

# Tracheotomy in ENT at CNHU HKM of Cotonou

Warou Dolou<sup>1\*</sup>, Stephen LA Lawson<sup>1</sup>, Sonia Lawson Afouda<sup>2</sup>, François Avakoudjo<sup>2</sup>,  
Wassi Adjibabi<sup>2</sup>, Berndadette Vignikin-Yehouessi<sup>2</sup>

<sup>1</sup>Department of Oto-Rhino-Laryngology, University Teaching Hospital of Kara, Kara, Togo

<sup>2</sup>Department of Oto-Rhino-Laryngology, University Teaching Hospital Hubert Koutoukou MAGA (HKM), Cotonou, Benin

Email: \*disamueli@live.fr

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## Abstract

**Background:** known since more than 5000 years, tracheotomy is indicated in severe obstructions of the upper airways or in improvement of ventilation in cases of problematic tracheal intubation. Its usefulness and efficiency are certain, but it needs regular assessments. **Aim:** to determine the frequency of tracheotomies in ENT at CNHU of Cotonou, identify the indications, surgical technics and the postoperative course. **Materials and methods:** the study was retrospective, based on files of patients who have had tracheotomies for ten years since 2010. **Results:** in 10 years, 105 tracheotomies were performed for 99 patients, average 10 to 11 per year. Patients were male in 61.9%. Extreme of age where 09 months and 80 years old. Children under 15 were concerned in 41.9%, while patients from 45 to 64 years old in 33.3%. Emergency tracheotomy represented 76%. Causes were tumors in 62.8%. Laryngeal papillomatosis was the predominant tumor in children; 28 cases or 26.67%. In adults, larynx cancer represented 20%. Skin incisions were horizontal in 94.3%. Tracheal opening was “H-shaped” in 92.4%. Complications occurred in 28.6%. They included granuloma (13.3%) and oeso-tracheal fistula (1.9%). Decanulation was possible in 87.6%, but it was more difficult in children. **Conclusion:** tracheotomy was an act of rescue in our practice.

## Keywords

Tracheotomy, ENT Tumors, Emergency

## 1. Introduction

Tracheotomy is the temporary or permanent opening of the trachea followed by the placement of a cannula. It is an important procedure in the treatment or prevention of respiratory emergencies in ENT [1].

The procedure is known since a very long time: mentioned since 3600 BC in

ancient Egypt and described by Guy de CHAULIAC (1300-1368), a French monk; the surgical tracheotomy as currently known was codified by CHEVALIER JACKSON [2]. The progress of endoscopy and the increasing of indications in the intensive care unit have allowed the development of less invasive procedures not requiring a surgical opening: there came percutaneous techniques [3].

Challenges of tracheotomy depend on the conditions and situations of practice. Sub-Saharan Africa is associated with low socioeconomic populations, few ENT who are concentrated in the main urban areas, and limitations in terms of health facilities. These factors have implications such as:

- Late consultations of patients often seen in an emergency context in which tracheotomy is the first procedure performed, sometimes under difficult conditions.
- Increasingly frequent demand for tracheotomy, linked to the increase in indications and the creation of intensive care units whose equipment does not always follow.
- Limits for the specific management of the causal affection, tracheotomy being sometimes the only therapeutic gesture practiced.

Therefore it is useful to periodically review the practice of tracheotomy in ENT departments. Hence the present study makes an assessment of tracheotomy in an ENT department in Black Africa.

The aim of this study was to determine the incidence of tracheostomy in ENT at the National Teaching school of Medicine of Cotonou (CNHU HKM), and to identify the indications with the causal conditions, the techniques used and the results.

## 2. Patients and Methods

The study was retrospective and descriptive, made in the department of Otorhinolaryngology and Head and Neck Surgery of the CNHU of Cotonou in Benin. It concerned tracheotomies performed for ten years since 2011.

The inclusion criteria were:

- All tracheotomies performed in the CNHU HKM of Cotonou.
- Tracheotomy performed by a Physician (Resident or Senior) from the ENT department of the CNHU HKM of Cotonou.
- Complete surgical report specifying the types of skin and tracheal incisions, the type of cannula.

Exclusion criteria were incomplete files and patients lost to follow-up.

A pre-operative check-up was required for planned tracheotomies: frontal chest X-ray, blood-cell-count, blood type, prothrombin and cephalin time. No pre-operative test was necessary for emergency cases.

