

## THE PLACE OF SLEEVE LOBECTOMY IN THE SURGERY OF BRONCHIAL CARCINOID TUMORS: -EXPERIENCE OF A MOROCCAN UNIT-

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### ABSTRACT

**Introduction:** Carcinoid bronchial tumors are the best indications for sleeve lobectomy which was initially indicated in patients who cannot tolerate pneumectomy before it has been considered as the intervention of choice. Through five clinical cases of bronchial carcinoid tumors having all benefited from a sleeve lobectomy, we will focus on the technical aspects of this surgical procedure as well as on its results with a review of the literature. **Patients and Methods:** This is a retrospective study over a nine year period collecting 5 cases of operated central bronchial carcinoid tumors in patients who undergone a sleeve lobectomy. We analyzed the clinical and para-clinical parameters as well as the operating technique used and the surgical results. **Results:** All patients were female. The major complaining symptom was low abundance hemoptysis in 4 patients (80%) and chest pain in one patient (20%). All included patients benefited from a chest X-ray with thoracic CT scan. Sleeve lobectomy was indicated and the post- operative outcome was simple in all patients. **Conclusion:** Our study, consistent with the literature data, demonstrated that recent advances in patient selection criteria and in surgical techniques have enabled sleeve-lobectomy to evolve becoming the first line intervention for lesions located in the center and for all histological grades.

**Keywords:** Bronchial carcinoid tumor; Lobectomy; Morocco; Sleeve.

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### INTRODUCTION

Bronchoplastic lobectomy consists in performing a lobectomy taking away the corresponding bronchial crossroads, either with a wedge bronchial resection or with a bronchial flap (bronchoplasty), either with a circumferential bronchial resection (sleeve lobectomy) associated in the latter case with a restoration of bronchial continuity by end-to-end anastomosis. Bronchial carcinoid tumors are the best indications. Sleeve lobectomy was performed initially for patients who did not tolerate pneumectomy, then it gradually became the intervention of choice [1-2]. Through five clinical cases of bronchial carcinoid tumors having benefited

from a sleeve lobectomy, we will focus on the technical aspects of this surgical procedure as well as on its results with a review of the literature.

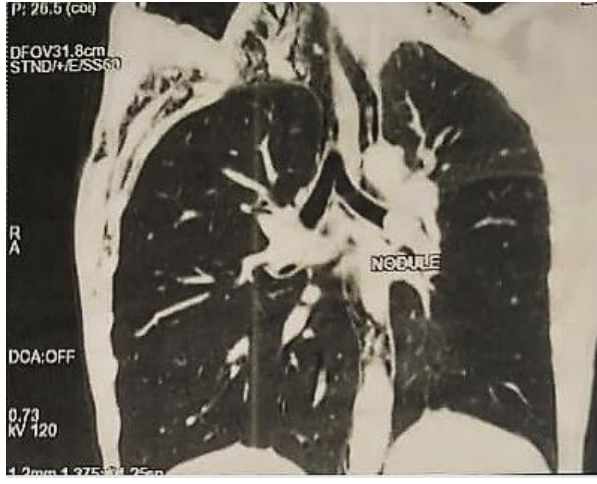
### PATIENTS AND METHODES

This is a retrospective study over a nine-year period (from 2011 to 2020), reporting all cases of local carcinoid tumor which benefited of a sleeve lobectomy in the department of thoracic surgery in Hassan II<sup>d</sup> University Hospital -Fez, Morocco. We analyzed the clinical and para-clinical parameters as well as the operating technique used and the surgical results. Patients lost of view were excluded and a

follow-up of at least 24 months after surgery was necessary for inclusion.

**RESULTS**

The study included 5 patients, all female, with a mean age of 45 year old [28-62], presenting low abundance hemoptysis in 4 cases and chest pain in one case. All patients benefited from a chest X-Ray and chest CT. Findings were an endobronchial process obstructing the lumen of the distal part of the left main bronchus in one patient (**Figure 1**), a t moral process at the origin of the right upper lobar bronchus in 2 cases, an intermediate trunk tumor with secondary atelectasis of the middle and lower right lobe (one case) and a tumor of the left lower lobe extending to the interlobar spur in the last patient.



