

# Thoracoscopy in Cameroon: Indications, Technics and Short Term Results

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## Abstract

**Introduction:** Thoracoscopy is a video-assisted surgical approach that mirrors the techniques used in thoracotomy. Our aim is to map the current state of thoracoscopy practice in Cameroon's hospitals. **Methods:** This was a descriptive study that collected both retrospective and prospective data over 57 months across four hospitals in Cameroon. It included 13 patients and focused on variables such as socio-demographic factors, clinical profiles, surgical procedures, and postoperative follow-up. **Results:** Thirteen patients, predominantly male (84.6%, n = 11), with a mean age of  $37.5 \pm 16$  years, were enrolled. Alcohol use (61.5%) and smoking (38.5%) were the most common past histories. The major complaints were dyspnea (84.6%) and chest pain (58.3%). The primary surgical procedure was clot-free thoracoscopy in 30.8% of cases, mainly for persistent hemothorax (41.8%). Most surgeries were elective (76.9%) and performed under general anesthesia with selective intubation (61.5%). The most common approach was single-port thoracoscopy (U-VATS) (76.9%), with no reported difficulties; however, one intraoperative incident occurred and was successfully treated. Drainage was performed systematically in all patients, and one case required conversion to open surgery. Postoperative complications were minor (Clavien-Dindo grade I) and mainly consisted of pain, with a mortality rate of 15.4%. No significant association was found between risk factors and the occurrence of complications or postoperative mortality. **Conclusion:** Thoracoscopy, a novel approach in our context, primarily focuses on minor thoracic surgeries.

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## Keywords

Thoracoscopy, Single-Port, Hemothorax, Cameroon

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### 1. Introduction

Thoracoscopy is the endoscopic examination of the pleural cavity, surrounding organs (diaphragm, pericardium, part of the mediastinum), and particularly the lung's peripheral surface [1]. This technique was first introduced by Jacobeus in 1911 to sever adhesions in the thorax [2]. Thoracoscopy is a video-assisted, minimally invasive surgical method using endosurgical tools, based on the same techniques as those used in thoracotomy, while maintaining equivalent safety. It involves inserting an endoscope connected to a camera and the required instruments into the pleural cavity [3].

Advantages of Thoracoscopy include optimal visibility of the entire lung and pleural space, significantly reduced postoperative pain with lower analgesic consumption, minimized blood loss, and better cosmetic results [2].

The year 1992 marked the rise of video-assisted thoracoscopic surgery (VATS) with the completion of the first lung resection through small incisions without separating the ribs. Gradually, the traditional multi-port approach evolved into a single-port (uniportal) approach. The development of uniportal VATS initially focused on minor procedures until 2010, when the technique was applied to major lung resections, and later to more complex procedures such as bronchial and carinal resections and vascular reconstructions.

Thoracoscopy is increasingly utilized in thoracic surgery, with its application depending on the surgeon's skill. Common indications include the diagnosis and treatment of pleurisy, biopsies and removal of certain pleural tumors, removal of lung nodules and lung biopsies, treatment of pneumothorax, biopsy of mediastinal lymph nodes, excision of certain mediastinal tumors, and performing pulmonary segmentectomy and lobectomy. The practice of thoracoscopy in Africa, however, is still under development. A 2015 study by Owono-Mbouengou *et al.* in Gabon [4] reported that video thoracoscopy constituted only 3% of video-assisted surgeries in the visceral surgery department of the Omar Bongo Ondimba Hospital over an eight-year period. Despite this, some studies on isolated indications have shown that video thoracoscopy is an effective technique for both diagnosis and treatment, with low morbidity and mortality rates [4].

In Cameroon, the use of this approach is less common, and to our knowledge, no studies on the subject have been conducted. Therefore, we aim to investigate the current state of thoracoscopic surgery practice, identify its indications and techniques, and evaluate the short-term outcomes.

### 2. Methods

This was a descriptive study that utilized retrospective data collected from Janu-

ary 2019 to December 2022, and prospective data from January 2023 to August 2023. It was a multi-centric study conducted in four hospitals in Cameroon:

- The Yaoundé General Hospital (YGH)

A first-category hospital, it comprises several departments, including the Digestive and Visceral Surgery Department, which has a team of two surgeons.

- Laquintinie Hospital in Douala (LH)

This hospital is a second-category facility featuring four surgical departments. Among them is the “C” surgery department, specializing in visceral and thoracic surgery and staffed by a team of five surgeons focused on digestive and thoracic procedures.

- The Yaoundé Teaching Hospital (YTH)

A first-category hospital with a surgery department comprising five surgeons.

