Open laryngeal trauma. A rare neck trauma presentation. A case report

Elizabeth Alcala Ochoa M.D.
Gonzalo Vega Sandoval M.D.
Citlalli Berenice Rodriguez Cervantes M.D.
Alexis Ordaz Contreras M.D.
Fernando Eli Olvera Camacho M.D.
Dania Yulieth Baez Armenta M.D.
Andres Hernandez Martinez M.D.
Metztli Erreguín Breña M.D.

Queretaro, Mexico

Background:
We present the case of a 35-year-old male patient with a history of substance abuse, who was admitted to the emergency department with a penetrating neck injury in zone II that had been evolving for 12 hours, and he was hemodynamically unstable. Surgical exploration revealed vascular, muscular, and laryngopharyngeal injuries. A grade III laryngeal injury and pharyngeal laceration were described, for which primary closure and a sternocleidomastoid patch were performed. Aerodigestive injuries are rare, with high morbidity and difficult management, so we present an alternative surgical approach with good outcomes.

Keywords: Neck trauma, head and neck reconstruction, laryngeal trauma.

Case Report

General Surgery

OPEN ACCESS

The larynx is a complex anatomic structure, and a properly functioning larynx is essential for breathing, voice, and swallowing. (5) Laryngotracheal trauma is a rare entity, with an incidence of 1 in 125,000 visits to the emergency department. Laryngotracheal injuries are reported in 0.1 to 10% of those with cervical trauma and involvement of adjacent structures has been evidenced in 66.9% of these cases. Laryngeal injuries are rare, occurring in only 1 of 5000 to 137,000 emergency room visits and among only 1 in 445 patients with severe injuries, laryngeal trauma mortality rate is reported between 1.6% and 11% and is associated with secondary lesions. (5)(1) It is the second most common cause of death in patients with head and neck trauma after intracranial injury. (2)

The severity of laryngeal injuries is assessed according to Schaefer-Fuhrman's classification. Grade I injuries are the most frequent, present in 52% of the patients 10, followed by Grade II injuries representing 37% to 45% of the cases. (1)

Case report

This is a 35-year-old male patient with a history of substance abuse (alcoholism, cocaine, and crystal meth). He has been diagnosed with major depressive disorder of unknown duration with unspecified treatment. There were two previous suicide attempts, both highly lethal involving self-inflicted neck injuries that did not damage vital structures.

He presented to the emergency department in shock with the following vital signs: blood pressure 70/40 mmHg, heart rate 105 bpm, oxygen saturation 94%, respiratory rate 26 bpm. Family reported a 12-hour evolution of a self-inflicted neck wound in zone II caused by a sharp object, with no active bleeding but presence of saliva.

We decided surgical treatment, involving orotracheal intubation. Direct laryngoscopy revealed extensive laryngeal edema and partial vocal cord paralysis; emergency tracheostomy was performed to secure the airway, and a nasogastric tube was inserted. Further evaluation showed complete section of the right internal jugular vein, fracture-dislocation of the hyoid bone, complete section of the right facial artery, a penetrating injury to the laryngopharynx around 2 cm in length, exposure of the cricoid cartilage and mucosa. The right internal jugular vein and facial artery were ligated, and primary closure whit non absorbable suture was performed in two layers of the laryngopharynx and larynx. A sternocleidomastoid patch was placed, leaving an open drain and finally we closed in layers before admission to the intensive care unit.

A methylene blue leak test on the fifth day postoperatively showed leakage through the tracheostomy tube. The patient continued fasting and parenteral nutrition for three more days and then underwent a contrast study that did not demonstrate leakage. He started on oral intake with good tolerance. Finally, he was referred to a psychiatric hospital for management of the underlying mental health condition.

From the General Surgery Department at Hospital General de Queretaro, Queretaro, Mexico. Received on June 4, 2024. Accepted on June 8, 2024. Published on June 9, 2024.

DOI 10.5281/zenodo.11540792

Figure 1. Neck wound in zone II caused by a sharp object, with no active bleeding but presence of saliva.

Discussion

External laryngeal trauma is an uncommon injury, which tends to occur as part of a multiple injury. While laryngeal trauma is rare, it is most seen in association with other, often severe, injuries and so the initial assessment may be complicated by the severity of any associated injuries to the head, thorax or abdomen. However, securing the airway remains the main priority. (3) All patients with ongoing bleeding, clinical instability, expanding neck hematoma, signs of airway obstruction, or depressed level of consciousness will require definitive airway protection. (6)

The subsequent management of laryngeal injuries is dependent upon the severity of the injury as determined by Schaefer's classification. Grade I: These patients can be managed medically, without the need for intubation or tracheostomy. They will however require careful observation for 24–48 hours. Grade 2: These patients will require a tracheostomy for airway stabilization followed by urgent endoscopic assessment including micro laryngoscopy, bronchoscopy and oesophagoscopy. Grade 3, 4 and 5: In addition to tracheostomy and endoscopy these patients will require open exploration of the larynx via a midline thyrotomy with or without laryngeal stenting (3)

In all the situations that surgery is necessary we suggest anesthetic examinations of the esophagus and larynx with direct laryngoscopy and endoscopy, respectively. Significant mucosal lacerations, unstable fractures, or displaced fractures will require an open neck examination and probably a thyrotomy for treatment. The mucosa should be mended first to provide a covering and prevent scarring or webbing. Any esophageal and pharynx injuries should be addressed, and finally, any laryngeal fractures should