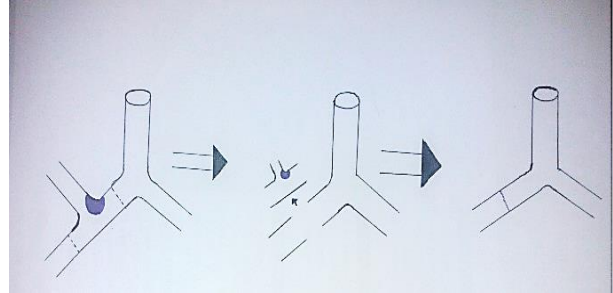
**Figure 1:** chest CT scan showing an endobronchial process in the distal part of the left main bronchus with lumen obstruction.

Bronchial fibroscopy was performed in all patients, allowing the diagnosis of carcinoid tumor to be evoked on the macroscopic aspect without a biopsy being done, in addition bronchial fibroscopy made it possible to specify the site and the endo- bronchial extension of the tumor.

In our series, pre- operative spirometry was normal in all patients. Before surgery, loco- regional and distant metastasis were checked by cerebral CT and thoracic abdominal pelvic CT. No distant metastasis was detected. Regarding the surgical procedure, all patients underwent a conservative postero-lateral thoracotomy approach through the 5th intercostal space with selective intubation.

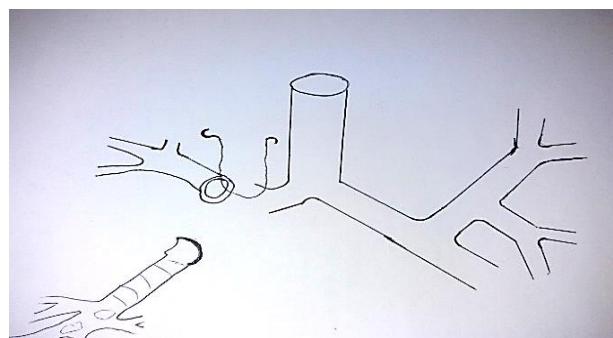
Thus, we have achieved:

\* A right upper lobectomy with bronchial anastomosis between the right main bronchus and intermediate trunk (2 cases) (**Figure 2**).



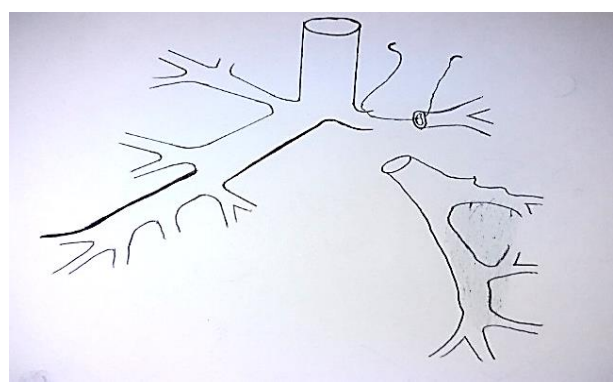
**Fig. 2:** right upper lobectomy with bronchial anastomosis between the right main bronchus and intermediate trunk

\* One patient underwent a lower and middle bi-lobectomy with anastomosis between the right upper lobar bronchus and the right main bronchus (**Figure 3**).



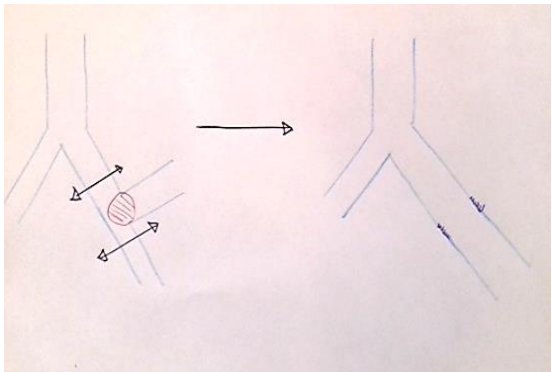
**Figure 3:** lower and middle bi-lobectomy with anastomosis between the right upper lobar bronchus and the right main bronchus

\* A patient underwent a left lower lobectomy and anastomosis between the left main bronchus and the left upper lobar bronchus (**Figure 4**).