Tracheotomies were performed in the ENT department operating room for patients planned for surgery or admitted during operating hours. On-call hours, tracheostomies were performed in the operating room of the emergency department.

Patients admitted for upper obstructive dyspnea had a pre-medication including: corticosteroid therapy, prophylactic antibiotic therapy (amoxicillin + clavulanic acid or ceftriaxone) and pre-oxygenation. Corticosteroid therapy was administered at a dosage of 1 to 10 mg/kg in a bolus, renewable after 15 to 30 minutes. In case of persistent dyspnea, surgery was indicated. These parenteral treatments allowed the patient to be disinfiltrated, disinfected and oxygenated in order to perform the procedure in optimal conditions. In the postoperative period, patients were given analgesics and antibiotics (7 to 10 days, or more in case of other indications). Corticosteroid therapy was stopped between the third and fifth day. A chest X-ray was ordered in case of postoperative dyspnea.

Simple cannula care was performed daily by the nurses. Cannula changes were the responsibility of the physicians. Patients tracheotomized for prolonged intubation returned to the ICU immediately after the procedure. ENT staff were involved in their cannula care.

All patients had follow-ups noted in the records by ENT department physicians. Once the emergency was resolved, the etiology of the dyspnea was investigated with its appropriate treatment. For patients with a tumor, CT scan showed the lacoalisation an extension and histopathological examination specified the histopathological type.

Patients with normal breathing and unproblematic decanulation were considered cured. Patients who could not support decanulation or whose etiological treatment did not allow a favorable evolution were considered as failures.

The parameters studied were: the age, the gender, the context of the intervention: emergency or programmed, the indications, the involved pathologies involved, the type of anesthesia, the cutaneous and tracheal incisions, the types of cannulas, the specific postoperative courses of tracheotomy with the complications attributable to the procedure and the time before decanulation.

As some patients had tracheotomies several times, the study focused on the number of tracheotomies, the calculations concerned the parameters for each procedure and not the number of patients.

### 3. Results

During 10 years, 105 tracheotomies were performed in 99 patients. Four patients had it twice and one patient had three times.

Patients were male in 65 cases or 61.9% of tracheotomies. Sex ratio was 1.44.

Age varied from 09 months to 80 years, with an average of 27.2 years. Children represented 41.9% against 58.1% for adults. Patient from 45 to 64 counted for 33.3% of tracheotomies. **Table 1** summarizes the distribution of patients depending to age.

We reported 80 cases of emergency tracheotomy, performed for laryngeal dyspnea with vital prognosis, *i.e.* 76.2%. Intubation tracheotomies concerned 16.2% and safety tracheotomies, were 7.6%. In 62% cases, tracheotomies were indicated for tumors, followed by trauma in 18%. **Table 2** shows the distribution according to the etiologies and the type of tracheostomy. **Figure 1** shows pictures

**Table 1.** Distribution of cases by age group (in years).

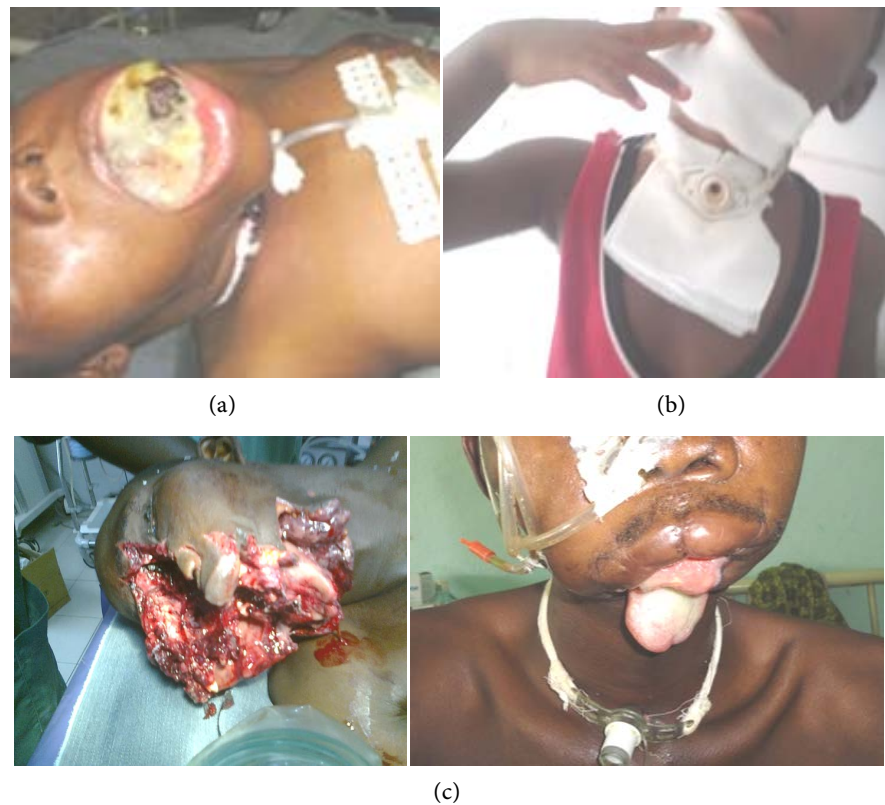
Age	n	%
00 - 05	18	17.1
06 - 10	19	18.1
11 - 15	07	06.7
16 - 24	06	05.7
25 - 34	05	03.8
35 - 44	05	04.8
45 - 54	15	14.3
55 - 64	19	19.0
65 - 75	09	8.6
75 - 80	02	1.9
Total	105	100

