International Journal of Otorhinolaryngology
2024, Vol. 10, No. 2, pp. 69-73
https://doi.org/10.11648/j.ijo.20241002.15

Case Report

Open Trauma to the Larynx by a Stab Wound: A Case Report

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Abstract

Introduction: Open laryngeal trauma is rare. Only early and appropriate diagnosis and treatment can preserve or restore the respiratory and phonatory functions of the larynx and prevent the appearance of disabling functional sequelae. *Material and method*: This was a 50-year-old patient with a history of psychiatric illness, admitted for treatment of a penetrating wound to the neck following an attempted self-lysis with a bladed weapon (knife). On examination, we objectified a conscious patient with a makeshift bandage soiled with blood at the neck. A respiratory murmur was also perceived. Given this picture, the patient was immediately taken in a lying position to the operating room for surgical management. The postoperative course was marked on D13 by a decannulation process and a complete decanution on D15 postoperatively. We proceeded to remove the nasogastric tube on D21. A cure without respiratory or vocal sequelae was obtained on D28 postoperatively. *Conclusion*: Open trauma is a diagnostic and therapeutic emergency. If unrecognized or poorly managed, it can be life-threatening in the immediate term or cause serious long-term after-effects.

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Received: 11 September 2024; **Accepted:** 29 September 2024; **Published:** 18 October 2024

Keywords

Trauma, Bladed Weapon, Larynx

1. Introduction

External trauma to the larynx is rare. This can be explained by the anatomical situation of the larynx, its mobility and the elasticity of the cartilages. They can be encountered at any age, but more often in young adults, and with a male predominance [1]. Only early and appropriate diagnosis and treatment can allow the preservation or restoration of respiratory and phonatory functions of the larynx and avoid the appearance of disabling functional sequelae dominated by stenoses [1, 2]. A well-codified diagnostic and therapeutic strategy has been defined, which should allow an improvement in the management of these traumas [3].

Through a clinical observation we will review the literature, according to the clinical and therapeutic aspects of an open trauma of the larynx.

2. Materials and Methods

Clinical observation

This was a 50-year-old patient with a history of psychiatric illness, admitted to the emergency reception services of Nianankoro Fomba Hospital in Ségou, for treatment of a penetrating wound to the neck following an attempted self-lysis with a bladed weapon (knife) figure 1.

Figure 1. *Etat de plaie ouvert a son admission.*

On examination, we observed a conscious patient with a makeshift bandage soiled with blood on his neck. A respiratory murmur was also heard. Given this picture, the patient was immediately taken to the operating room in a lying position for surgical management.

After rapid conditioning, we performed a low safety tracheostomy with placement of an intubation tube through the tracheostomy orifice.

On examination of the wound, we discovered a jagged wound of approximately 10 cm, hemorrhagic on zone 2 of the neck, a rupture of the anterolateral faces of the thyrohyoid membrane of the larynx, a horizontal section of the thyroid cartilage with detachment of the foot of the epiglottis. A section of the hypopharynx exposing the cervical spine. A section of the branches of the right anterior jugular vein and the MSCM exposing the subdigastric muscle and the right submandibular gland. The other structures of the larynx, the neurovascular bundles of the neck were not affected. In addition, we note a large abdominal wound without breach of the peritoneum.

We performed a ligation of the veins, a repair of the hypopharyngeal mucosa with vicryl 3.0. A suture of the thyroid cartilage and a reinsertion of the foot of the epiglottis. The suture of the muscular and cutaneous plane followed by the placement of a nasogastric tube for gavage and a tracheotomy cannula after extubation (figure 3). A visceral surgery team was involved in the management of the abdominal wound.

Figure 2. *Reparation cervicale avec mise en place de canule de tracheotomie.*

Adjuvant treatment consisted of antibiotic therapy based on Amoxiclav for 7 days, analgesia based on Paracetamol,

short-term corticosteroid therapy and supportive psychotherapy. The psychiatric pathology found was acute depression. The postoperative course was marked on D13 by a decannulation process and a complete decanution on D15 postoperatively. We proceeded to remove the nasogastric tube on D21. A control nasofibroscopy highlighted the integrity of the laryngeal structure. Healing without respiratory or vocal sequelae was obtained on D28 postoperatively (Figure 3).

Figure 3. *Etat a j28 post operatoire.*

3. Discussion

3.1. Epidemioclinically

Open laryngeal trauma is rare, representing approximately 15 to 20% of laryngeal trauma and 0.2 to 8% of neck wounds depending on the series. In civilian practice, attempts at self-lysis and assaults represent the main etiology of open trauma, far ahead of work accidents (explosion, spinning top) and high-speed traffic accidents (trauma by crushed sheet metal, larynx impaled by a brake handle) [4, 5, 6].

