

Research article

# Airway Issues in Management of Severe Cut-Throat Injuries

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## Abstract

**Introduction:** Open or incised anterior neck injuries inflicted by sharp implements may be described as Cut-throat injuries (CTIs). The managing team is immediately confronted with airway management options, therefore, a close collaboration between the surgeon and the anesthetist is required to adopt a strategy that will guarantee a safe airway and ensure a successful outcome. In this article, we discuss the factors that led us to perform tracheostomy before repair while avoiding a rule of tracheostomy for all. **Method:** A prospective study was conducted at Federal Medical Centre, Gusau, between January 2019 -August 2023. Nine (9) patients presented with zone II cut-throat injuries and the choice of airway management was discussed between the surgeon and the anesthetist focused on symptoms of air obstruction and findings within the larynx that could lead to airway obstruction once repair was done. **Result:** There were nine patients (9) with the age range of 18-60 years. Tracheostomy rate was 55.6% (n=5). There is a positive correlation (+1) between tracheostomy and laryngeal edema. A subset of patients, 22.2% (n=2) was selected for repair without a tracheostomy. **Conclusion:** The choice of perfect airway management should result from constructive collaboration between the surgeon and the anesthetist. Tracheostomy should be considered in patients with asymptomatic laryngeal edema.

## Keywords

Laryngeal Edema, Cut-Throat Injury, Tracheostomy

## 1. Introduction

Open or incised anterior neck injuries inflicted by sharp implements such as razor blades, knives or broken bottle pieces or glasses may be described as Cut-throat injuries (CTIs) [1-3]. The term “severe” is often used when multiple neck structures are involved and often requiring specialized

care [4] Triggers for Cut-throat injuries in our environment are those related to banditry, kidnapping, communal clashes, and family dispute.

Victims rarely survive because of maximum brutality, and the few that do are frequently transported in suboptimal con-

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ditions. The managing team is immediately confronted with airway management options, therefore a close collaboration between the surgeon and the anesthetist is required to adopt a strategy that will guarantee a safe airway and ensure a successful outcome. The rate of tracheostomy in management of severe cut-throat injuries appears to be high, but there are a few unambiguous signals that would influence the team's decision to use a certain alternative, except for patients who presented with upper airway obstruction [5-7].

In this article we discuss the factors that led us to perform tracheostomy or endotracheal tube intubation and subsequent extubation before repair of cut-throat injury while avoiding a rule of tracheostomy for all as suggested in an earlier study in the same region [8].

## 2. Methods

A prospective study was conducted at Federal Medical Centre (FMC), Gusau, between January 2019 -August 2023. Gusau is the capital of Zamfara State in Northwestern Nigeria with coordinates 12°10'N 6°15'E.

Nine (9) patients in total had zone II cut-throat injuries. The surgeon and the anesthetist carefully considered the best course of action for managing the patient's airway based on symptoms of airway obstruction at presentation and findings within the larynx that could lead to airway obstruction after repair. The goal was to fit the patients for tracheostomy, endotracheal tube intubation, sedation, or local anesthesia prior to repair. All issues were thrashed out before a particular choice of airway management strategy was adopted for each patient.

Patient's age, gender, level of education, type of settlement, etiology, laryngeal findings, airway choice were documented and analyzed using SPSS version 25. One patient was excluded from the study because his injuries were treated in a secondary care hospital and had no feeding or airway complaints. All patients gave consent for study and SQUIRE 2.0 reporting guidelines was used as format for manuscript writing [9].

Ethical approval was obtained from the research and ethics committee of Federal Medical Centre, Gusau.

## 3. Result

A total of nine (9) patients and all males mostly from rural settlements were treated within the study period. Age range was 18-60 years with mean of  $34 \pm 13$  ( $\mu \pm SD$ ), victims were spread between the second and sixth decade of life, clustering of cases was noticed around third and fourth decade of life (Table 1).