Figure 2. Aero-digestive injury. We observed the endotracheal tube. The anterior zone injury is supra-epiglottic, it has a diagonal disposition downwards, injuring the cricoid cartilage along the path and the posterior part reaches the glottis.

be reduced and corrected. Repairing soft tissue and skin should come last. (4)

The devitalized tissue should always be removed, only healthy mucosa, submucosa, and muscle should be used to perform the closure. The reinforcement of primary closure with viable perilesional tissue is controversial, it has been used in esophageal perforations, those in favor of this technique argue that it may decrease the risk of a potential fistula, thus modifying morbidity and mortality, tissues described in literature for reinforcement include pericardial patch, vascularized pleural pedicle, sternocleidomastoid, pectoralis major, and omentum. (8)

Due to its role in phonation, breathing and alimentation, injuries to the aero-digestive tract also expose the patient to severe later impairment and a poorer quality of life. (7) The severity of complications might range from highly minor to catastrophic. As the intralaryngeal mucosa heals, any lesion to it is likely to have some granulation tissue. This can occasionally be rather serious and result in scarring or, extremely rarely, an obstructive tumor. Cicatrix development is a terrifying complication, and the best prevention is quick mucosal healing and avoiding laryngeal muscle or exposed cartilage. Long-term tracheostomy reliance may occur if scarring is severe or persistent. Wound healing complications such as recurrent tracheo- or laryngo-cutaneous fistulae are fortunately uncommon, although they can occur. Vocal fold paresis or paralysis evident at the

DOI 10.5281/zenodo.11540792

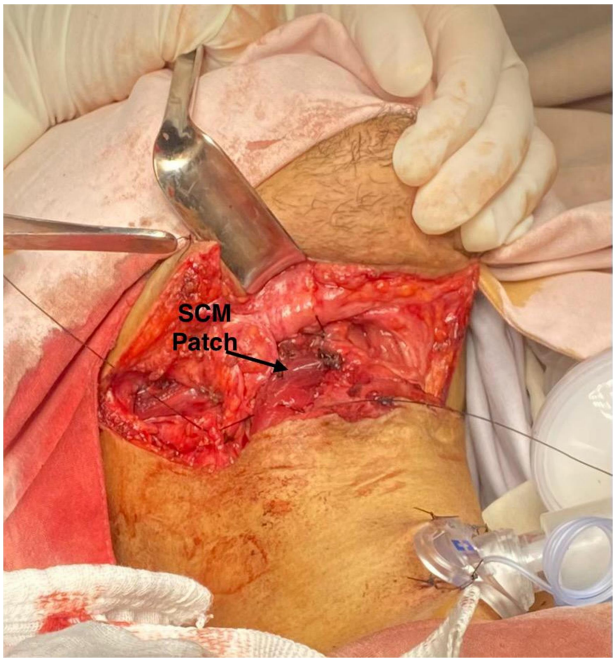

Figure 3. Sternocleidomastoid muscle patch.

presentation following trauma would commonly improve, but it may take up to a year. (4)

Conclusion

The primary closure in two planes with a sternocleidomastoid patch emerges as a surgical alternative for the management of aero-digestive injuries. In our center, we do not have specialists or recommended materials in the literature for the evaluation of these types of injuries. The implemented management showed adequate efficacy in our patient, who had a good clinical evolution. We conclude that the described technique is a suitable alternative for centers like ours, although it is still too early to assess the late complications that the patient may present.

Conflicts of interests

The authors have no conflicts of interest in the development of this research.

Acknowledgements

To the head of the General Surgery Service of the Cadereyta Hospital, for the trust and teamwork.

References

1. Herrera MA, Tintinago LF, Victoria Morales W, Ordoñez CA, Parra MW, Betancourt-Cajiao M, et al. Damage control of laryngotracheal trauma: the golden day. Colomb Med [Internet]. 2020;51(4): e4124599.
2. Moonsamy P, Sachdeva UM, Morse CR. Management of laryngotracheal trauma. Ann Cardiothorac Surg [Internet]. 2018;7(2):210–6.
3. Thevasagayam MS, Pracy P. Laryngeal trauma: a systematic approach to management. Trauma [Internet]. 2005;7(2):87–94.
4. Malvi A, Jain S. Laryngeal trauma, its types, and management. Cureus [Internet]. 2022
5. Elias N, Thomas J, Cheng A. Management of laryngeal trauma. Oral Maxillofac Surg Clin North Am [Internet]. 2021;33(3):417–27.
6. Shilston J, Evans DL, Simons A, Evans DA. Initial management of blunt and penetrating neck trauma. BJA Educ [Internet]. 2021;21(9):329–35.
7. Berget J, Tonglet M, Ransy P, Gillet A, D'Orio V, Moreau P, et al. Direct and indirect injuries of the pharynx and larynx. B-ENT. 2016; Suppl 26(2):59–68.
8. Braghetto M I, Rodríguez N A, Csendes J A, Korn B O. Perforación esofágica: Experiencia clínica y actualización del tema. Rev Med Chil [Internet]. 2005;133(10).

Elizabeth Alcala Ochoa
General Surgery
Hospital General de Queretaro
Queretaro, Mexico.

 DOI 10.5281/zenodo.11540792