



Emergency tracheostomy: indications, techniques and complications in 67 cases at the Omar Bongo Ondimba Army Training Hospital

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ABSTRACT

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Introduction: Tracheotomy is the temporary or permanent surgical opening of the cervical trachea followed by the placement of a cannula.

Objective: to recall the indications, techniques and complications of emergency tracheotomy.

Materials and Method: This was a retrospective descriptive study conducted in the ENT and CCF department of HIAOBO, involving 67 medical records of hospitalized patients in whom a tracheostomy was performed in emergency from January 2010. to December 2019.

Results: The study involved 51 men (76%) and 16 women (24%), a ratio of 3.18 . The average age was 45.85 years with extremes of 5 and 78 years. Laryngeal dyspnea was the reason for consultation in 86.57% of cases. The indications were malignant tumors of the upper aero-digestive tract in 54% of cases, difficult extubation in intensive care patients in 12% of cases, laryngeal papillomatosis in 12% of cases, inflammatory pathology in 7 cases, traumatic pathology 4 cases, extrinsic tracheal compression, muscle disease and laryngo -tracheal stenosis in 1 case each. Tracheotomy was performed under general anesthesia in 73% of cases and under local anesthesia in 27% of cases. Complications were observed in (16.42%).

Conclusion: Emergency tracheotomy is a survival gesture. Mastery of the technique, the right choice of equipment, perfect knowledge of the anatomical relationships of the trachea, and postoperative care help to minimize complications.

KEYWORDS:

Emergency tracheotomy, laryngeal dyspnea, cancers, papillomatosis , foreign body.

1. Introduction

Tracheostomy is the opening of the cervical trachea followed by the placement of a cannula. It is intended to achieve a short-circuit of the upper airways [1]. Its technique of realization can be surgical or percutaneous and concerns both the child and the adult. The ideal technique is the surgical technique performed in the operating room.

Recent technical developments have made percutaneous tracheostomy easier at the patient's bedside. It therefore benefits from being practiced early and is the technique most

used in burn victims [2]. There are two emergency techniques: regulated emergency tracheotomy and extreme emergency or rescue tracheotomy.

The method of carrying out the tracheotomy therefore depends on the clinical condition of the patient. Indeed, a patient with dyspnea who fights effectively benefits from an emergency tracheotomy but performed in the operating room. Salvage tracheostomy is necessary in a patient at the pre-anoxic stage, with impaired consciousness, disappearance of signs of struggle, respiratory pauses and major cyanosis [3]. Tracheostomy is also performed in intensive care on patients on prolonged mechanical ventilation (more than 7 days) or for difficult extubation [4]. If the tracheotomy remains a life-saving act, its complications must remain in the mind of the nursing staff because they are sometimes formidable. In Africa, this intervention is used. In Côte d'Ivoire, the experience of the Otorhinolaryngology (ORL) department of

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the University Hospital Center (CHU) of Treichville in Abidjan reported an incidence of 54% of emergency tracheotomies [5].

In Gabon, a first study carried out in the ENT and Cervicofacial Surgery (CCF) department of the Omar Bongo Ondimba Armed Forces Training Hospital (HIAOBO) on tracheotomies in general revealed an incidence of 42.16% of emergency tracheotomies [6]. Thus, these various works highlight the importance of tracheotomies in the hospital environment. The main objective of this work is to report the main indications of this life-saving technique and its impact on the future of emergency tracheostomy patients in the ENT and CCF department at the HIA OBO. To achieve this objective, we will rely on the following specific objectives: identify the epidemiological aspects of tracheotomy; discuss the different indications for this intervention; describe the different techniques used; to call the interest of monitoring and postoperative care; list the complications and sequelae of tracheotomy.

2. MATERIAL AND METHODS

2.1. Study framework

Our study setting was the Otorhinolaryngology and Cervicofacial Surgery (ORL and CCF) department of the OMAR BONGO ONDIMBA Armed Forces Training Hospital (HIA OBO), which is a public establishment of multidisciplinary care, located in the town of Libreville (Quartier Pk9).

2.2. Duration and type and study

The study spanned a period from January 1st 2006 to December 31, 2015, ie a period of 10 years. This was a retrospective, descriptive study aimed at identifying patients who underwent emergency tracheostomy in the ENT department of the HIA OBO.

2.3. Inclusion and non-inclusion criteria

Were included, all the patients, of the two sexes and the various ages having undergone an emergency tracheostomy in the department of ORL of the HIA OBO during the period of study.