**Fig. 4:** left lower lobectomy and anastomosis between the left main bronchus and the left upper lobar bronchus

\* A patient underwent a left upper lobectomy with anastomosis between the lower left lobar bronchus and the left main bronchus (**Figure 5**).



**Fig. 5:** Left upper lobectomy with anastomosis between the left lower lobar bronchus and the left main bronchus

In all cases, the anastomosis was performed by separate points and protected by a pleural flap and preceded by a frozen examination of the bronchial cross-sectional area (**Figure 6**).



**Fig. 6:** Bronchial cross-sectional surgical specimen.

The histopathological study of the surgical specimen was in favor of a typical carcinoid tumor in 3 patients (60%) and atypical in 2 patients (40%). All our patients had benefited from an active post-operative physiotherapy with a bronchial control fluoroscopy on day 10 and then after a month. The postoperative course was uneventful in all patients with a follow-up of 6 months to 10 years.

**Table: Summary of characteristics and outcome of patients with carcinoid tumors in our series.**

Case	Age/ Gender	Symptoms	Chest CT Findings	Bronchoscopic findings	Surgical Procedure	Outcome
1	48 (F)	Low abundance hemoptysis	Intermediate trunk tumor with secondary atelectasis of the middle and lower right lobe.	Tumor bleeding to the touch with a diagnostic impression of a carcinoid tumor completely obstructing the intermediate trunk and extending to the orifice of the right upper lobar bronchus	Lower and middle bi-lobectomy with anastomosis between the right upper lobar bronchus and the right main bronchus + mediastinal lymphadenectomy	
2	37 (F)	Chest pain	Tumor of the left lower lobe extending to the interlobar spur.	Endoscopic mass fully obstructing the left lower lobar bronchus extending to the interlobar spur.	Left lower lobectomy and anastomosis between the left main bronchus and the left upper lobar bronchus + Mediastinal lymphadenectomy	Good Evolution
3	50 (F)	Low abundance hemoptysis	Tumoral process at the origin of the right upper lobar bronchus.	Endobronchial tumoral mass bleeding to the touch at the right upper lobar bronchus	Right upper lobectomy with bronchial anastomosis between the right main bronchus and intermediate trunk + mediastinal lymphadenectomy	No Recurrence reported during follow-up
4	62 (F)	Low abundance hemoptysis	Tumoral process at the origin of the right upper lobar bronchus.	Endobronchial tumoral budding, bleeding to the touch at the origin of the right upper lobar bronchus.	Right upper lobectomy with bronchial anastomosis between the right main bronchus and intermediate trunk+ mediastinal lymphadenectomy	
5	28 (F)	Low abundance hemoptysis	Endobronchial process obstructing the lumen of the distal part of the left main bronchus.	Smooth tumoral budding of approximately 5 cm	Left upper lobectomy with anastomosis between the lower left lobar bronchus and the left main bronchus + mediastinal lymphadenectomy	

M: Male; F: Female.

## DISCUSSION

The first sleeve-lobectomy was performed in 1947 by Sir Price Tomas in a patient with a carcinoid tumor of the right upper lobe. In 1952, Allison performed the first sleeve-lobectomy in a patient with bronchial carcinoma.

Sleeve lobectomy was introduced as a procedure performed for patients with a central bronchial tumor and whose pulmonary function does not allow pneumonectomy. In recent years, it has been stated that such conservative operations are very valid for central tumors with long-term results comparable to pneumonectomies with minimal morbidity and mortality when technically feasible [3-7].

We noted a female predominance in our series, unlike data from the literature, notably in Okada [8], Mezzetti [9], Deslauriers [10] and Kim [11] respective series.