**Table 2.** Distribution according to etiologies and types.

Etiology	Tracheotomy of Intubation + safety	Emergency	Total	%
<b>Tumors</b>	<b>17</b>	<b>48</b>	<b>65</b>	<b>62.8</b>
Larynx	08	42	50	47.6
Mandible	04	01	05	04.8
Hypopharynx	02	03	05	04.8
Cavum	02	01	03	02.9
Oropharynx	01	01	02	01.9
<b>Traumatisms</b>	<b>-</b>	<b>19</b>	<b>19</b>	<b>18.1</b>
Larynx foreign bodies	-	09	09	08.5
Face	-	05	05	04.8
Laryngo-tracheal injury	-	05	05	04.8
<b>Infections/Inflammations</b>	<b>-</b>	<b>12</b>	<b>12</b>	<b>10.5</b>
Cervical cellulitis	-	07	07	06.7
Laryngitis	-	05	05	04.8
<b>Prolonged ventilation</b>	<b>06</b>	<b>-</b>	<b>06</b>	<b>05.7</b>
<b>Thyroid hypertrophy</b>	<b>02</b>	<b>-</b>	<b>02</b>	<b>01.9</b>
<b>Laryngeal paralysis</b>	<b>-</b>	<b>01</b>	<b>01</b>	<b>00.9</b>
<b>TOTAL</b>	<b>25</b>	<b>80</b>	<b>105</b>	<b>100</b>

of cases where tracheotomy was performed.

In children, 44 tracheotomies were reported representing % of total performed. Laryngeal papillomatosis was the first indication (26.67%), followed by foreign bodies in upper respiratory tract (8%), laryngitis (4.8%), upper-glottic



**Figure 1.** Iconography. (a) Tracheotomy of intubation performed for surgery for a large ameloblastoma; (b) 06 years-old male, tracheotomized twice for laryngeal papillomatosis; (c) Tracheotomy performed for a severe face injury caused by a gun.

angioma (0.95%) and face obstructive tumor (0.95%).

About the 65 tracheotomies in adults, 57.4% were indicated for tumors. These included 21 cases of laryngeal cancer, *i.e.* 20%. These were patients with chronic dysphonia of the voice or woody type, followed by progressively worsening laryngeal dyspnea, which was a sign of laryngeal obstruction. **Table 3** shows the distribution according to etiologies in adults.

Tracheostomy was performed under local anesthesia in 56.2%. All tracheotomies were surgical. **Table 4** details operative technique of the cases.

Postoperative course was uneventful in 71.4%. Complications occurred in 28.6%; 20.9% concerning emergency tracheotomies. Complications included: orificial granulomas (13.3%), emphysema (4.8%), infection (3.8%), tracheal stenosis (2.9%) and oeso-tracheal fistula (1.9%). Two deaths (1.9%) occurred during the anesthetic induction of tracheotomies indicated for prolonged intubation for a severe cerebral trauma and an encephalitis.

