four elements have to be satisfied for proof of medical malpractice: duty, breach of duty, harm, and causation.<sup>14</sup> Even if breach of duty, also known as deviation from standard of care, is admitted or proven, plaintiffs still need to prove (in order to recover damages) that all three other conditions, without exception, were violated.

Out of the 23 cases, nine (39.1%) did not end with a decision in favor of the physician. Three of these cases were out-of-court settlements. In the case with the \$250,000 settlement, the plaintiff alleged forceful intubation was the cause of subsequent tracheal stenosis. Considerable hemorrhage upon intubation was observed and documented, which could be interpreted as confirmation

of traumatic intubation. The other case settlement, for \$175,000, involved a 38-year-old woman undergoing an endometrial ablation when she started experiencing acute respiratory difficulty secondary to fluid overload, loss of airway control, and suffered hypoxic encephalopathy with reflex sympathetic dystrophy of her extremities. She ultimately required a tracheotomy, which caused tracheal stenosis. Although tracheal stenosis was one of the reasons for the malpractice suit, her other severe injuries, along with her age, likely influenced and encouraged the decision of the defendants to settle out of court. A third case, settled for \$900,000, also involved a patient undergoing a gynecologic procedure; the defendant anesthesiology team had repeated failed (and traumatic) intubation attempts that resulted in extensive laryngeal injuries including subglottic stenosis and vocal cord injury, ultimately requiring multiple surgeries.

Plaintiffs were awarded damages by a jury in six cases, which were substantially higher than the three out-of-court settlements. One case involved tracheal stenosis secondary to an emergency cricothyroidotomy after multiple failed endotracheal intubation attempts. The court noted that although tracheostomy placement is standard of care within 24 hours after cricothyroidotomy, the plaintiff's cricothyroid incision remained the site of his airway for nearly 2 weeks, causing substantial stenosis and ultimately his death several months later. In the case that was settled for \$800,000, a surgeon removed healthy lung and failed to remove cancerous tissue, secondarily causing tracheal stenosis after the procedure as well. Although the tracheal stenosis was named as one of the reasons for the suit, the jury verdict was possibly influenced by negligence related to the surgeon's failure to remove the malignancy.

Another notable case with damages of \$1 million awarded involved a diagnosis of laryngeal and subglottic stenosis. A middle-aged female had initially presented to the hospital with respiratory and abdominal symptoms and underwent a cholecystectomy during her stay. Post-operatively, she experienced dyspnea and was transferred to the intensive care unit, where she was endotracheally intubated. After 12 days of intubation, she experienced further respiratory distress and required an emergency tracheotomy. The patient was eventually discharged with chronic mild dyspnea and hoarseness and was ultimately diagnosed with laryngeal and subglottic stenosis. She underwent eight operative procedures attempting repair, which likely contributed to the sizeable damages awarded by the jury.

The case with the highest damages awarded (\$1.91 million) involved an 8-year-old plaintiff with chronic subglottic stenosis. He initially presented to the emergency department with severe burns, when the defendant emergency physician allegedly used an oversized endotracheal tube for airway management. Aside from the patient's age, other considerations influencing this decision was an alleged failure to properly examine the patient's airway and failure to employ more conservative airway management.

Examination of who was named as defendants in these 23 cases revealed several interesting trends (Fig.



3). Hospitals were named in 56.5% of cases. Anesthesiologists were the most litigated against medical specialty, followed by otolaryngologists and cardiothoracic surgeons.

As expected, endotracheal intubations and tracheostomy placements were the most common alleged factors in these cases (Table I). An interesting finding is the variable types of procedures and presentations that necessitated airway management before tracheal and laryngeal obstruction (Table II). As a result, no specific characteristics in this regard can be linked to litigation in tracheal and laryngeal stenosis cases aside from location of the lesion. A higher proportion of cases involving laryngeal stenosis resulted in payment, and the mean dollar amounts trended higher than cases stemming from tracheal stenosis. It is important to note the numerous risk factors cited in the medical literature for developing laryngotracheal stenosis, including history of previous intubations, multiple tracheostomy procedures, and percutaneous tracheostomy.<sup>15</sup> The latter was not seen as a factor in any of the cases examined.

This analysis had several limitations. The heterogeneity of the court data available through Westlaw cannot be emphasized enough. The various cases had different types of information with different pieces of data missing. Although certain trends can be and were noted, this was just as much a qualitative as quantitative analysis. In addition, although federal and state court records were searched, cases that may have been administered in local jurisdictions may not have been included in this database. To account for limitations specific to Westlaw, Lexis Nexis legal database (<http://www.lexisnexis.com>) was searched for cases regarding tracheal and laryngeal stenosis as well, and the search results were very similar and involved the same cases. As the authors felt Westlaw was more user friendly to the nonlegal layperson, with better organization of search results, it was chosen for use in this analysis.

The jury verdicts and settlements (right side of Fig. 1) included in Westlaw are only available for cases that are voluntarily reported by attorneys. Attorneys contribute these cases because they facilitate characterization of outcome profiles and award totals and provide detailed accounts highlighting factors in determining legal responsibility.<sup>10</sup> Although sources such as Westlaw and Lexis Nexis may undercount decisions and as a result not determine the incidence of a particular case, these details reveal factors physicians may take into account to minimize liability and enhance patient safety

and may also help legal professionals representing physician defendants determine an optimal legal strategy. Accordingly, Westlaw has been used for other recent analyses studying litigation topics of interest to otolaryngologists, including hearing loss and corticosteroid use.<sup>9,10</sup>

## CONCLUSION

In this analysis, multiple cases mentioned a history of intubation as a potential risk factor that may have led to tracheal and laryngeal stenosis. Other factors, including location of stenosis and requirement of reparative procedures, may also influence outcomes. In those nine cases that were not decided in favor of the defendants, there were frequently other extenuating circumstances, including severity of other injuries that may have contributed to these outcomes. For the most part, however, physicians who were vigilant about correct placement location of tracheostomies and avoided traumatic and forceful intubation techniques did not have negative judgments.

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