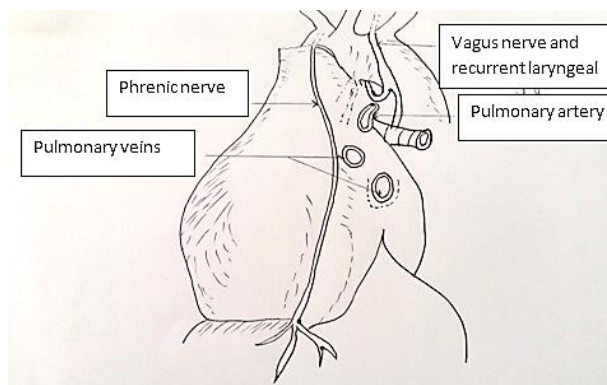
As with any bronchial tumor, the clinical presentation is variable. [12-15]. Authors report hemoptysis and chronic cough as the most common clinical signs. [14,16]. In the series of Fink [17] and Kyriass [18] 70% of the patients were symptomatic. In our series, hemoptysis (60%) and chest pain (40%) were the most commonly reported symptoms. The chest radiography allows to highlight ventilatory disorders in a patient with respiratory symptomatology. However, thoracic CT scan is an essential examination for detecting and specifying centrally developed bronchial tumors: location and size of the tumor in the tracheobronchial tree as well

as the presence of atelectasis or ventilatory disorder, and the evaluation of the local and regional tumor extension.

Before or at the time of surgery, a bronchial bronchoscopy must be performed to assess the extent of bronchial involvement, the quality of the mucosa and the state of the lung to be saved. [19].

Sleeve lobectomy is an ideal indication to treat benign endo- bronchial tumors and tumors with reduced malignancy, in particular carcinoid tumors with an excellent survival rate (95%).

A frozen examination of the bronchial cross-sectional area is imperative before proceeding with the bronchial anastomosis. The later must be performed without tension that is why if necessary, a section of the triangular ligament will help in the mobilization of the bronchial stumps, and exceptionally we can have recourse to a section in U shaped of the pericardium below the lower pulmonary vein. (**Figure 7**).



**Figure 7:** section in U shaped of the pericardium below the lower pulmonary vein.

The choice of operating anastomosis technique (by separate points or by continuous suture) is a subject of debate. However, in the series of Kultu using bronchial anastomoses by continuous suture technique (20), the results in terms of post-operative morbi- mortality were similar to those of bronchial anastomoses by separate points. In another side, whatever the anastomosis technique used, the main key message is to respect the basic principles, namely:

- Careful bronchial dissection limited to the tumor area;
- Preservation of bronchial vascularization
- Frozen examination of the bronchial cross-sectional area;
- Tension-free bronchial anastomosis protected by a muscle or pleural flap;
- Performing a fibroscopy at the end of the anastomosis step and before discharge;
- Active post-operative physiotherapy of bronchial drainage;

- Early ambulation;
- Effective post-operative analgesia;
- Maintaining a good nutritional level.

All sleeves lobectomies in our series were associated with a radical mediastinal lymph node dissection, an imperative condition for any surgery for bronchial cancer. There is no consensus regarding the indication for adjuvant therapy for resected carcinoid tumors, however, it can be discussed in the case of an atypical carcinoid tumor, in particular of large size, or in the presence of mediastinal lymph node metastasis. In our study, the indication for adjuvant chemotherapy, after the multidisciplinary consultation meeting, was not retained in any patient.

Regarding the survival of operated patients, there are no prospective randomized studies which compare sleeve - lobectomy to pneumonectomy. Three retrospective studies focused on the results of sleeve lobectomies and pneumonectomies performed for lung cancers [8, 21, 22]: the long-term survival after sleeve lobectomy was identical to or better than that after a pneumonectomy and vice versa the morbidity in the pneumonectomy group was superior to that of the sleeves lobectomy group.

## CONCLUSION

Sleeve-lobectomy, the most common form of bronchoplastic procedures, was first conceived as an alternative to pneumonectomy for anatomically suitable tumors with low-grade lesions, located in the center and a limited cardiopulmonary reserve. However, our study, consistent with the literature data, demonstrated that recent advances in patient selection criteria and in surgical techniques have allowed sleeve-lobectomy to evolve, becoming the first line intervention for lesions located in the center and for all histological grades.

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## CONFLICTS OF INTEREST:

Authors declare no conflict of interest.

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