

Clinical profile, surgical management and outcome of bronchial carcinoids - a single centre experience

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Abstract

Background and objectives: Bronchial carcinoid tumors are neuroendocrine neoplasms that range from low-grade typical carcinoids to more aggressive atypical carcinoids and, therefore demonstrate a wide spectrum of clinical behaviors, histologic features and outcome. The aim of the present study was to investigate the clinical profile, surgical management and outcome of bronchial carcinoids at a single centre over two years period.

Materials and methods: Patients with a final histologic diagnosis of bronchial carcinoid tumor were included in the study. Evaluation comprised of clinical history and physical examination, postero-anterior and lateral chest radiographs, and computed tomographic (CT) scans of the chest and upper abdomen (including liver and adrenal glands). Performance status was assessed by the Karnofsky scale. Pulmonary function tests were performed routinely.

Results: A total of 18 patients were included in the study. Out of 18 cases, 10 (55.6%) were female and 8 (44.4%) were males. Sixteen (88.9%) patients had typical carcinoid tumor and 2 (11.1%) had atypical carcinoid tumor. The tumor was located in the right lung in 11 (61.1%) and in the left lung in 7 patients (38.9%). Surgeries included 15 standard lobectomies and 3 bronchial sleeve resection. At one month post surgery, there was 13-22% increase in post operative FEV1 in patients who underwent bronchial sleeve resection while in patients who underwent lobectomy, the post operative FEV1 was 84% of pre-operative FEV1. Post surgery, all patients were in group A as per Karnofsky performance status.

Conclusion: Standard care of bronchial carcinoid tumors is surgical resection, and the surgical approach should depend on tumor's size, location and histology.

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Introduction

Bronchial carcinoid tumors are neuroendocrine neoplasms that range from low-grade typical carcinoids to more aggressive atypical carcinoids and therefore demonstrate a wide spectrum of clinical behaviors and histologic features [1]. Typical and atypical bronchial carcinoids have similar

imaging features. Because most bronchial carcinoids are located in central airways, radiologic findings are usually related to bronchial obstruction. Central bronchial carcinoids manifest as an endobronchial nodule, hilar or perihilar mass with a close anatomic relationship to the bronchus [1]. The mass is usually a well-defined, round or

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ovoid lesion and may be slightly lobulated at radiography and computed tomography (CT). Associated atelectasis, air trapping, obstructing pneumonitis, and mucoid impaction may also be seen. Peripheral bronchial carcinoids appear as solitary nodules. Calcification is common and is easily visualized at CT. Bronchial carcinoids demonstrate high signal intensity on T2-weighted and short-inversion-time inversion recovery magnetic resonance images. Prognosis of bronchial carcinoids is highly dependent on histologic findings. Typical bronchial carcinoids generally have an excellent prognosis, whereas atypical bronchial carcinoids have a worse prognosis. Therefore, understanding the histologic, clinical, and radiologic features of bronchial carcinoids facilitates accurate diagnosis and helps optimize surgical planning [2].

Standard care of bronchial carcinoid tumors is surgical resection. Surgical approach depends on tumor's size, location and histology. Pneumonectomy, while effective at removing lung tumors, can carry high morbidity and mortality by removing an entire half of a person's lung volume. Pulmonary resection techniques are varied and categorized by the extent of lung resected. Bronchial sleeve resection with complete pulmonary preservation (BSRCP) is a classic surgical method for the treatment of benign or low-grade bronchial tumors [3]. For elderly patients and patients with poor cardiopulmonary function, BSRCP is particularly advantageous because some of these patients may not tolerate lobectomy or pneumonectomy. The use of bronchial and arterial sleeve resections for the treatment of centrally-located lung cancers, when available, has become the option of choice in comparison with pneumonectomy (PN) or lobectomy. The present study evaluated the clinical profile, surgical management and outcome of bronchial carcinoids at a single center over two years period.

Materials and methods

The study was conducted in the Department of Cardiovascular and Thoracic Surgery, SKIMS Srinagar Kashmir from January 2020-January 2022. After local ethical clearance, patients with a final histologic diagnosis of bronchial carcinoid tumor were assessed for surgery and enrolled in the study.

Evaluation comprised history and physical examination, posteroanterior and lateral chest radiographs, and computed tomographic (CT) scans of the chest and upper abdomen (including liver and adrenal glands). Pulmonary function tests were performed routinely. All patients had a preoperative examination with a fiberoptic bronchoscope, and in all cases endoscopic biopsy was performed. At surgery, all specimens resected, including hilar and mediastinal lymph nodes were sent for histologic examination. Tumors were classified according to the current WHO/IASLC criteria for neuroendocrine tumors. Typical carcinoids were defined as tumors greater than 5 mm in diameter, with carcinoid morphology and less than 2 mitoses per 2 mm², and lacking necrosis. Tumors with a mitosis rate of 2-10 per 2 mm², with focal necrosis or limited necrosis, were classified as atypical carcinoid tumors [4]. All patients underwent complete blood count, fasting blood sugar, kidney and liver function tests. Performance status of the patients was assessed by the Karnofsky Performance scale (KPS) [5]. KPS describes a patient's functional status as a comprehensive 11-point scale correlating to percentage values ranging from 100% (no evidence of disease, no symptoms) to 0% (death) and classified patients into following three groups:

A: Able to carry on normal activity and to work. No special care is needed.

B: Unable to work. Able to stay at home and take care of most personal needs. A varying degree of assistance is needed.

C: Unable to care for self. Requires equivalent of institutional or hospital care. Disease may be progressing rapidly.