Homicidal intent occurred in 77.8% and laryngeal edema was found in 55.6% of cases which matched 55.6% rate of tracheostomy (Table 2). There was a positive correlation between laryngeal edema and tracheostomy. (1.000\*\*  $p=0.000$  at  $\alpha=0.01$ ), simple linear, transverse supraglottic

thyroid cartilage injury and duration at repair time were negatively correlated (Table 3).

**Table 1.** Socio-demographics.

Variables	Frequency (n)	Percentage (%)
Age (years)		
11-20	2	22.2
21-30	3	33.2
31-40	2	22.2
41-50	1	11.1
51-60	1	11.1
Total	9	100%
Gender		
Male	9	100
Female	0	0
Total	9	100%
Level of education		
Primary	0	0
Secondary	3	33.3
Tertiary	1	11.1
No formal education	5	56.6
Total	9	100%
Type of settlement		
Rural	7	77.8
Urban	2	22.2
Total	9	100%

**Table 2.** Etiology, laryngeal findings, and choice of airway management.

Variable	Frequency (n)	Percentage
Etiology		
Homicidal	7	77.8
Suicidal	2	22.2
Accidental	0	0
Total	9	100%
Laryngeal Findings		
Laryngeal Edema	5	55.6
Healthy laryngeal mucosa	4	44.4

Variable	Frequency (n)	Percentage	Variable	Frequency (n)	Percentage
Total	9	100%	GA via ETTI	2	22.2
Linear supraglottic			Tracheostomy + GA	5	55.6
Thyroid cartilage injury	2	22.2	Sedation	1	11.1
No Cartilage injury	7	78.8	LA	1	11.1
Total	9	100%	Total	9	100%
Choice of Airway					

**Table 3.** Correlation between tracheostomy, laryngeal edema, linear supraglottic thyroid cartilage injury, and duration at repair time.

		Tracheostomy	Laryngeal edema	Linear thyroid cartilage injury	Duration at repair time (Hours)
Tracheostomy	Pearson correlation	1	1.000**	-0.60	-0.09
	Sig (2-tailed)		0.000	0.88	0.81
Laryngeal edema	Pearson correlation		1	-0.60	-0.09
	Sig (2-tailed)			0.88	0.81
Linear thyroid cartilage injury	Pearson correlation			1	-0.42
	Sig (2-tailed)				0.26
Duration at repair time (Hours)	Pearson correlation				1

\*\* Correlation significant at 0.01 level (2-tailed)

## 4. Discussion

Cut-throat injury in our environment affects men between second-sixth decade of life with clustering of cases around the third-fourth decade when physical activity is high, similar male preponderance has been reported [10, 11] Homicide account for 77.8% of cases in this study (see tables 1 & 2). Because of maximum force employed at the scene, the larynx and pharynx are usually exposed making restoration of the airway and pharynx paramount, but making the right decision is not always straightforward, therefore, the otolaryngologist and anesthetist must have a constructive collaboration to decide whether to perform tracheostomy to serve both intra and postoperative airway needs, trans-oral endotracheal intubation and subsequent extubation without tracheostomy, or sedation, all issues or areas of concern should be addressed before choosing a particular modality of airway management option to prevent an unfavorable outcome and outrageous treatment modality [8].

Using endotracheal tube inserted through the open neck wound at a primary care level was reported [1], this modality was used as the initial method to secure airway in all cases that had tracheostomy via which anesthesia was continued

and the endotracheal tube was removed to allow clear field for the surgeon. The rate of tracheostomy was dictated by laryngeal edema, which is considered a risk factor for patients to develop immediate upper airway obstruction after repair, 55.6% of our patients were treated using this method (see table 2).

In this study, a perfect correlation between laryngeal edema and tracheostomy was seen (1.000\*\* p=0.000 at  $\alpha=0.01$ ). This further shows that even in absence of overt upper airway obstruction, tracheostomy should be considered always if laryngeal edema is noticed, this finding is corroborated by Bhattacharjee et al [10]. Other factors that were likely to have influence in our decision in favor of tracheostomy include simple linear transverse supraglottic thyroid cartilage injury and prolonged duration at time of repair which all appear to have a negative correlation, (table 3).