- Yokadouma District Hospital (YDH)

A fourth-category hospital in the East region offers various services, including a surgery department with one thoracic surgeon.

Our target population comprised patients undergoing thoracic surgery through a thoracoscopic approach.

✓ Inclusion criteria

- For the prospective phase, we included patients of all ages and sexes who underwent thoracoscopy, had given their informed consent, and whose post-operative follow-up was conducted for 30 days after surgery.
- For the retrospective phase, we included files of patients of all ages and sexes who underwent thoracoscopic surgery and whose outcomes were known 30 days post-operation.

✓ Non-inclusion criteria

We excluded the following patients from our study: those who refused to participate or were lost to follow-up before the 30th post-operative day.

Word processing was conducted using Microsoft WORD 2010, data processing with CSPro Version 7.7, and data analysis through SPSS 23. Diagrams and tables were created using Excel 2018.

Ethical clearance was secured from the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé 1’s ethical and research committee.

Research authorizations were obtained from the directors of YGH, YTH, YDH, and LH.

We ensured the confidentiality of the information collected.

### 3. Results

#### 1) Sample

##### a) Size

We enrolled 13 patients: 6 in the retrospective phase and 7 in the prospective phase.

##### b) Distribution according to recruiting hospitals

The majority of our patients were recruited at the HGY; the distribution was:

LH: 5 patients  
 YTH: 1 patient  
 YDH: 1 patient  
 GHY: 6 patients

## 2) Sociodemographic characteristics of operated patients

### a) Age

The average age of our patients was  $37.5 \pm 16$  years, ranging from 17 to 70 years. The most represented age group was 21 to 40 years old (**Table 1**).

### b) Gender

We observed a male predominance of 84.6%, with a sex ratio of 5.5:1.

### c) Profession, nationality and marital status

Our patients were predominantly students (53.8%), with only one being a foreign national, and nearly half were married (**Table 2**).

## 3) Clinical profile

### a) Medical history or comorbidities

Alcohol consumption was the most common history found in 61.5% of cases (**Table 3**).

**Table 1.** Distribution according to age.

Age	Frequency	Percentage (%)
≤20	2	15.4
21 - 40	6	46.1
41 - 60	4	30.8
>60	1	7.7

**Table 2.** Classification of patients according to profession, nationality and marital status.

Variables	Frequency	Percentage (%)
<b>Profession</b>		
Public sector	3	23.1
Private sector	2	15.4
Self-employed	1	7.7
Student and not employed	7	53.8
<b>Nationality</b>		
Cameroonian	12	92.3
Foreign	1	7.7
<b>Marital status</b>		
Married	6	46.1
Single	6	46.1
Widow	1	7.7

**Table 3.** Distribution according to patients' medical history.

Medical history	Frequency	Percentage (%)
Alcohol	8	61.5
smoking	5	38.5
Lungs disease	2	15.4

#### b) Functional signs

The average duration of symptoms was evaluated at 17.5 days [2-452].

Dyspnea (84.6%) was the primary symptom in our patients, followed by chest pain (58.3%) (**Table 4**).

#### c) Surgical indications

Persistent hemothorax (38.5%) was the main indication for thoracoscopy (**Table 5**).

### 4) Surgical technique

#### a) Type of surgery and anesthesia

The majority (76.9%) of surgeries were planned and performed under general anesthesia in all cases. Selective intubation was used in 61.5% of these cases (See **Table 6**). An epidural catheter was placed in three patients for postoperative analgesia.

#### b) Thoracoscopy approach

The most used approach was the uniport (76.9%) (**Table 7**).

#### c) Intraoperative procedures

The most performed operative procedures (**Table 8**) were hemostasis (46.2%) and unclotting (30.8%).

#### d) Frequency of difficulties, intraoperative incidents and local adaptations

A single intraoperative incident occurred (7.7%): a cardiorespiratory arrest, which was successfully resolved with resuscitation. Additionally, we encountered an intra-operative anesthesiological difficulty in 7.7% of cases, involving a collapse of the left lung after challenging selective intubation, necessitating a conversion to thoracotomy.

#### e) Duration of the operation

Most surgeries had an average duration (**Table 9**) which was between 1 hour and 1 hour 30 minutes.

#### f) Conversion in thoracotomy

We recorded one case of conversion to open surgery, a rate of 7.7%. This was due to the lung not collapsing and continuing to ventilate.

### 5) Post-operative follow-up

#### a) Post-operative morbidity

##### i) Occurrence of complications

Six patients experienced post-operative complications, resulting in a morbidity rate of 46.1%. These complications were primarily minor and predominantly involved pain (**Table 10**).