Results

The study group comprised of 18 patients, with 10 (55.6%) female and 8 (44.4%) male patients. Age at presentation ranged from 12 to 55 years (mean: 42 years). Out of 18 cases, 16 (88.9%) patients had typical carcinoid tumor and 2 (11.1%) had atypical carcinoid tumor. Both patients with atypical carcinoid were aged more than 45 years. Symptoms were present in 16 patients: cough (n= 15), fever (n=12), wheezing (n=9), hemoptysis (n=7) dyspnea

(n=7) and recurrent pulmonary infections (n=5). Two patients were asymptomatic and bronchial carcinoid tumor was incidentally detected during post Covid-19 illness checkup. General profile and presenting clinical features of the study population are shown in Table-1.

Table-1: General profile and presenting clinical features of the study population (n=18)

Profile	Value
Gender (n, %)	
Male	8 (44.4)
Female	10 (55.6)
Age (years)	
Mean	42
Range	12-55
Types of tumor (n, %)	
Typical carcinoid tumor	16 (88.9)
Atypical carcinoid tumor	2 (11.1)
Clinical features (n, %)	
Absent	2 (11.1)
Present	16 (88.9)
Symptoms (n, %)*	
Cough	15 (93.8)
Fever	12 (75)
Wheezing	9 (56.3)
Dyspnea	7 (43.6)
Hemoptysis	7 (43.6)

Note: *Multiple symptoms present

Location and types of the tumors: The tumor was located in the right lung in 11 patients (61.1%) and in the left lung in 7 patients (38.9%). Features of typical carcinoid lung tumor included: tumor size > 5 mm in diameter, with carcinoid morphology and less than 2 mitoses per 2 mm². Atypical carcinoid tumor had a mitosis rate of 2 to 10 per 2 mm², with focal necrosis or limited necrosis.

Surgery and postoperative course: Surgeries included 15 standard lobectomies (5 right inferior, 3 right superior, 2 right middle, 3 left superior and 2 left inferior) and 3 bronchial sleeve resection (2 left and 1 right). The patients who underwent lobectomy were discharged 9 to 14 days after surgery (mean duration: 12 days) and the patients who underwent bronchial sleeve resection were discharged 7 to 11 days after surgery (mean duration: 9 days). There was a complete resolution

of symptoms immediately in all patients, however, 2 out of 15 patients who underwent lobectomy felt dyspnea on exertion at 15 day follow up which gradually improved. At one month, there was 13-22 % increase in post operative FEV1 in patients who underwent bronchial sleeve resection. In patients who underwent lobectomy, the post operative FEV1 was 84% of pre-operative FEV1 at one month. Post surgery, all patients were in group A (able to carry on normal activity and to work, no special care is needed) as per Karnofsky performance status.

Discussion

Carcinoid tumors are a unique type of malignant pulmonary disease. They are rare, comprising less than 2% of all primary pulmonary neoplasms [6]. The prevalence of bronchial carcinoid tumors is slightly higher in females [7]. The mean age of our patients at presentation was 42 years (range 12 to 55 years), which is in line with literature. Patients having atypical carcinoid tumors were significantly older at presentation than patients with typical carcinoid tumors, as mentioned in various studies [8].

Bronchoscopy plays a big role in the diagnosis of carcinoids. In majority of our cases the tumors were centrally located and visible at endoscopic evaluation, as described by others [9]. Some authors found bleeding to occur in two thirds of their patients and some advised against biopsy when carcinoid was suspected. However, others disagreed, maintaining that bronchoscopic biopsy significantly increases the diagnostic yield without adding morbidity. In our experience, no troublesome bleeding was reported after endoscopic biopsy.

Preoperative radiologic evaluation and histologic typing are mandatory in selecting the extent of surgical resection. Newer modalities of investigation for staging bronchial carcinoid tumors that have recently been introduced include positron emission tomography and octreotide scintigraphy. Positron emission tomographic imaging of bronchial carcinoid tumors demonstrates lower uptake than non-small cell lung cancers, suggesting that the process is benign

and that staging of regional lymph nodes might be unreliable [10]. Scintigraphy with ¹¹¹In-octreotide has demonstrated reliable uptake in primary tumors and the ability to detect early recurrences and metastases even in asymptomatic patients, suggesting that it would be a useful tool for routine staging in the future [11]. At present, however, decisions regarding appropriate therapy for patients with bronchial carcinoid tumors are made on the basis of histologic features and clinical staging of the tumor by bronchoscopy and CT scan.

The success of current surgical management of bronchial carcinoids is influenced by the recurrence rates and survival patterns. In patients with centrally located typical carcinoid tumor of the lung, we think that bronchial sleeve resection or sleeve lobectomy should be considered, when possible, because local recurrence is rare and survival is excellent. Despite the low local recurrence rate, early-stage typical carcinoids should be considered as low-malignancy neoplasms and should be managed by an anatomic resection to secure the least risk of recurrence. On the other hand, local recurrence rate and long-term survival are both unfavorably affected by the finding of atypical subtype. If this histologic subtype is identified, a more extensive surgical approach such as lobectomy or pneumonectomy associated with lymph node dissection is mandatory.

Standard care of bronchial carcinoid tumors is surgical resection, with the surgical approach depending on tumor's size, location and histology. Pneumonectomy, while effective at removing lung tumors, can carry high morbidity and mortality by removing an entire half of a person's lung volume. Pulmonary resection techniques are varied and categorized by the extent of lung resected. Bronchial sleeve resection with complete pulmonary preservation (BSRCP) is a classic surgical method for the treatment of benign or low-grade bronchial tumors.

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