Carcinoid lung tumors

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Background
Carcinoid lung tumor is a low-grade malignant neoplasm. They tend to grow slower than other types of lung cancers. They are made of special kinds of cells called neuroendocrine cells.

Aim
To study cases of carcinoid lung tumor admitted, evaluated and surgically managed at the Department of Thoracic Surgery of the Medical City Teaching Hospital in Baghdad, Iraq.

Patients and methods
This is a retrospective and comparative study of 18 patients with pulmonary carcinoid tumors admitted to the Thoracic Department of the Medical City Teaching Complex during 15 years (1996–2010). Their ways of presentation, radiological findings, bronchoscopic appearance and modalities of surgical resection were evaluated.

Results
Ten of the patients were female and eight were male. Their age ranged between 20 and 58 years. Cough and shortness of breath were the most common symptoms. Imaging studies were mostly of collapsed lobe or lung. All the patients underwent bronchoscopy, the appearance of which was diagnostic, but biopsy ended with severe bleeding controlled with difficulty. All the patients underwent successful pulmonary resection.

Conclusion
Surgery offers the most fruitful outcome in pulmonary carcinoid tumor.

Keywords:
carcinoid lung tumors, lobectomy, pnemonectomy, pulmonary carcinoid

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Introduction

Carcinoid tumors are an uncommon group of pulmonary neoplasms. They tend to grow slower than other types of lung cancers. They are made up of special kind of cells called neuroendocrine cells, which in some respect are like nerve cells and in other ways like cells of endocrine (hormone-producing) glands. These cells are scattered throughout the body and can be found in different organs, for instance lung, stomach and intestine. Uncontrolled growth of these cells leads to the development of carcinod tumors. Pulmonary carcinoid tumors represent 10% of all carcinoid tumors and 1–2% of all lung tumors [1].

It arises from Kultchisky Amine Precursor Uptake Decarboxylation (APUD) cells in the bronchial epithelium. Carcinoid tumors are divided histopathologically into typical carcinoid tumors and atypical carcinoid tumors. Typical carcinoid tumors are the least malignant and the most indolent of the spectrum of pulmonary endocrine tumors that include atypical carcinoid tumors, large-cell undifferentiated carcinoma and small-cell carcinoma (most malignant). Typical carcinoids and atypical carcinoids are distinguished by their histologic features. Both tumors consist of small nests or interconnecting trabeculae of uniform cells separated by a prominent vascular stroma and numerous thin-walled blood vessels. In terms of histological features predictive of prognosis, typical carcinoids show no evidence of necrosis and less than two mitoses per 10 high-power fields (HPFs), whereas atypical carcinoids have areas of necrosis or 2–10 mitoses per 10 HPF [2].

The carcinoid syndrome occurs in ~10% of carcinoid tumors [3] and manifests when vasoactive substances from the tumors enter the systemic circulation escaping hepatic degradation. This is the case when carcinoid tumors metastasize to the liver or they arise for example in the bronchus. These tumors release too much of the hormone serotonin and several other chemicals that cause the blood vessels to open (dilate) [4]. The most important clinical finding is flushing of the skin, usually of the head and the upper part of the thorax [5]. Diarrhea and abdominal cramps are also characteristic features of the syndrome. When the diarrhea is intensive, it may lead to electrolyte disturbance and dehydration. Other associated symptoms are nausea and vomiting. Bronchoconstriction affects a smaller number of patients and often accompanies flushing. The presence of carcinoid syndrome or other paraneoplastic syndromes in the absence of lymph node or distant metastases does not seem to affect the prognosis adversely [6].

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Patients and methods

Eighteen patients with pulmonary carcinoid tumor were admitted, evaluated and managed successfully in the Thoracic and Vascular Department of the Medical City Teaching Complex during a 15-year period.

After full history taking and detailed physical examination, all patients were sent for plain chest radiography and computed tomography (CT) imaging. All patients underwent rigid bronchoscopy under general anesthesia, and the typical appearance of the lesion was documented. After full preoperative preparation, these patients underwent formal posterolateral thoractomy, and the collapsed lobe or lung was resected. Patients had a smooth postoperative course, and were discharged in a good condition. Patients were followed up during the following years and no recurrence was observed.

