



Case Report

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## Controlled Fiberoptic Intubation with a Glide Fiberoptic Scope on a Survival Hanging Injury with Bilateral Cord Paralysis, and Review of the Literature

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### **Abstract**

*Patient: Male, 35-year-Old*

*Final Diagnoses: Vocal Cord Paralysis*

*Symptoms: Unable to ventilate post-extubation*

*Medication : None.*

*Clinical Procedure: Control Airway Endotracheal intubation with a Glide Fiberoptic Scope*

*Specialty: Critical Care*

*Objective: Unusual clinical course*

**Background:** We report a case of a patient's survival after an attempted hanging during the COVID 19 epidemic due to severe depression compounded by social distancing. The patient survived asphyxiation, developed severe stridor and dyspnea post-extubation. This was associated to vocal cord paralysis from direct trauma and posterior horn fracture of the larynx resulting from direct compression.

**Case Report:** 35-year-old male presented to the emergency room after practicing social distancing for over two months due to COVID19. The patient decided to take his life by hanging himself from the roof of his home. The patient was intubated in the field and required mechanical ventilation. Full trauma workup, including head, neck, and chest CT scans, showed direct compression of the voice box with fracture of the posterior horns.

Initial complete blood count, comprehensive metabolic panel and cardiac enzymes were all normal. After 48 hours, the post-incident patient woke up and followed commands while on the ventilator, his neurological exam was non-focal. The patient had an excellent leak test and was able to pass air around the deflated cuff. Lung mechanics, including minute ventilation, Negative Inspiratory Force (NIF) and Rapid Shallow Breathing Index (RSBI), were normal for extubating. Physical exam was routine except for a bluish discoloration around the mid-length from the rope and no evidence of any open wounds or crepitus.

The decision to extubated was taken based on preliminary results noted above. Nevertheless, we set up a Glide fiberoptic scope and were ready to reintubate. The function of the vocal cords and the ability to protect the airway was in question due to the mechanism of injury. After we extubated, the patient was not able to move air, protect the airway and his saturation decreased below 40%. The patient was emergently reintubated and subsequently was sent to the operating room for a tracheostomy. Direct laryngoscopy before intubation reveals bilateral vocal cord paralysis.

**Conclusion:** Controlled extubation post hanging injury must be planned even with normal lung mechanics. Direct trauma to the laryngeal nerve or even the vocal cords should be expected, and if in doubt of the ability to protect the airway, a tracheostomy should be considered in all these patients early in the clinical course.

**Keywords:** tracheostomy, hanging injury, endotracheal intubation, vocal cord injury, neck trauma

## Background:

The neck is a very vulnerable area for direct trauma due to its small diameter compared to other parts of the body. The neck is comprised by cervical vertebrae and spinal cord, vessels, endocrine glands as well as superior parts of both respiratory and digestive tracts. It is very vulnerable to injuries such as strangulation, hanging, and direct trauma. Hanging can be classified as complete or incomplete and is proportional to the amount of weight the victim puts on the neck. The most common type of injuries relate to damage incurred to cartilage, bone abnormalities, spinal cord, and vessels. It is essential to consider a direct blow to the vocal cords or even the nerves that allow for the proper function of the vocal cords. Missed diagnoses or mismanagement may result in the patient's death or significant long term morbidity. Bilateral cord paralysis is extremely rare. We believe that a possible compression of the right and stretching of the left vagus nerves caused this injury. It may also be possible that the right recurrent laryngeal nerve was compressed as it entered the larynx at the cricothyroid articulation and the left recurrent laryngeal nerve was stretched.

## Case Report:

35-year-old male with no past medical history except for depression. After being in quarantine due to Covid-19 he was found hanging from the roof of the apartment where he lived. When he was found, his full weight was on the neck and it was considered a complete hanging. After two rounds of ACLS and epinephrine, he was resuscitated, intubated, and brought to the emergency room. His initial trauma series, including head, neck chest, and abdomen CT scans, was standard except for fracture of the posterior horns. His initial drug screen, EKG, CBC, and CMP, were normal. After forty eight hours on mechanical ventilation, the patient awoke. His RSBI, NIFF, and leak test were all normal. Chest X-ray did not show infiltrates or evidence of pulmonary edema. When he was extubated, we had a standby endotracheal tube and Glide scope. Almost immediately, the patient presented dyspnea, he could not talk and was not able to ventilate air. An emergent direct laryngoscopic intubation, with the video glide scope was performed, patient was intubated and subsequently taken to the OR for tracheostomy.