**Table 4.** Principal symptoms of patients.

Symptom	Frequency	Percentage (%)
Dysphagia	1	7.7
Hemoptysis	0	0
Asthenia	2	15.4
Cough	4	30.8
Thoracic pain	7	53.8
Dyspnea	11	84.6

**Table 5.** Indications for thoracoscopy.

Indications	Frequency	Percentage (%)
Persistent hemothorax	5	38.5
Recurrent pneumothorax	2	15.4
Pulmonary wound	1	7.7
Diaphragmatic wound	1	7.7
Cardiac tamponade	1	7.7
Pyothorax	1	7.7
Recurrent pleurisy	1	7.7
Mediastinal tumor	1	7.7

**Table 6.** Summary of the type of thoracoscopy and anesthesia performed.

Variables	Frequency N = 13	Percentage (%)
<b>Type of surgery</b>		
Urgent	3	23.1
Elective	10	76.9
<b>Type of anesthesia</b>		
GA + OTI	5	38.5
GA + Selective intubation	8	61.5

**Table 7.** Thoracoscopy approaches.

Thoracoscopy approaches	Frequency	Percentage
U-VATS	10	76.9
Biportal	1	7.7
Triportal	2	15.4

ii) Study of factors associated with morbidity

In univariate analysis, no risk factor was associated with the occurrence of complications (See **Table 11**).

**Table 8.** Summary of intraoperative procedures.

Indications	Frequency	Percentage
Hemostasis (intercostals)	6	46.2
Removal of blood clot	4	30.8
Pleurectomy	2	15.4
Bullectomy	1	7.7
Diagnostic-video	1	7.7
Pleuropericardial window	1	7.7
Aspiration-drainage	6	46.2
Pulmonary wound suture	1	7.7
Pleural biopsy	1	7.7
Diaphragmatic repair	1	7.7
Mediastinal biopsy	1	7.7

**Table 9.** Duration of operation.

Duration (minutes)	Frequency	Percentage (%)
30 - 60	1	7.7
60 - 90	8	61.5
90 - 120	2	15.4
120 - 150	2	15.4

**Table 10.** Postoperative complications according to the Clavien-Dindo classification and treatment received.

Clavien-Dindo classification	Type of complication	Frequency n = 6	Percentage (%)	Treatment
Grade I	Pain	4	66.7%	Analgesics
	Hyperthermia and persistent bullae	1	16.6%	Antipyretics
Grade III	Thoracic empyema	1	16.6%	Thoracic drainage and antibiotics

**Table 11.** Analysis of the occurrence of complications according to age, presence of comorbidities, and duration of symptoms.

Variables	Complications		OR (95% CI)	P-value
	Yes n (%)	No n (%)		
Age				
≥40 years	3 (50.0)	2 (28.6)	2.5 (0.25 - 25.0)	0.59
<40 years	3 (50.0)	5 (71.4)		

**Continued**

Comorbidities				
Tobacco	3 (50.0)	2 (28.6)	2.5 (0.25 - 24.72)	0.59
Alcohol	4 (66.7)	4 (57.1)	1.5 (0.16 - 14.42)	1
Lung disease	0 (0)	2 (28.6)	-	0.46
Duration of symptoms				
>14 days	2 (33.3)	5 (71.4)	5.0 (0.47 - 52.96)	0.29
<14 days	4 (66.7)	2 (28.6)		

**b) Post-operative mortality**

We recorded two cases of post-operative death, representing a mortality rate of 15.4%. The deaths occurred on the second and fourth postoperative days due to associated defects and respiratory distress with septicaemia, respectively. Postoperative mortality was not correlated with any risk factor.

**c) Length of hospitalization**

The average hospital stay was 6 days, ranging from 1 to 14 days. There were no cases of re-intervention.

**4. Discussion****1) Socio-demographic characteristics of operated patients****Age and sex**

The average age of the patients was  $37.5 \pm 16$  years, ranging from 17 to 70 years. The most common age group was 21 to 40 years old, accounting for 46.1% of cases. This age group represents young people and young adults, who are the most active and are often involved in fights and accidents on public roads, as observed in our study. The patient population consisted of 11 men (84.6%) and 2 women (15.4%).

**2) The clinical profile****Indications**

Pleural involvement was the predominant issue, with persistent hemothorax being the main indication in five patients, followed by recurrent pneumothorax. These common indications reflect our team's initial attempts at this surgical approach. In contrast, many thoracic surgery departments and expert centers frequently perform partial lung resections through video-assisted thoracoscopy (VATS) for early-stage lung cancers, which have become a cornerstone of modern thoracic oncology [5] [6]. In our setting, such major surgeries are not yet common as the teams are mostly in their early experiences and remain cautious.