A special formula was used to divide patients with regard to the age of presentation, sex, clinical presentation, radiological findings, bronchoscopic appearances and methods of surgical treatment.

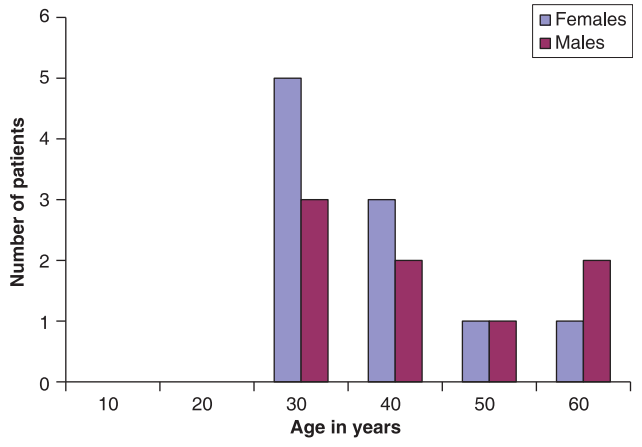
Results

Ten of our patients were female (55.55%) and eight patients were male (44.44%).

The youngest patient was a 25-year-old woman, the oldest being a 58-year-old man. The majority of the patients (eight cases) were between 20 and 30 years old; the distribution of these patients with regard to age and sex is shown in Fig. 1.

Most of the patients presented with cough (75%), shortness of breath or recurrent wheezy chest (50%) and recurrent chest infection (32.5%). Hemoptysis was seen in four patients (22%). Carcinoid syndrome was so rare that it was seen in only one female patient who presented with pyrexia, facial flushing, tachycardia, night sweat and diarrhea. The 24-h urine level of 5-hydroxy indoleacetic acid, the end product of serotonin metabolism, which is specific to carcinoid tumors, was not available in our laboratories at the time of this study.

Figure 1



Age and sex distribution of patients.

Chest radiography was performed for all the patients as the primary imaging modality; Table 1 shows the radiological findings of these cases.

CT was performed in all of the patients, which showed an endobronchial tumor mass localized to one lobe, two lobes or to the main bronchus, which coincides with the findings of chest radiography.

Rigid bronchoscopy under general anesthesia was performed in all of the patients, and the characteristic bronchoscopic appearance of a cherry-red-colored, smooth, polypoid, vascular tumor that bleeds easily and profusely was seen in almost all the patients. Biopsy was performed in three patients, followed by severe bleeding that was controlled with difficulty. In two of these patients, bronchoscopic resection was performed, and the severe bleeding that followed was controlled efficiently but with difficulty. In these patients, the asymptomatic period lasted for about 2 years followed by recurrence that necessitated surgical resection of the involved lobe or lung.

Preoperative assessment for fitness for general anesthesia with regard to the blood investigation and pulmonary function tests were performed so that all the patients were in the optimum condition before surgery.

Surgery was performed for all the patients under study by the formal posterolateral thoracotomy, and the affected parts of the lung (lobe, lobes or lung) were resected and sent for histopathological confirmation. The modalities of the surgical resection are illustrated in Table 2.

All the patients ran an uneventful postoperative course with only mild wound infection in two patients, which was treated conservatively. No mortality was observed.

Table 1 Chest radiograph findings

Findings	*n* (%)
Collapsed left lung	7 (38.88)
Collapsed left upper lobe	3 (16.66)
Collapsed right middle and lower lobe	3 (16.66)
Collapsed right upper lobe	2 (11.11)
Collapsed right lung	2 (11.11)
Collapsed right middle lobe	1 (5.55)

Table 2 Types of pulmonary surgical resection

Type of surgery	*n* (%)
Left pnemonectomy	7 (38.88)
Left upper lobectomy	3 (16.66)
Right middle and lower lobectomy	3 (16.66)
Right upper lobectomy	2 (11.11)
Right pnemonectomy	2 (11.11)
Right middle lobectomy	1 (5.55)

The histopathological report obtained in 17 patients confirmed the mass to be a carcinoid tumor with a tumor-free resected margin, and the excised lymph nodes were tumor free; in only one female patient with a preoperative attack of carcinoid syndrome, the histopathology turned out to be an atypical carcinoid tumor of intermediate grade, and this is the only patient who was referred to the oncologist for consideration of postoperative radiotherapy.