## Discussion

The Neuroanatomy of the right vocal cords is essential to review. The vagus nerve innervates the larynx and its associated muscles. The vagus nerve is comprised of nerve fiber that arises from the nucleus ambiguus in the medulla portion of the brainstem. Upper-motor cortico-bulbar neurons originate from the cerebral cortex and descend to synapse onto these lower motor vagal nerve fibers. After arising from the brainstem, the vagus nerve then exits the skull base at the jugular foramen and descends into the

neck to give off three main branches (the pharyngeal branch, the superior laryngeal nerve, and the recurrent laryngeal nerve. The superior laryngeal nerve supplies sensation to the larynx above the glottis and innervates the cricothyroid muscle. The recurrent laryngeal nerve descends into the neck in the tracheoesophageal groove, where it enters the larynx posteriorly, near the cricothyroid joint. The recurrent laryngeal nerve innervates all remaining intrinsic muscles of the larynx, including the posterior cricoarytenoid, inter-arytenoids, lateral cricoarytenoid, and the thyroarytenoid muscles.

Damage to the neurovascular, spinal, and bone structures need to be considered on hanging injuries. If neurological exams, chest X-ray labs, and lung mechanics are standard, we need to examine damage to the nerve, vocal cords, and surrounding tissues and assume that the patient may not have a patent airway post-extubation. The severity of the injury can range from laryngeal fractures to compression injury of the recurrent laryngeal nerves. Despite standard lung mechanics and appropriate evidence of ventilation oxygenation with a lack of pneumonic process or atelectasis. Trauma to the recurrent laryngeal nerve or vocal cords will be difficult to assess and may precipitate the loss of airway like this patient had. Plan a controlled extubation with the ability to reintubate immediately, should it be necessary on these types of patients. We recommend having a fiberoptic scope like the glide scope on standby to re-establish an airway.

Suicide is the act of taking one's own life in a moment of despair as a response to a stressful situation. There can be many factors that augment the feeling of hopelessness, such as depression, anxiety, mental illness, loss of a job, substance abuse or isolation. When Covid 19 became a reality, a vast majority of people went into a panic hoarding food and basic household supplies. It was evident by the shortage of cleaning supplies, toilet paper and restrictions set on how many items one could buy. After the shortages, came social distancing, closing of most commercial establishments and stay at home orders in many states. This was a stressor to all of society, causing many to have a bleak perspective on life and on the future. Table 1 below provides data from 2016 on method of suicide courtesy of the [CDC WISQARS Leading Causes of Death Reports](#)

Suicide by Method (2016)	
Data Courtesy of CDC	
Suicide Method	Number of Deaths
Total	44,965
Firearm	22,963
Suffocation	11,642
Poisoning	6,698
Other	3,662

The National Institute of Mental Health (NIH) has classified suicide in the top 10 causes of death in the United States, claiming 47,000 people. [Centers for Disease Control and Prevention \(CDC\) WISQARS Leading Causes of Death Reports 2017](#) Both the CDC and NIMH provide video resources and information to assist family members and to persons considering self-harm. NIMH has a national suicide prevention lifeline.

### **Conclusion:**

We propose that for all complete or partial hangings, control extubation may be performed in all these patients with the ability to reintubated immediately with direct visualization of vocal cords. Direct damage to the nerve, vocal cords, or the voice box may be difficult to assess. Swelling, partial blockage, and complete lack of function of the vocal cords may not be visualized during CT of the neck. One control extubation can assure that the patient can continue having a patent airway if not able to protect it. Suicide can be exacerbated by many contributing factors, at present the prevalent focus is due to the uncertainty and fear caused by Covid-19. CDC and NIMH provide resources on preventing and assisting persons considering self-harm.

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