Not included in our study are all the other types of tracheotomy, in particular those known as safety tracheostomy, performed for intubation during suspension laryngoscopy or for prolonged intubation in the intensive care unit.

2.4. Data collection techniques and tools

The data collection technique used was the use of patient observation notebooks and operating report registers. The collection tool was a survey sheet containing the variables studied (appendices).

2.5. Statistical analysis

The entry and analysis of our data were carried out using the EPI INFO version 7 software. The Microsoft Office EXCEL 2013 spreadsheet was used to produce the graphics. In addition to the epidemiological characteristics, it was a question of raising from the observation books of the patients and the registers of the operating reports : the indication of the tracheostomy, the conditions and the operating technique, the etiology of the air obstacle and the evolution of the patient after the tracheostomy.

3. RESULTS

3.1. Epidemiological data

3.1.1. Frequency of emergency tracheostomy

During the study period, 125 tracheotomies were performed. 67 tracheotomies were performed in emergency, i.e. 53.6% with an annual incidence of 6.7 tracheotomies.

3.1.2. Breakdown by sex

Of the 67 tracheotomies in our study, 51 had been performed in male subjects (76.12%) against 16 (23.88%) in female subjects, i.e. a sex ratio of 3.19.

3.1.3. Distribution by age

The average age of our patients was 45.85 years with extremes of 5 years and 78 years.

The 50-60 age group was the most represented with 16 cases. Fifteen subjects or 22.38% of the patients were children and 52, adults or 77.62%

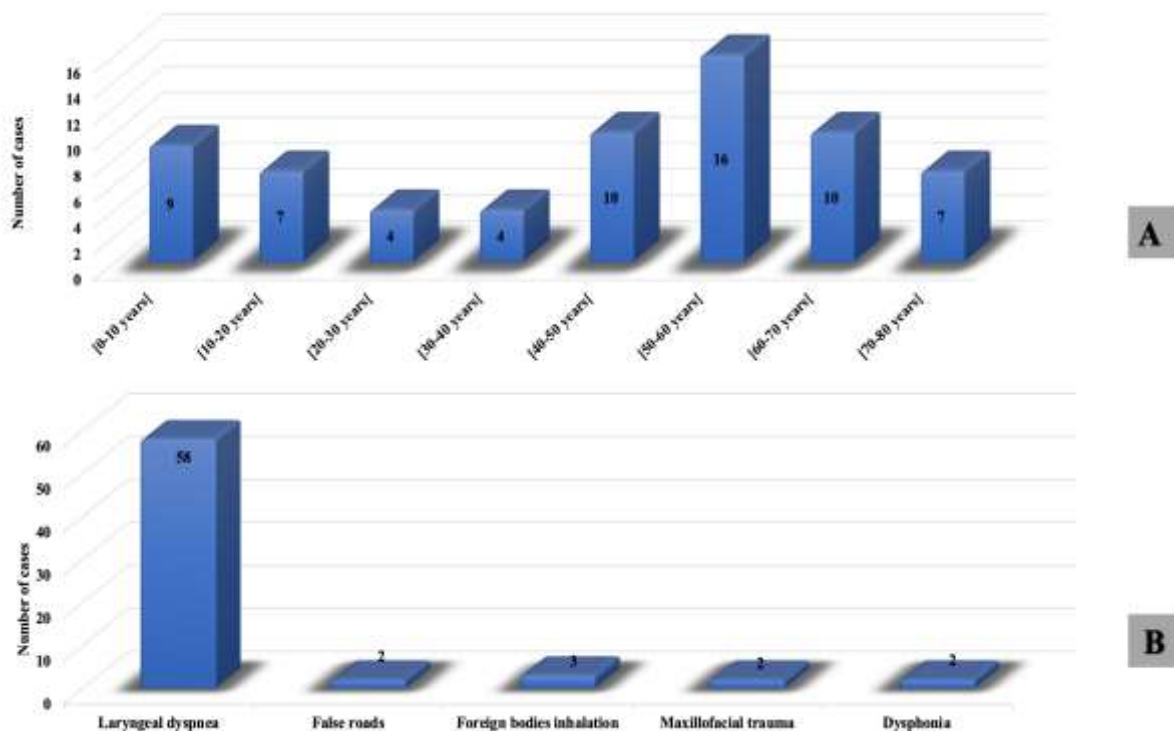


Figure 1 : A : Distribution of patients according to age group; B : Different consultation symptoms.