**3) Surgical technique****a) Type of anesthesia**

Anesthesia Video thoracoscopy is conducted under general anesthesia, requiring selective intubation to exclude the affected lung and create enough space for the surgical procedures. Specifically, anesthesia for thoracoscopy involves



single-lung ventilation. At the end of the procedure, pulmonary separators are inserted into the airways and positioned in one of the bronchi [7]. In our study, selective intubation was used in 61.5% of cases, likely due to the lack of technical support in our context. We also noted the absence of specialized equipment, such as Carlens tubes, which allow for safe and not blind selective intubation.

#### b) Approach

In our study, the uniportal approach was used in 10 patients (76.9%). Two patients underwent a triangulation approach using three trocars, and one patient had a biportal approach. Various studies comparing the uniportal to the three-portal approach have indicated a preference for the uniportal method. This method significantly enhances patient quality of life, reduces pulmonary injuries, and improves respiratory function; it also decreases blood loss during surgery and post-operative complications such as nausea and vomiting, along with shortening the length of post-operative hospital stays [8] [9]. We believe that the uniportal approach is gaining importance and becoming the preferred method in thoracoscopy.

#### c) Duration of the procedure

The majority of surgeries lasted between 60 and 90 minutes, similar to the duration reported by Khalid Khattala *et al.* at Hassan II University Hospital in Fez, where the average surgery time for managing hydatid cysts in children through thoracoscopy was found to be 90 minutes [10].

The increase in activity within our thoracoscopic surgery departments could lead to reduced operating times through improved mastery of procedures and better anticipation of intraoperative difficulties.

#### d) Conversion rate

In our series, one case was converted to open surgery, resulting in a conversion rate of 7.7%. This conversion might have been avoided with adequate equipment for selective intubation. Owono Mbouengo *et al.* in Gabon [4] found a conversion rate to open surgery of 3.6% among 926 patients, 28 of whom underwent a thoracoscopy procedure. This difference could be attributed to our team's initial steps in this procedure and the lack of full mastery over anesthesia procedures for improved visibility of the thoracic cavity.

Furthermore, the decision to use an open path was made quickly; thus, it was necessary to always have a thoracotomy opening kit nearby to facilitate conversion decisions.

### **4) Post-operative follow-up**

#### a) Post-operative morbidity

Post-operative complications were primarily minor, with pain present in 66.7% of cases and hyperthermia in 16.6%. Marwane Lakranbi *et al.* in Morocco [11] found similar results, with chest pain occurring in 65% of cases. The thoracoscopic approach offers better long-term survival and fewer major complications compared to the conventional open thoracotomy, including lower rates of prolonged pneumonia, atrial arrhythmias, and renal failure. It also enhances musculoskeletal and aesthetic outcomes in infants and children over the me-

dium term [9] [12] [13].

b) Post-operative mortality

The post-operative period was marked by the early deaths of two patients, one due to hypovolemic shock and the other from septic shock. The latter was a polytrauma patient who underwent surgery by both trauma and thoracic teams, which could explain the sepsis due to multiple potential infection sites. These results are notably more significant than those reported by Marwane Lakranbi *et al.* in Morocco [11], who documented one immediate post-operative death among 104 operated patients.

c) Hospital stay

The average hospitalization length was relatively short, at 6 days, with a range from 1 to 14 days. In comparison, Baiz *et al.* in Marrakech, Morocco (Marrakech) [14] reported an even shorter average stay of 3 days. This discrepancy could be due to simpler surgical outcomes in the majority of cases during their study.

Furthermore, an American study by Kirby T. J. *et al.* found a similar duration of 5.5 days  $\pm$  1.9 days for thoracoscopic lobectomy surgeries [11]. However, it's important to note that the indications in their study were major, unlike in ours, where the indications were primarily first-line.

**5) Limitation of the study**

The small size of our sample limited our understanding of thoracoscopy practices in our country.

## 5. Conclusion

Our study suggests that thoracoscopy is in its early stages in Cameroon, primarily involving young adult males. The main indications for surgery were persistent hemothorax, with hemostasis and clotting procedures being the most common surgeries performed through uniportal access, resulting in short operating times. Both morbidity and mortality rates were low. We recommend that Cameroonian surgeons continue practicing thoracoscopy and consider expanding its use to include partial lung resections.

## What Is New about This Study

This study investigated the current state of practice of thoracoscopy in Cameroon.

## Conflicts of Interest

The authors declare no competing interests.

## Authors' Contributions

All authors participated in the study and have read and approved the final manuscript.

## Declared

All authors contributed equally to the production of this manuscript.

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