

# Open External Laryngeal Trauma: A Report of 3 Cases Treated at Kamenge University Hospital

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## Abstract

This study is a retrospective analysis of three rare cases of open external laryngeal trauma primarily resulting from self-harm attempts and assaults managed over five years. These injuries constituted a medical-surgical emergency requiring immediate, multidisciplinary intervention, including surgical exploration to repair underlying laryngeal, muscular, and vascular structures. Although the patients were successfully intubated (avoiding tracheotomy), a good functional prognosis depends on prompt diagnosis, rapid management, and adherence to post-operative follow-up, which proved challenging for some patients.

**Keywords:** Open External Laryngeal Trauma, Neck Injuries, Airway Obstruction, Surgical Management, Laryngeal Fracture, Thyroid Membrane, Epiglottic Injury.

## Introduction

Open external laryngeal trauma is rare. It can pose formidable problems in emergency settings. It predominantly affects young adult males. Open laryngeal trauma can be isolated or part of a multiple trauma context. The complexity of potential clinical pictures is largely explained by the multiplicity of anatomical elements that traverse the cervical region and which can be the source of associated injuries [1, 2].

These traumas constitute a medical-surgical emergency, capable of causing aesthetic and irreversible sequelae, rapidly threatening the patient's vital prognosis due to airway or aerodigestive obstruction, or uncontrollable hemorrhages [3].

Our goal is to study the clinical, therapeutic, and evolutionary characteristics of open external laryngeal trauma to develop an appropriate management plan based on the severity of the initial injury assessment.

## Patients and Methods

This is a retrospective study of three cases, over a period of 5 years, from January 1, 2018, to December 31, 2022, at the

Kamenge University Hospital Center (CHUK).

The data sources were the follow-up medical records of patients admitted to the ENT department of CHUK.

## Results

### 1st Case

This was a 30-year-old female patient with no particular pathological history who was transferred to us by Mpanda Hospital for an anterior cervical wound following an attempted self-harm. She arrived about 5 hours after the trauma. In management, she had already received 2 units of whole blood (Baxter's), analgesic treatment, anti-tetanus serum, and compressive dressings applied to the wound. Clinically, the patient was conscious, presented with dysphonia, and had a jagged transverse anterior cervical wound of 10cm in zone II exposing the thyroid cartilage. There was slight bleeding from the anterior neck vessels. There was a passage of air bubbles through the wound, the anterior section of the thyrohyoid membrane, the pre-thyroid muscles, and the branches of the anterior jugular veins. The patient did not benefit from any complementary examination as it was an emergency, and she was admitted to the operating room.

Under general anesthesia, a suspension laryngoscopy was performed, and no mucosal lesions were observed. The patient was intubated; after prepping and draping, a fissure was noted at the junction between the epiglottis and the thyroid cartilage. The thyroid cartilage was opened via a median thyrotomy, revealing disinsertion of the foot of the epiglottis and a pre-epiglottic space hematoma. The treatment involved ligation of the anterior jugular veins, reinsertion of the foot of the epiglottis, drainage of the hematoma, a U-suture of the fissure at the epiglottis-thyroid

cartilage junction with absorbable Vicarly thread No. 2-0, and layer-by-layer closure down to the skin. A nasogastric feeding tube was placed.

Post-operatively, she was placed on antibiotic prophylaxis, corticosteroid therapy, anti-reflux treatment, and monitored in the intensive care unit. The outcome was good, with discharge on the 10th day after removal of the nasogastric tube, with no respiratory or vocal sequelae.



**Figure 1:** Preoperative Appearance of Patient No. 1

## 2nd Case

This was a 53-year-old male patient who was transferred to us by Kabezi Hospital for the management of a penetrating neck wound following a knife assault by criminals. He arrived 9 hours after the incident; the hemorrhage had stopped. He had been given anti-tetanus serum, and a compressive dressing was in place. He presented with dysphonia, dyspnea, and a slightly altered general condition. On inspection, he had an anterior cervical wound of about 8cm, sectioned pre-thyroid muscles, and the passage of air bubbles through the wound.

On palpation, there was abnormal mobility between the cricoid cartilage and the thyroid cartilage, with a slight degree of luxation. The emergency complete blood count (CBC) showed Hb at 12g/dl.

No imaging examination was performed, and he was immediately admitted to the operating room for surgical exploration.

Under general anesthesia, after prepping and draping, a cervicotomy was performed following the wound line, with surgical exploration from the superficial to the deep plane; this revealed a section of the anterior jugular veins and lesions of the pre-thyroid muscles, along with a cricothyroid fracture with a horizontal line. Reduction and suture of the cartilaginous fragments were performed with Poyal 2-0 thread, ligation of the branches of the anterior jugular veins, suture of the muscular lesions, and layer-by-layer closure.