Decannulation was effective in 87.6%, after an average duration of 18 days, extremes at 2 and 198. **Table 5** shows the distribution according to the time to decannulation. Impossible decannulation was 4.8%, including. It concerned a child tracheotomized since 09 years for laryngeal papillomatosis, and four adults respectively with laryngeal cancer, mandibular tumor, laryngeal malformation and laryngeal stenosis.

## 4. Discussion

In terms of incidence: the study found an average of 10 to 11 tracheotomies per year. The same observation was made in 2007 by VIGNIKIN-YEHOUESSI B [4]

**Table 3.** Distribution of indications in adults.

	n	%
Malignant tumors	32	52.5
Larynx	21	20.0
Hypopharynx	5	4.8
Cavum	3	2.8
Oropharynx	2	1.9
Mandibule	1	0.9
Benign tumors (pharynx and face)	3	4.9
Traumatisms	10	16.4
Extensive cervical cellulitis	07	11.5
Prolonged ventilation	06	9.8
Thyroid tumors	02	3.3
Laryngeal paralysis	01	1.6

**Table 4.** Distribution according to surgical technique.

	Effectifs	%
<b>Anesthesia</b>	<b>105</b>	<b>100</b>
Local	59	56.2
General	46	43.8
<b>Skin incision</b>	<b>105</b>	<b>100</b>
Horizontal	99	94.3
Vertical	6	5.7
<b>Tracheal incision</b>	<b>105</b>	<b>100</b>
Under thyroid isthmus	98	93.3
Sus-isthmic	5	4.8
Trans-isthmic	2	1.9
<b>Shape of tracheal incision</b>	<b>105</b>	<b>100</b>
“I” or “H”	97	92.4
“U”	8	7.6
<b>Cannula material</b>	<b>105</b>	<b>100</b>
Metallic	65	61.9
Plastic	40	38.1
<b>Type of cannula</b>	<b>105</b>	<b>100</b>
Complete	69	65.7
Incomplete	36	34.3

**Table 5.** Distribution according to time to decannulation.

	n	%
<7 days	32	30.5
7 to 30 days	35	33.3
>30 days	25	23.8
Death before decannulation	08	07.6
Impossible decannulation	05	04.8
Total	105	100

in the same department over a period of 15 years, as did DIOP EM [5] in Senegal, OUOBA K. [6] in Burkina and KPEMISSI E. [7] in Lomé, Togo. Higher incidence were reported in Europe, by PUCHER [8] in Poland and KOITSCHEV [9] in Germany with respectively 215 and 170 cases in 10 years. The increasing demand for tracheotomy in intensive care units (mainly percutaneous tracheotomies) in developed countries partly explains their higher incidence.

Regarding gender, a predominance of males (61.9%) was noted in the ENT department at the Cotonou University Hospital. Same predominance was reported by KOFFI-AKA V [10] in Ivory Coast, YUEN H [11] and BABU V [12], with respectively found 78%, 74% and 70.2%. It is explained by the predominance on adult males for obstructive pathologies of the upper aerodigestive tract such as laryngeal cancers and cervical extensive cellulitis.

Concerning indications, emergency tracheotomies represented 76% imposed by laryngeal dyspnea at stage III or IV. These situations need quick response to save life. This marked predominance of rescue tracheotomies can be explained by the late consultations linked to poverty or to the long health paths of patients before arriving in a specialized environment. This is common in developing countries, of which Benin is a part, such as Burkina Faso [6], Ivory Coast [10] or Senegal [5]. In developed countries, emergency tracheotomies are performed in lower proportions, as reported by YUEN H [11] in Singapore with 49% or CHARFEDDINE [22] in Tunisia with 48%.

In adults, it was mostly laryngeal cancer representing 20% of the cases. This finding is confirmed by other authors such as KOFFI-AKA V [10], BABU V [12] and YUEN H [11] with respectively 31.5%, 22.8% and 18.5%.