Most of the patients were symptom free during the follow-up period, with only two of them lost to follow-up.

Discussion

Carcinoid tumors are uncommon low-grade malignancies, most commonly seen in the gastrointestinal tract, with the lung being the second most common site [7].

The small number of patients confirmed that it is an uncommon condition, and this coincides with others studies by Hamid *et al*. [8] who reported 21 patients with pulmonary carcinoid, and Akiba *et al*. [9] who reported 32 patients.

Female patients were affected more often than male patients in our study, with a ratio of 1.25 : 1, and this coincides with some studies [10], but is in contradiction to other studies reporting a higher incidence among men [9], whereas Hamid *et al*. [8] reported equal sex incidence.

The majority of our patients 13 (72.2%) presented between 20 and 40 years of age, which coincides with other studies [8,11].

Cough, dyspnea and hemoptysis were the most common symptoms, and this coincides with other studies [8,12].

Chest radiography was performed in all the patients, and all of the patients have the abnormal finding of collapsed lobes or lung, whereas Hamid *et al*. [8] described an abnormal chest radiograph in only 16 patients out of 21 patients (76.2%).

The CT findings showed an intrabronchial mass localized to a lobe or to a main bronchus associated with collapsed consolidation of the affected area of the lung with no pleural effusion or infiltration.

Bronchoscopy was the main tool of diagnosis, with the typical bronchoscopic appearance of the carcinoid tumor obstructing the left main bronchus or the left upper lobe in 10 (55.5%) out of 18 patients. Other studies showed the right main bronchus to be predominately affected [8]. Ronchod and Levine [13] reported that the right middle lobe is the most commonly affected.

Bronchoalveolar lavage fails to confirm the presence of malignant cells, which is in agreement with other studies [8,13]. The biopsy performed in three patients was confirmatory to the presence of carcinoid tumor, but was unfortunately followed by severe bleeding that was controlled with difficulty in contradiction to the study conducted by Hamid *et al*. [8] in which endobronchial biopsy was the mainstay of diagnosis.

Surgery was the mainstay of treatment with aggressive resection as pneumnectomy was performed in nine out of 18 patients (50%), left pneumnectomy in seven and right pneumnectomy in two patients, followed by lobectomy in six patients and bilobectomy in three patients.

A lobectomy was the main surgical procedure in other work [14,15].

In contrast to our radical resection, Ismail *et al*. [14] adopted the policy of parenchyma-sparing or tissue-saving operations as the treatment of choice for carcinoid in 29 out of 83 patients (34.9%), whereas Elhassani's personal experience in the surgical management of carcinoid tumor consisted of bronchotomy or sleeve resection of the bronchus whenever possible, and lobectomy or pneumonectomy if there was tumor extension to the lung parenchyma, if the lesion has caused permanent irreversible pulmonary suppuration and if there was intrathoracic nodal involvement [15]. Harpole *et al*. [11] did not recommend bronchoscopic resection, as this procedure was followed by recurrence of the tumor in two cases in their study.

Postoperative complications were seen only in two patients in the form of wound infection.

The recent use of endobronchial ultrasound in the diagnosis of peripheral pulmonary carcinoid tumors has been reported by Steinfort *et al*. [16] emphasizing the high diagnostic rate and very low incidence of adverse events; however, this facility is not available in our center currently.

All our patients showed complete recovery with no mortality.

Conclusion

Early detection of bronchial carcinoid tumor using endobronchial ultrasound or future tumor markers, a more conservative surgical procedure such as sleeve resections or wedge resections, can be adopted with the hope of saving more healthy lung tissues.

Acknowledgements

Conflicts of interest

None declared.

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