After the intervention, a nasogastric feeding tube was placed, but the patient removed it the next day. He was placed on antibiotic prophylaxis (a 3rd-generation cephalosporin and an aminoglycoside) and anti-reflux treatment. The post-operative course was marked on D2 by subcutaneous cervical emphysema, which resolved spontaneously. He was discharged on the 8th day, stable, but with persistent dysphonia. He did not return for his follow-up appointment.



**Figure 2:** Preoperative Appearance of Patient No. 2

### 3rd Case

This was a 37-year-old male patient who consulted for an anterior cervical wound; he had been assaulted by someone with a knife. The patient arrived at CHUK four days after the accident; clinically, he was stable but had dysphonia, a blowing cervical wound located in zone II, weeping pus, and a foul odor. He had delayed seeking treatment for the wound at home. The management involved putting the patient on antibiotic therapy, analgesics, corticosteroid therapy, and local care, and then he was scheduled for exploration in the operating room the next day.

Under general anesthesia, a suspension laryngoscopy with a 30° scope and video column was performed, and the larynx appeared normal. The patient was intubated, and an exploratory cervicotomy was performed. A section of the infrahyoid muscles and a median fistula in the thyrohyoid membrane were discovered. The fistula was repaired, and an infrahyoid muscle flap was created to reinforce the fistula; then, the sectioned muscles were repaired. Layer-by-layer closure was performed, and a nasogastric feeding tube was placed. On post-operative D4, the patient removed the tube and refused its reintroduction, and on the 8th day, the patient left against medical advice (Elopement).

### Discussion and Literature Review

Open laryngeal trauma is rare, accounting for 15 to 20% of laryngeal trauma and 0.2 to 8% of neck wounds [4-6]. In our series, out of a total of 3541 surgical procedures performed in the operating room over 5 years, we collected 3 cases of open external laryngeal trauma, i.e., 0.08%.

In civilian practice, attempted self-harm and assaults represent the majority of open trauma etiologies [7-9]. Stab wounds usually result in clean wounds. The vascular axis is protected by the sternocleidomastoid muscles

Slashing wounds are generally suprahyoid and do not affect the larynx. Sectioning of the thyrohyoid membrane may be accompanied by sectioning of the epiglottis and involvement of the superior laryngeal nerves. In our series, one patient was a victim of an attempted self-harm, and the other two suffered an assault with a sharp weapon. Clinically, open laryngeal trauma leads to an absolute emergency situation where the patient's vital prognosis is at stake.

- The functional signs are all inconstant.
- Dysphonia is almost constant, ranging from simple hoarseness to aphonia.
- Dyspnea determines the emergency management. It can be immediate or delayed, and of variable intensity.

Dysphagia is more or less noticeable, associated with hypersalivation, and is responsible for pharyngeal and then tracheobronchial congestion. The cervical wound is of variable extent. In our series, all patients presented with dysphonia and an anterior cervical wound; one had dyspnea, another had hemoptoic cough indicating tracheobronchial flooding, and the third had a wound contaminated with pus. In the literature, lesions in this zone II of the neck may affect vascular, airway, digestive structures, and the laryngeal cartilages. In our series, we found a section of the branches of the anterior jugular veins in two cases, a section of the thyrohyoid membrane in one case, a fistula of the thyrohyoid

membrane in one case, a disinsertion of the foot of the epiglottis in one case, and a cricothyroid fracture in one case. Paraclinical assessment: A biological workup is immediately requested to assess blood loss.

Cervical CT scan has become the reference examination for assessing laryngeal injuries. It helps to specify the extent of laryngeal trauma, the nature of the lesions, and the presence or absence of associated injuries [10-12].

Our patients had a biological workup, but did not have imaging tests because it was an emergency. The first two were admitted immediately to the operating room for surgical exploration and repair of the lesions, and the last was operated on the day after his arrival.

This approach is consistent with that of some authors, such as Schaeffer and A. Charfi et Coll, who state that a CT scan may not be performed when the indication for urgent surgical exploration is obvious [13].

**Therapeutic Management:** The management of external laryngeal trauma includes a medical and a surgical component.

The priority is airway security and stabilization of vital signs. Management is provided by a multidisciplinary team involving surgeons, anesthetists, and intensivists.

**Surgical Exploration:** Any wound penetrating beyond the platysma muscle must be explored.

The first major principle is early exploration (within the first 24 hours) of the lesions, from the surface to the depth after a cervical incision or by using the wounds, and repair from the depth to the surface. This approach has the advantage of preserving the respiratory and phonatory prognosis, allowing for better healing, and limiting progression towards complications such as strictures, local superinfections, and cartilaginous lysis. Mucosal lesions are repaired first to cover the cartilages, preferably using inverted extra mucosal sutures to limit the risk of local superinfection, which is a source of granuloma and chondritis [14].

In our series, our patients underwent an exploratory cervicotomy. In the first case, we performed ligation of the anterior jugular veins, drainage of the pre-epiglottic space hematoma, reinsertion of the foot of the epiglottis, suture of the thyrohyoid membrane, and suture of the muscular lesions.