Stab wounds most often result in clean wounds. The blade slides over the laryngeal cartilages and cuts the areas of least resistance: infrahyoid muscles, cricothyroid membrane, thyrohyoid membrane, trachea. The vascular axis is protected by the sternocleidomastoid muscles [7, 8]. Throat wounds are generally suprahyoid and do not involve the larynx. Section of the thyrohyoid membrane may be accompanied by section of the epiglottis and damage to the superior laryngeal nerves [9, 10].

Hypopharyngeal and esophageal lesions are rare in laryngeal stab wounds. They are more common in cases of tracheal injuries. They may be associated with recurrent nerve section, with a major risk of damage to the large vessels. [6, 11].

The functional signs are all inconstant and can be variously associated. Dyspnea is immediate or delayed, it conditions the attitude to adopt. It can take the form of pulmonary congestion linked to flooding by blood and saliva during open trauma. Dysphonia is almost constant. Pain when swallowing is due to mobilization of the traumatized larynx and can also reflect hypopharyngeal contusion. Coughing reflects tracheobronchial flooding and salivary aspiration. Swallowing disorders (dysphagia) are more or less clear, associated with hypersalivation responsible for pharyngeal then tracheobronchial congestion. [6, 12].

On cervical clinical examination, a median and anterolateral cervical wound is noted and may be associated with a laryngeal wound. The diagnosis of laryngeal involvement is obvious when there is a blowing wound, more or less hemorrhagic (20% of cases for Mouth). A hypopharyngeal or esophageal wound may be suggested in the presence of salivary discharge. a loss of laryngeal relief, in particular depression of the anterior thyroid angle; pain on palpation or movement of cartilage, indicating a fracture; subcutaneous emphysema, indicating an opening of the laryngotracheal axis [9, 12, 13].

In the presence of severe trauma, the clinical examination assesses the general condition of the injured person, looking for signs of shock and associated injuries [6, 14].

Vascular lesions: are common in neck wounds: 31%. Apart from the extent or appearance of the bleeding, a vascular wound should always be suspected based on the path of the wound, being wary of venous wounds that may appear secondarily and in the presence of an extensive hematoma [15, 16]. The neck is usually divided into three regions [10, 16]:

1) zone I: from the clavicle to the cricoid;
2) zone II: from the cricoid to the mandibular angle;
3) zone III: from the mandibular angle to the base of the skull.

Vascular lesions are more common in zone I wounds where they are often occult [17].

Cervical spine injuries: A fracture must systematically be sought before any manipulation of the cervical spine and in particular before any endoscopy [6, 13, 18].

Nerve injuries: The recurrent nerves or superior laryngeal nerves are most commonly affected [13, 18].

Digestive lesions: Present in 33 to 50% of open traumas, they must be systematically sought and treated. Neglected or unrecognized, they are the cause of very serious secondary complications: mediastinitis, tracheo -esophageal fistula [15, 16].

Facial injuries: The mandible is often affected, with the injured person having the reflex to lower the chin to protect himself. Fracture of the mandible promotes posterior fall of the tongue, which aggravates dyspnea [6, 14].

Examination of the larynx with a nasofibroscopy is the emergency examination of choice for most authors; it allows assessment of laryngeal mobility, the state of the respiratory tract, the integrity or otherwise of the laryngeal mucosa, and the presence of exposed cartilage. [19, 20, 21].

Frontal and lateral cervical X-rays are: systematically performed, without hyperextension, allowing: to check the integrity of the cervical spine; to objectify an incipient subcutaneous emphysema, a tilt of the epiglottis, a narrowing or a

deviation of the laryngeal lumen; to detect the presence of foreign bodies (projectiles); to objectify the presence of a retropharyngeal air effusion, indicating the opening of the digestive tract [6, 13, 22].

Chest X-ray: It can reveal a pneumomediastinum, a pneumothorax. Mediastinal widening or hydropneumothorax should raise suspicion of a digestive wound [6, 23].

Cervical CT scan: It perfectly visualizes the cartilages and laryngeal lesions: displaced or non-displaced fractures, cricoarytenoid or thyroarytenoid dislocation [12, 24].

Hypopharyngeal and esophageal transit: In case of doubt about the existence of a pharyngeal or esophageal wound, opacification is carried out using water-soluble contrast products [12, 16].