3.2. Clinical study

As shown in Figure 2, laryngeal dyspnea was the most common consultation symptom (58 cases or 86.57%).

3.3. Indications

In our study, the indications for tracheotomy were integrated into the following sections:

1. Malignant tumor pathologies (pharyngo-laryngeal cancers): 36 cases: Cancers of the upper aero-digestive tract were at the top of our tracheotomy indications (36 patients, or 53.73% of cases)
2. Benign tumor pathologies (laryngeal papillomatosis): 8 cases: Laryngeal papillomatosis was reported in 11.94% of cases, i.e. 8 patients. It was the main indication in children.
3. Difficult extubation: 8 cases: Eight patients in the intensive care unit underwent emergency tracheostomy following failure to wean from mechanical ventilation.
4. Inflammatory pathologies: 7 cases: (Angion oedema): 2 cases and acute dyspneic laryngitis: 5 cases (mainly in children).
5. Traumatic pathologies (4 cases): Maxillofacial trauma: 2 cases and laryngo-tracheal foreign bodies: 2 cases
6. Extrinsic compression of the trachea (compressive cervical adenopathy): 1 case

7. Muscular diseases (Duchenne muscular dystrophy): 1 case
8. Laryngo-tracheal stenosis: 1 case
It was an iatrogenic stenosis after prolonged intubation.

Table 1: Indications for tracheostomy in our series

Directions	Number	%
Cancers of the aero-digestive tract	36	53.73
Laryngeal papillomatosis	8	11.94
Difficult extubation	8	11.94
Acute laryngitis	5	7.46
Maxillofacial trauma	3	4.48
Quinke's edema	2	2.98
Laryngo -tracheal foreign bodies	2	2.98
Compressive cervical lymphadenopathy	1	1.49
Duchenne muscular dystrophy	1	1.49
Laryngo -tracheal stenosis	1	1.49
Total	67	100

Among the 15 children listed in our series, 8 or 53.33% of tracheotomies were performed in emergency for severe acute dyspnea symptomatic of laryngeal papillomatosis (Figure 2 A).

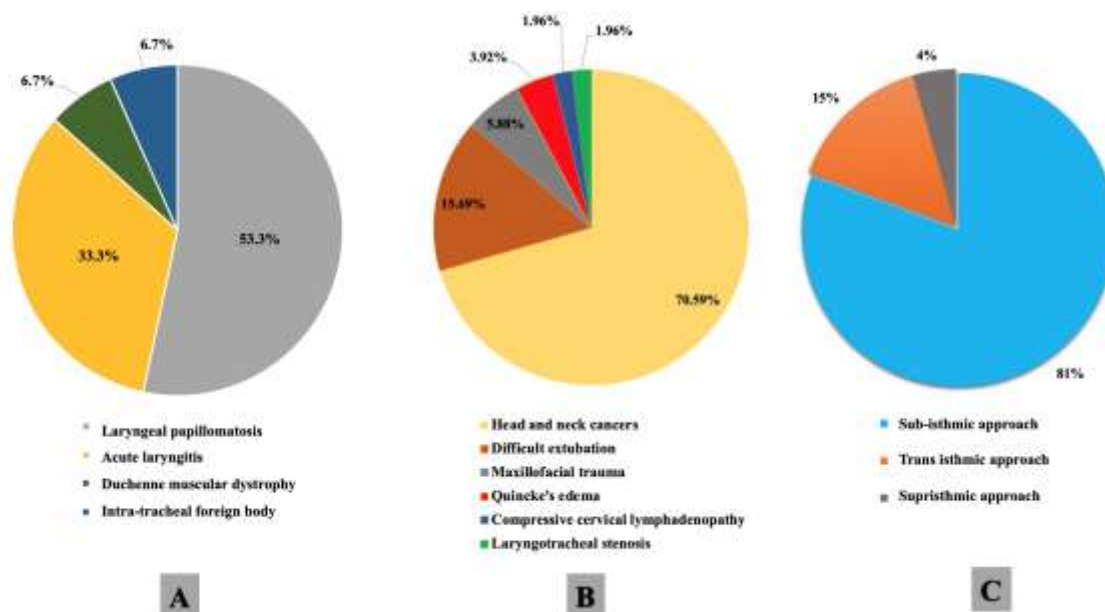


Figure 2: A : Indications in children; B : Indications in adults; C: Different isthmus approaches

3.4. Service and operator

All tracheotomies were performed by an otolaryngologist and in the presence of an anesthesiologist. The majority of tracheotomies were performed in the operating room and in the ENT and CCF department. This intervention was also performed urgently in the intensive care unit in 8 patients (11.94%) whose extubation was difficult.