Laryngeal edema can result from fast spreading infection, local effect of saliva, reflux of gastric content, and direct environmental exposure, this may account for upper airway obstruction in most patients.

Generalization of these findings may be misleading considering the natural history of severe CTIs, as there are open questions about the negative correlation between linear thyroid cartilage injury, delayed presentation, and tracheostomy, this is due to the sample size. If there is any uncertainty about

a smooth post-operative course of patients selected for treatment without tracheostomy, it is better to perform a tracheostomy rather than run the risk of a disastrous post-operative airway obstruction.

As a rule, tracheostomy should be performed on patients who presented with overt upper airway obstruction or in anticipation that the patient will not maintain airway once repair is done, a subset of patients that would not have tracheostomy should be carefully selected [12, 13].

Repair was done without prior tracheostomy using general anesthesia via transoral intubation and subsequent extubation in two cases (22.2%) see table 2. The first case presented within two hours after the injury and had on-table assessment of risk for post operative upper airway obstruction which showed a possibility of success since there was no edema within the larynx and the thyroid cartilage was healthy, the post operative course was smooth. See picture labelled 1a and 1b.

Building on that experience, the second case presented 3 days after the injury with stable airway despite approximated edges of the anterior neck wound in natural position, a combined preoperative video laryngoscopy and on-table assessment showed no edema within the larynx; despite having a simple linear supraglottic transverse thyroid cartilage injury, repair was done fifth day after the injury without tracheostomy. Mild stridor occurred immediately after extubation but was resolved with chin lift and oropharyngeal airway, postoperative course was smooth. Prior hospitalization, judicious use of antibiotics and steroid could have prevented the development of laryngeal edema in this patient. See picture labelled 2a and 2b. A fibreoptic laryngoscopy was used by Davies to assess larynx before repair of the cut-throat Injury [14]. Whenever this modality is used for repair of cut-throat, a close monitoring plan should be adopted because the clinical picture could rapidly change.

Early presentation, supraglottic injury, absence of laryngeal edema are favorable factors for repair without tracheostomy. We have not met complex laryngeal, glottic or subglottic injuries which we believe tracheostomy should be considered always [1].

The decision to use sedation or local anesthesia was straightforward because the injuries were limited only to soft tissue of the neck, see table 2.

## 5. Conclusion

The choice of perfect airway management should be a result of constructive collaboration between the surgeon and the anesthetist. Tracheostomy should be considered in patients with asymptomatic laryngeal edema.

Picture showing the patient who presented within two hours (1a and 1b) and the patient who presented three days after the injury (2a and 2b), see figure 1. All repaired without tracheostomy.



**Figure 1.** Patients treated without tracheostomy.

## Highlights

A constructive collaboration between the surgeon and anesthetist is required for airway management.

Endotracheal intubation through the open neck wound can be lifesaving and a route for initial general anesthesia.

Tracheostomy should be considered always in patients with asymptomatic edema within the larynx.

A subset of patients should be carefully selected for repair without tracheostomy in supraglottic CTIs in absence of laryngeal edema.

## Abbreviations

CTIs	Cut-throat Injuries
ETTI	Endotracheal Intubation
GA	General Anaesthesia
LA	Local Anaesthesia

## Author Contributions

**Manya Caleb:** Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

**Solomon Joseph Hassan:** Conceptualization, Data curation, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing

**Jibrila Ibrahim:** Conceptualization, Methodology, Visualization, Writing – original draft, Writing – review & editing

**Inoh Mfon Ime:** Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

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**Yikawe Semen Stephen:** Validation, Visualization, Writing – original draft, Writing – review & editing

## Conflicts of Interest

The authors declare no conflicts of interest.

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