Angiography: may be of interest for patients with suspected vascular injury in zones I and III of the neck, who are hemodynamically stable and have no respiratory problems. In particular, it may allow angiographic treatment of exposed vertebral pedicle lesions that are difficult to treat surgically [12, 25].

3.2. Conduct and Treatment

EMERGENCY ACTIONS

In the presence of severe trauma, emergency measures are necessary:

1) reestablishment of a respiratory system: significant dyspnea, extensive subcutaneous emphysema require emergency treatment;
2) treatment of shock: establishment of a venous access and perfusion of macromolecular solutions while waiting to know the blood group, oxygen therapy with humidification of the inspired air, possibly corticosteroid therapy;
3) control and stopping of bleeding.

Immediate intubation carries a significant risk of worsening endolaryngeal injuries, aspiration and decompensation of laryngotracheal disinsertion. It is difficult due to changes in the laryngeal structures and/or possible hemorrhage. However, it remains, most of the time, the only way to save the injured person, by reestablishing a respiratory tract and allowing ventilation until arrival at the hospital. Indeed, if immediate tracheotomy, without cervical extension, represents the most suitable solution for this type of situation, its emergency performance in the middle of tissues torn by the hematoma and subcutaneous emphysema requires training that few doctors, or even resuscitators, possess. In open trauma, intubation is sometimes possible directly through the laryngeal wound itself. The placement of a catheter or balloon cannula allows tracheobronchial flooding to be stopped and aspirations to be performed. The injured person is transported as quickly as possible, avoiding extension of the cervical spine [13].

However, less serious trauma, without immediate respiratory distress, benefits from rapid transport, under close monitoring, and medical treatment (venous access, oxygen therapy, corticosteroid therapy) due to the risks of secondary aggravation. Intravenous antibiotic therapy is started immediately if possible.

IN HOSPITAL ENVIRONMENT

On arrival at the hospital, if the condition of the injured person allows it, the questioning of the injured person or, failing that, of those close to him specifies:

1) the time of the trauma;
2) the circumstances and mechanism of the accident, elements of orientation on the potential severity of the trauma [6, 19];
3) the age of the injured person, their medical history;
4) treatments already carried out (in particular initial corticosteroid therapy which can reduce or delay the onset of dyspnea), the existence of a correct anti-tetanus vaccination. The clinical examination looks for signs of shock. A biological assessment is immediately requested to assess blood loss: blood group, blood count, hematocrit, blood ionogram. Ensuring satisfactory ventilation and then controlling any possible hemorrhage are the first steps to take [12, 13].

At the end of this examination, three situations may arise:

1) *either the trauma is isolated:*
   a. stage I laryngeal trauma benefits, after a nasofibroscopy examination, from a CT scan to check the integrity of the laryngeal cartilages, and from hospitalization for monitoring for at least 24 hours under aerosol therapy, corticosteroid therapy and monitoring by pulse oximetry [20, 24];
   b. stage II laryngeal trauma generally requires an initial tracheotomy, an endoscopic assessment under general anesthesia and monitoring in a hospital setting;
   c. stage III, IV and V trauma, after initial tracheotomy and endoscopy, requires surgical exploration;
2) either it is a complex cervical trauma:
   a. ensuring satisfactory ventilation and then controlling any possible hemorrhage are the first steps to take [12, 13];
   b. a fracture of the cervical spine must then be treated;
   c. treatment of the laryngeal trauma then occurs, associated with treatment of any pharyngeal or esophageal wound;
3) either the trauma is part of a multiple trauma:
   a. the problem of what to do only arises in the absence of respiratory problems;
   b. nasofibroscopy examination, the risk inherent in ignoring the initial diagnosis and/or secondary decompensation means that performing a first tracheotomy to control breathing and rest the larynx is the solution which seems to us to provide maximum safety;
   c. such an attitude should also be discussed in a patient who cannot communicate (coma) and in whom the cervical examination or the history of the trauma suggests laryngeal trauma [8, 12, 13].

4. Conclusion

Stab wounds, generally resulting in clear and systematic laryngeal wounds and injuries. Open trauma is a diagnostic and therapeutic emergency. If unrecognized or poorly managed, it can be life-threatening in the immediate future or cause serious long-term after-effects. Immediate management requires, as a priority, the restoration of a respiratory system, treatment of shock or stopping of bleeding.

Abbreviations

MSCM Sternocleidomastoid Muscle

Conflicts of Interest

The authors declare no conflicts of interest.

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