3.5. Conditions and techniques used

No percutaneous technique was performed during our study period. The operative technique used was conventional surgical tracheostomy. It was performed in 73% of cases under general anesthesia and in 27% of cases under local anesthesia. Under general anesthesia, the patient was placed in the supine position with oro-tracheal intubation. Under local anesthesia, the patient was in a half-sitting position with oxygen goggles, injection of xylocaine adrenaline then incision in the skin. The skin incision was horizontal in the majority of cases (64 cases or 95.52%) and vertical in 3 cases or 4.48%. An injection of xylocaine adrenaline was made again at the level of the isthmus before the opening of the trachea. Depending on the location of the tracheal opening, the tracheostomy was sub-isthmus in 54 cases (80.6%), trans-isthmus in 10 cases (14.93%) and supra-isthmus in 3 cases (4.47%) (Figure 2C).

The tracheal opening was performed between the second and the fourth ring with an H-shaped tracheal flap in 55 cases (82.09%) and a U-shaped one in 12 cases (17.91%). In the child, it is also made between the second and the fourth ring but the tracheal opening is vertical with location of the edges. A patient-specific low-pressure balloon cannula was used in all cases; she was held in place by wires around her neck.

3.6. Evolution and complications

3-6-1-Postoperative care

The postoperative treatment had associated in all cases antibiotic therapy, mucolytics and analgesics. The change of dressing and the care of the orifice are once a day. Tracheal aspirations with maximum asepsis are performed several times a day.

3-6-2-Decannulation

Decannulation was difficult to specify for our entire series. The average duration of the tracheostomy is generally 4 to 20 days.

A patient with a nasopharyngeal fibroma wore the cannula for 6 months while awaiting surgical treatment after embolization.

3-6-3-Complications

Postoperative follow-up was simple in 56 patients, or 83.58%.

Complications attributable to tracheostomy occurred in 11 patients (16.42%)

Table 2: complications of tracheostomy

	Complications	Number	%
Intraoperative complications	Heart failure	1	9.09
	Early complications	Hemorrhages	4
Secondary complications	Subcutaneous emphysema	3	27.27
	Retractile scars	2	18.18
Late complications	Tracheal stenosis	1	9.09
Total		11	100



Figure 3: Tracheostomy cannula (iconography of the ENT department, Pr MILOUNDJA).

A: Different components: 1) **Mandrel:** serves as a guide for inserting the cannula; 2) **Internal cannula :** it is inserted into the external cannula. It protects the external cannula from a risk of blockage caused by secretions from the lungs since it can be removed for cleaning; 3) **External cannula :** used to keep the stroma open; 4) **Balloon :** flexible membrane that surrounds the outer cannula, when inflated, it acts as a seal between the trachea and the cannula to prevent air leaks ; 5) **Pilot balloon:** used to inflate and deflate the balloon. **B: Balloon cannula ; C: 7-year-old child tracheostomized** for severe respiratory distress secondary to inhalation of a foreign body.

4. DISCUSSION

4.1. Epidemiological data

4-1-1-Incidence of tracheotomy

It is a frequent surgery in ENT. In our series , 6.7 tracheotomies were performed urgently every year. These values are in agreement with those of certain authors of the sub-region such as KPEMISSI et al [7] and KEITA et al [8] whose work focused on tracheotomies in general found respectively annual frequencies of 7.4 cases and 6.6 cases of emergency tracheotomies.

All emergency tracheotomies in our study accounted for 53.6% of tracheotomies performed during our study period. An international study by ESTEBAN et al. [9] found an average tracheostomy completion of 13.5% in patients and significant intercountry variability . In France, this figure seems to be around 5%. Thus, the incidence of tracheostomy varies from one country to another and no regulatory provision limits its practice from one country to another.

4-1-2-Patient demographic characteristics

Sex: Our study reports a male predominance with a male/female sex ratio of 3.19. This predominance is also reported by the majority of studies with a sex ratio ranging from 2.38 to 3.5 [5, 10, 11, 12].

Age: The average age of our sample is 45.85 years. It is similar to those reported in the literature, with the 50 to 60 age group being the most represented [2, 13] . According to KOFFI-AKA [5], the most affected age group is between 60 and 70 years old. In YUEN's study [11], it is between 61 and 80 years old, with an average age of 61.64 +/-17.06 years. Cancerous pathologies of the upper aerodigestive tract, which represent the majority of indications for tracheostomy, are more frequent in adulthood.