In the second case, we performed reduction and suture of the cartilaginous fragments, and sutures of the sectioned pre-thyroid muscles.

In the third case, we performed suture of the thyrohyoid membrane fistula and suture of the sectioned infrahyoid muscles. Regarding tracheotomy, some teams consider that, to secure the airways, intubation is dangerous and risks aggravating endolaryngeal lesions and decompensating the respiratory state. They then indicate a prophylactic tracheotomy. However, this technique remains a subject of controversy.

In our series, none of our patients benefited from a tracheotomy;

they were admitted to the operating room and intubated to allow for surgical exploration of the lesions. Our technique is consistent with that of other teams, such as the American College of Surgeons and Mc Crystal who recommend an initial intubation attempt and recourse to tracheotomy if the latter fails [15].

It does not always seem necessary because epiglottoplasty was performed without tracheotomy, which is explained by the absence of mucosal lesions, as was the case in the Mbonyingingo series. Authors such as Mc Crystal DJ et al. and Mandel JE et al. found in their studies that the complication rate for emergency tracheotomy was 7.8%, which therefore acts as a deterrent to its use as a first-line procedure [16-18].

**Medical Management:** Treatment consists of vocal rest, a semi-sitting position, humidification treatment, corticosteroid therapy, and anti-reflux treatment, as well as antibiotic therapy. Anti-tetanus serology is necessary for open laryngeal trauma. Antibiotic therapy is started early in open laryngeal trauma and continued for 2 to 10 days to prevent the risk of infection, particularly perichondritis [19,20].

In our series, in accordance with the literature, all three patients were placed on antibiotic therapy. Two were put on a 3rd generation cephalosporin, and the third was put on amoxicillin-clavulanic acid and gentamicin. The nasogastric tube is usually placed, even in the absence of a pharyngeal wound, in traumas requiring surgical exploration. It is removed as quickly as possible.

In our series, our patients were put on corticosteroid therapy postoperatively to combat laryngeal edema. Other authors also propose corticosteroid therapy to fight laryngeal edema.

Prescription of anti-reflux treatment is systematic after laryngotracheal trauma, even minor (H2-blockers and more recently, proton pump inhibitors) [ 21]. This treatment aims to combat potential gastroesophageal reflux, which can cause laryngeal inflammation, risking delaying good lesion healing or causing strictures [22]. In our series, two of our patients were also put on anti-reflux treatment in accordance with the literature. Subsequent clinical surveillance involves indirect laryngoscopy and especially nasofibrosopic examination, every 2 weeks.

Nasofibrosopic examination is the preferred examination in an emergency for most authors, but also for post-operative monitoring. It is a well-tolerated examination. Its purpose is to check functional recovery and to detect the occurrence of a potential stricture. This examination was not performed in our series due to a lack of equipment. In our series, the patients underwent suspension laryngoscopy before surgical exploration, and no laryngeal mucosal lesions were observed.

Complications of external laryngeal trauma are dominated by the formation of granulomas, which can progress to fibrous stenosis of the laryngeal passage. Infection is the most frequent complication in hospitalized patients. It is mainly seen in cases of open trauma or mucosal breach.

Speech therapy aims to optimize functional results. It should not be neglected but requires patient adherence and motivation. Despite the existence of a speech therapy center, the patient who

presented with dysphonia did not adhere to the treatment.

Functional results are assessed by two important criteria: voice quality and the restoration of normal breathing. In the literature, the vocal outcome of laryngeal trauma is generally good. It depends on several factors, including the severity of the initial lesions and the time to management. In our series, one patient developed subcutaneous emphysema on the 2nd post-operative day, but the emphysema resolved spontaneously. This same patient had dysphonia upon discharge; for the others, the outcomes were good. The patients were supposed to return for a follow-up indirect laryngoscopy two weeks later, but none of them kept the appointment. The 3rd patient left against medical advice on the 8th day after the intervention (Elopement).

## Conclusion

Open external laryngeal trauma is rare, representing 0.2 to 8% of neck wounds. Their etiologies are dominated by attempted self-harm and assaults. They constitute a diagnostic and therapeutic emergency. If unrecognized or poorly managed, the vital prognosis is compromised, and they can pose a real danger due to the risk of asphyxia or hemorrhage from vascular axis involvement. Open laryngeal traumas are often clean wounds in the case of sharp weapon trauma or truedélabrement, where skin lesions are associated, with or without substance loss. Rapid and adequate management is necessary and must be multidisciplinary, involving surgeons, anesthetists, and intensivists. This management primarily requires the restoration of the respiratory tract, treatment of shock, or stopping the hemorrhage. Functional results, namely the resumption of normal breathing and correct phonation, depend on the promptness of diagnosis and rapid management. Post-operative surveillance is necessary to monitor the functional prognosis.

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