

# Endoscopic Management of Blunt Pediatric Laryngeal Trauma

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**Objectives:** Blunt laryngeal trauma in the pediatric population is an uncommon but unique entity that can be potentially life-threatening. Given the infrequency of these events, its management can pose a clinical dilemma. The authors review the evaluation and treatment of blunt pediatric laryngeal trauma.

**Methods:** We present a case report and a review of the literature.

**Results:** We describe the case of a 3-year-old boy who presented with laryngeal injury following blunt trauma. The patient sustained endolaryngeal hematomas and mucosal lacerations with exposed cartilage. After mucosal approximation, the patient was successfully managed in a critical care setting without a tracheostomy.

**Conclusions:** With an appropriate and thorough evaluation of the pediatric patient, endoscopic management without a surgical airway may be considered as a viable alternative for blunt laryngeal trauma.

**Key Words:** blunt trauma, endoscopy, laryngeal trauma, larynx, pediatrics, tracheostomy.

## INTRODUCTION

Laryngotracheal trauma in the pediatric population can have serious implications and requires a high index of suspicion to be diagnosed and treated properly.<sup>1,2</sup> It has a low incidence, because children are involved in blunt trauma less frequently than adults and because of the unique features of the pediatric larynx.<sup>3,4</sup> The cartilage of the pediatric larynx is more pliable, and the pediatric larynx is located higher in the neck, so that it is protected by the mandible. Laryngeal trauma does not frequently involve fractures of the cartilaginous framework, but rather, soft tissue injuries.<sup>1,5</sup> A case is presented here to illustrate a serious laryngeal injury occurring after blunt trauma without an associated cartilaginous fracture and the appropriate management.

## CASE REPORT

A 3-year-old boy presented after being struck in the neck by a swing while playing in his family's backyard. His mother noticed immediate hoarseness and some bruising of his anterior neck. Upon evaluation, dysphonia, mild inspiratory stridor without chest retractions, and a small amount of hemoptysis were noted. No crepitus was noted in his head and neck area, but some ecchymosis was noted over

his anterior submental region. His oxygen saturation was 99% on room air. Computed tomography of the neck revealed bilateral supraglottic and glottic edema, but failed to demonstrate any fractures or subcutaneous emphysema. Flexible fiberoptic laryngoscopy revealed small hematomas of the aryepiglottic folds and exposed arytenoid and corniculate cartilages bilaterally. Both vocal cords appeared mobile.

The patient was taken to the operating room, where direct laryngoscopy and bronchoscopy was performed. Intraoperative examination confirmed the presence of bilateral hematomas of the aryepiglottic folds and bilateral mucosal lacerations with exposed arytenoid and corniculate cartilages (Fig 1). After the patient was placed in suspension and with the aid of the operating microscope, the mucosa was reapproximated transorally with 6-0 Vicryl sutures (Fig 2). Because minimal edema was present, the patient was not intubated and tracheostomy was not performed. The patient was admitted to the pediatric intensive care unit for treatment with corticosteroids, antibiotics, and an antireflux regimen. He remained on humidified air with no supplemental oxygen. He did well on postoperative day 1 and was transferred out of the intensive care unit. No stridor was audi-

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**Fig 1.** Direct laryngoscopy shows aryepiglottic hematomas and bilateral mucosal lacerations with exposed arytenoid and corniculate cartilages.

ble. He was discharged on postoperative day 2. On follow-up 2 weeks later, he was doing well with no stridor. His voice had improved, but there was persistent mild hoarseness. Flexible fiberoptic laryngoscopy revealed a small amount of granulation tissue in the vicinity of a suture on the right false vocal fold. Persistent mild edema was also noted.

#### DISCUSSION

Laryngeal trauma in children is a different entity from that in an adult. Because of the pliability of the cartilage and the location of the larynx, fractures are rare.<sup>1,6</sup> Nevertheless, the loose association of the mucosa to the underlying cartilage and the lack of soft tissue result in a higher incidence of mucosal injuries and edema. In addition, the narrow size of the laryngotracheal passage in children can create an acute airway situation with what may seem to be relatively innocuous trauma.<sup>1</sup>

Recognizing laryngeal trauma is key and critical in the appropriate management. Symptoms such as hoarseness, stridor, dyspnea, dysphagia, drooling, and hemoptysis following blunt trauma to the neck need to be pursued aggressively. Physical signs such as anterior neck crepitus, ecchymosis, and blunting of laryngeal and neck landmarks may also occur, but may not always be observed.<sup>7,8</sup> The critical studies to be performed are flexible fiberoptic laryngoscopy and computed tomography of the neck. These can be pursued only after airway stability is ensured. Flexible fiberoptic laryngoscopy is critical in the assessment of the child in the initial encounter, as this can identify mucosal lacerations and avulsions, submucosal hematomas, arytenoid dislocations, and the mobility of the vocal cords.<sup>1</sup> Computed tomographic scans are helpful in the evaluation, but ther-



**Fig 2.** During suspension microlaryngoscopy, mucosa was reapproximated with 6-0 Vicryl sutures.

apy should not be withheld pending results of radiographic investigations.<sup>9</sup>

In the presence of laryngeal trauma, the possibility of cervical spine trauma should be considered. However, once a laryngeal injury in a child is recognized, the immediate priority is management of the airway.<sup>1</sup> Schaefer's<sup>10</sup> classification has been used for management of the airway. Review of the literature suggests that other than minor endolaryngeal trauma with or without nondisplaced fractures, the airway must be secured.<sup>1,3,4,9,10</sup> Controversy exists as to whether intubation or tracheostomy is the preferred method.<sup>4,9,10</sup> Schaefer<sup>10</sup> and Fuhrman et al<sup>4</sup> recommended emergent tracheostomy as the only method for management. The argument for tracheostomy is that placement of an endotracheal tube across an injured airway may exacerbate a mucosal laceration or further disrupt displaced structures.<sup>4</sup> In the presented case, the patient was not intubated and did not require a surgical airway. The decision was made to observe the patient in a critical care setting because of the minimal edema seen on fiberoptic and direct laryngoscopy. The patient had minimal stridor and no respiratory distress at the time of operative intervention and afterward. The management of this patient did not follow algorithms advocated by other authors; however, the patient had a good outcome without a surgical airway being established. This approach could only be supported by careful inspection of the larynx and trachea in the operating room during direct laryngoscopy and bronchoscopy and reliable intensive care observation.

The mucosal lacerations in this child were repaired by suspension microlaryngoscopy. Three absorbable 6.0 Vicryl sutures were used to reapproximate the mucosal injuries. The amount of exposed

cartilage in the endolarynx necessitated repair of the lacerations. This could be achieved with an open approach if repair is not possible with the patient in suspension.<sup>1,11</sup>

This particular patient had postoperative improvement in his voice, but some dysphonia persists. Dysphonia is the most common persistent sequela of laryngeal trauma. Predictors of late complications include extensive injuries and delay in diagnosis and treatment.<sup>1</sup> Airway compromise is not a common late complication. In a review of 61 patients with blunt laryngeal trauma, only 1 patient was unable to maintain an airway.<sup>3</sup>

## CONCLUSIONS

This case study illustrates a point on the spectrum of pediatric blunt laryngeal trauma and management without a tracheostomy. Although the purpose of presenting this case is not to challenge the current management of laryngeal trauma in children, it does emphasize the importance of a thorough workup in any child presenting with blunt trauma to the anterior neck. The mechanism of injury should be the foremost factor in the evaluation of these patients. This particular patient had relatively innocuous complaints, but pursuit of these symptoms led to the discovery of potentially life-threatening injuries.

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