4.2. Reason for consultation

In our series, the reason for consultation is essentially laryngeal dyspnea (86.57% of cases). MOSTADI et al. [12] also found this predominance in 85% of cases . This could be explained by the fact that in our communities the pathologies of the upper aero-digestive tract, especially cancers, are seen in consultation at a late stage requiring an emergency tracheostomy in the face of severe respiratory distress.

4.3. Indications for emergency tracheostomy in adults

Pharyngo-laryngeal cancers :

The frequency of carrying out a tracheostomy during the evolution of these cancers varies considerably according to

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the socio-economic and epidemiological context. These factors are decisive and hold:

- to the patient who most often confides first in the traditional healer;

- to practitioners: the symptoms that may suggest cancer beginning in the upper aero-digestive tract are most often trivialised. A patient with cancer of the hypopharynx can be treated for angina for a long time [14].

These cancers represent the main indication in our study (36 patients or 61.02%) whereas in the YUEN [12] and BABU [10] series, they presented respectively 17.8% and 22.85% of the indications .

We also find in the series of BADIANE et al. [15], a predominance of cancers of the larynx and hypopharynx (40.46% of cases). KPEMISSI in Togo [7], describe cancers of the larynx at the top of the indications for tracheotomy in an ENT department with a frequency of 37.8%.

In developed countries, the alternative technique for dyspneic head and neck tumors is laser clearing [16]. Thus, the large series of 266 patients with malignant tumors of the larynx and hypopharynx reported by BRENEMAN of the University of CINCINNATI includes only 7.9% of cases of tracheostomy [17].

Non-infectious and allergic laryngeal edema:

In our series, angioedema required a life-saving tracheotomy in 2 cases, i.e. 2.98%. Laryngeal edemas are of rapid formation, in a few minutes or a few hours and can be life-threatening. They require immediate treatment. Treatment is usually medical, but intubation may be necessary. Intubation is difficult if there is cervico-facial and/or lingual involvement of the oedema. Performing an emergency tracheostomy is then the solution [18].

4.4. Tracheotomy in children

Laryngeal papillomatosis :

Laryngeal papillomatosis is both a rare condition and the most common benign tumor of the larynx in children [19]. It is a predominantly male pathology [19, 20], two-thirds of the cases of which are seen in children, producing juvenile laryngeal papillomatosis , mainly before the age of 10 years. The seriousness of this juvenile form is due to its unpredictable evolution, marked by a very high potential for recurrence and the possibility of occurrence of severe acute dyspnoea, in the case of the florid form .

In our study, 15 children underwent emergency tracheotomy, of which 8 or 11.94% were carriers of laryngeal papillomatosis . Our data can be superimposed on those of BADIANE et al. [15]. KOFFI-AKA et al. [5] reported 14% of 37 emergency tracheostomy cases.

Acute dyspneic laryngitis :

The tracheostomy was performed in an emergency context after the failure of well-conducted medical treatment. It is

above all a frequent pathology in children between 1 and 6 years old [21]. It is most often of viral origin but also bacterial. In our study, 7.46% of emergency tracheostomy cases involved acute dyspneic laryngitis . These acute dyspneic laryngitis represent 33.3% of tracheotomies performed in children. In the series by BADIANE et al. [15], they represented 3.72% of the tracheotomies performed.

4.5. Conditions and techniques

Numerous studies show that the technique used was the classic surgical tracheostomy [5, 10, 11, 15, 22]. The same is true in our study. It was performed under general anesthesia in 73% of cases, but also under local anesthesia in 23% of cases. The skin incision was horizontal in the majority of cases (95.52%) and vertical in 4.48% of cases due to the urgency and the clinical condition of the patient.

The tracheostomy was sub-isthmic in the majority of cases (54 cases, i.e. 80.60%) and supra or trans-isthmic in the rest of the cases, with an H-shaped or U-shaped tracheal flap.

Although the transisthmic incision is the most recommended, the subisthmic tracheotomy remains the most common [7, 23]. Its choice, like the vertical skin incision, is linked to the speed of access to the trachea, allowing it to be opened directly, particularly in the event of an emergency.

A balloon cannula chosen according to the patient is used in all cases and is held in place by fastening means around the neck.

The practice of an adequate technique, the choice of an adapted cannula and the good quality of post-operative care reduce the frequency of complications.