In children, laryngeal papillomatosis was the first indication. This benign tumor is fatal because of its laryngeal site [13] which is fragile and high in the child. Symptoms are early dysphonia, followed by dyspnea at rest, evolving to a real asphyxia. The evolution is unpredictable, with frequent recurrences, especially in the florid forms. Tracheotomy is not recommended because it would favor the tracheal diffusion of papillomatosis [13]. However, in the study series, 26.67% of tracheostomies were due to laryngeal papillomatosis because the children were admitted with respiratory distress. In this context and given the difficulties of intubation because of the characteristics of the child's larynx (very

spasmogenic), in addition to the risk of diffusion of the clusters to the trachea, rescue tracheotomy is necessary in order to save the life immediately. The results of the series are comparable to those of VODOUHE SJ [14] with 20.3% ( $p < 0.001$ ) and significantly lower than that of KOFFI AKA V [10] who reported 37.9%. Laryngeal papillomatosis represented 63.6% of the indications for pediatric tracheotomies in the study series. In this indication, tracheotomy is often an emergency procedure as reported by DIOP [15] in Senegal and FASUNLA I [16] in Nigeria respectively 50.8% and 90%.

Other indications were encountered: dyspneic acute laryngitis represented 4.76% of the indications, a value close to that of VIGNIKIN-YEHOUESSI in 2007 [4] with 3.53% but different from the results of BABU V [12] B and YUEN H [11] with respectively 1.90% and 8.2%. Trauma represented 18.1% of the indications for tracheotomy, including 8.57% for laryngotracheal foreign bodies. This result was close to the 8.22% reported by VIGNIKIN-YEHOUESSI B [4]. AMUSA YB [17] recorded a higher proportion with 13.6% of laryngotracheal trauma. Cervicofacial cellulitis represented 6.7% of indications, close to the 7.8% recorded by LAWSON AFOUDA [18]. Prolonged intubation represented 5.7% of the indications. In these cases, tracheostomy allows the prevention of laryngeal lesions secondary to prolonged intubation, to secure the tracheal approach especially in agitated patients, to improve patient comfort and to facilitate nursing care [19] [20] [21].

Local anaesthesia was predominant with 61.9% of the reported cases. This result was confirmed by BABU V with 58% [12], CHARFFEDINE with 64% [22] and AMUSA YB with 68% [17]. It can be explained by the difficulties in achieving effective intubation in patients who arrive at stages of dyspnoea that do not allow general anaesthesia under the best conditions. Local anaesthesia is less convenient than general anaesthesia, because it needs the procedure to be quick and efficient to avoid respiratory decompensation. However, when the emergency situation requires tracheotomy to be performed as quickly as possible to save the patient, local anaesthesia is the best choice.

All the tracheotomies of the series were performed according to the classical surgical technique, because of the lack of material for the transcutaneous tracheotomies which require moreover an endoscopic control. This was the case for the series by VODOUHE [14] and AMUSA YB [17]. This place of classical tracheotomy by cervicotomy does not necessarily reflect a gap in the practices of the Cotonou department in relation to technical advances, because YUEN H [11] and BABU V [12] reported the same result with better equipments.

Horizontal cutaneous incisions are still the most common: 94.3% in the study series, 100% in BABU V [12]. In the study series as well as in other series [10] [11] [12] [22], the tracheal incisions were "H" or "U" shaped. The sub-isthmus site was the majority in the study series with 88% of cases, similar to the results of YUEN H [8], 89.2 with 84% and AMUSA YB [17] with 90%. Sub-isthmus tracheostomies allow a shorter, less hemorrhagic and more convenient procedure.



In the study series, the cannulas used were metallic in 65% of cases. They offer the advantage of being easily recyclable. KOFFI-AKA V [10] also reported a predominance of silver metal cannulas, the only variety available in their department.

About the postoperative course: complications represented 28.6% of the cases. Lower rates were recorded by BABU V [12] with 9.5% and YUEN H [11] 8.2%, who had a better technical platform and working conditions. Complications also depend on the quality of the cannular care. In the study series, decanulation was possible in 87.6%. Variable rates are reported by several authors, ranging from 75% to 92% [11] [12] [16]. Removal of a tracheostomy cannula depends on the disappearance of the causative condition. Removal of a tracheostomy tube depends on the disappearance of the causative condition. Difficulties with decanulation in children are related to laryngeal papillomatosis, a condition with an unpredictable course and possible recurrence.

## 5. Conclusion

Tracheostomy is a therapeutic procedure of survival whose usefulness and effectiveness are certain. It is necessary to know how to perform it cold in order to save human lives, especially children. Let us keep in mind that it is sometimes associated with complications that can be fatal in some cases.

## Disclosure of Interest

No disclosure related to this publication.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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