We recall the current trend which is the practice of percutaneous tracheostomy, the kits of which are not yet available in our environment. This is a technique often performed at the patient's bedside under fibroscopy allowing continuous visual control which helps to take the landmarks in relation to the trachea and whose results can be superimposed on those of the surgical technique [1, 24]. .

4.6. Complications related to emergency tracheotomy

Complications attributable to emergency tracheostomy are diverse. The overall incidence of complications is about 16.42%, however their incidence in the case of a saving tracheostomy is higher (two to five times higher) [25, 26]. Our study reported complications in 13 patients, i.e. 16.88%. They are consistent with those described in the literature in varying proportions. [1, 24].

They are defined as:

Intraoperative complications (1 case)

We report 1 case of cardio-respiratory arrest recovered by external cardiac massage and administration of adrenaline. On the other hand Badiane [15] reported in his study a case of cardiac arrest, reversible but followed by death in the recovery room.

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postoperative complications (< 3 weeks) : 5 cases

Occur within the first 3 weeks. Early postoperative bleeding is the most frequent complication. In the literature, its overall incidence is between 0.8 and 5.7% [27, 28]. They are often due to insufficient hemostasis, the cough reflex can increase its risk by raising venous pressure.

In our series, there are 5 cases of haemorrhage from the tracheal orifice, 3 of which were quickly controlled and 2 others required readmission to the operating room.

Secondary complications (>3weeks<3 months) : 3 cases

Subcutaneous emphysema, which is caused by a very wide dissection of the subcutaneous tissue associated with excessively tight sutures around the cannula [29], most often releasing the stitches is enough to expel the air.

We note in our series, 3 cases which evolved spontaneously. Our data can be superimposed on those of the literature [5, 10, 15]. There were no cases of pneumothorax or tracheal orifice infection in our series.

Late postoperative complications and sequelae: 2 cases

These complications can threaten the functional prognosis of the patient through a tracheal stenosis and finally have a psychological impact due to an unsightly and indelible scar. In our series, we report tracheal stenosis and retractile scars. Late postoperative complications were revealed in 4 cases. This is due to the fact that cured patients no longer systematically came for consultation for a control tracheal fibroscopy. This observation was also made by MIGNONSIN [30].

Tracheal stenosis

Tracheotomy was complicated by tracheal stenosis in 2 patients. NGUESSAN and BENHAMOU report a case in their respective series [23,31]. These stenoses represent 4 to 60% of complications depending on the case [26]. The factors responsible for this complication are multiple. The main ones are:

- a poorly conducted surgical procedure (opening too high, source of necrosis and cricoid stenosis ; opening too wide or lateralised, source of collapse of the tracheal rings)
- unsuitable care (too frequent, sudden aspiration, with rigid probes);
- a cannula with an ill-adapted curvature or an overinflated balloon.

4.7. Decanulation

The evolution can be marked by an accidental decanulation, hence the interest of a reminder thread during the placement of the cannula. In our series, all patients received a reminder thread. According to BEDUNEAU et al. [32], the decision to remove the cannula depends on the disappearance of the cause that led to its placement. In our series, this parameter could not be studied objectively. The date of decanulation

was not systematically mentioned in the patient files. Nevertheless, the minimum delay for the tracheotomies performed was 3 days without exceeding 2 months. The same observation was made in KOFFI-AKA et al. in Treichville.

CONCLUSION

Emergency tracheotomy is indicated in upper airway obstructions, to improve ventilation. It is currently considered as a therapeutic gesture of survival whose usefulness and effectiveness are certain, but sometimes grafted with multiple complications. The risks of these complications can be minimized by mastering the operative technique, the right choice of equipment and appropriate postoperative care. In our case, all tracheotomies were performed surgically by an otolaryngologist. It would be desirable for anaesthetist-resuscitators and emergency physicians to be able to master this technique in order to optimize the management of patients both in hospitals and in the field of operation.

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AUTHORS' CONTRIBUTIONS

LP is the main author, designed the study and developed the protocols. AA collected and analyzed the data. ENG participated in the development of protocols. MNAB wrote and corrected the manuscript. MJ reviewed and made the necessary editorial corrections to the manuscript. NL supervised this work and definitively approved the submission of the revised version. All authors have read and approved the final version.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol was carried out in accordance with the Helsinki declaration. No name or clue that could reveal the identity of the patient has been written on the pre-established technical sheet to guarantee confidentiality and all records have been kept in a safe place.

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