Intraluminal Bronchial Carcinoid Resection by Bronchoscopy

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MJAFI 2008; 64 : 86-88

Key Words: Carcinoid tumour; Diode laser; Laser photoresection; Fiberoptic bronchoscopy

Introduction

Pulmonary carcinoid tumour is an uncommon malignant neoplasm derived from the surface or glandular epithelium of the conducting or transitional airways. It is a neuroendocrine neoplasm that arises from the enterochromaffin cells of the amine precursor uptake and decarboxylation system of bronchial mucosa. They represent 1-2 % of all pulmonary neoplasms [1-4]. The carcinoid tumours can be divided into two clinicopathological types, typical and atypical. They behave like low grade malignant tumours and have a high rate of resectability and better prognosis [5]. The prognosis depends on size of tumour, histological type, nodal involvement and the presence of metastasis. Majority of carcinoids are located centrally within the trachea and mainstem bronchi and are reachable with flexible bronchoscope [3-5]. Curative surgical resection with focus on lung sparing or bronchoplastic surgery is the treatment of choice [1,2,5].

Endobronchial laser resection via rigid or flexible bronchoscope can photocoagulate and vaporize lesions. The potassium titanyl phosphate (KTP), argon dye, yttrium aluminium perovskite (YAP), neodymium-yttrium aluminium garnet (Nd:YAG) and diode lasers are suitable for use in fiberoptic bronchoscopes. The Nd:YAG laser is currently preferred for airway resection because of its predictable effect on living tissue (photocoagulation or vaporization), depending on the amount of energy applied [6,7]. At 980 nm diode laser shows a smaller optical penetration depth than the Nd:YAG laser at 1064 nm. Thus with identical application parameters, higher temperatures are produced with the diode in most tissues at superficial and interstitial applications. Most experts use flexible bronchoscope for laser photoresection [6]. We report a case of bronchial carcinoid in the left main

bronchus causing collapse of left lung. The endobronchial resection via diode laser resulted in complete removal of obstruction with an excellent result.

Case Report

A 25 year old female presented with history of cough, dyspnoea on exertion and recurrent scanty hemoptysis for three months. There was no history of fever, chest pain, wheeze or weight loss. She was treated with antibiotics without relief. On physical examination she had decreased air entry with dull percussion note and volume loss on left side of chest. Examinations of other systems was normal.

All routine laboratory investigations were within normal limits. The chest radiograph showed opaque left hemithorax with volume loss suggestive of collapse left lung (Fig.1). Computed tomography (CT) of the chest revealed a rounded, well defined, endobronchial mass in the left main bronchus with collapse of left lung. No mediastinal or hilar lymphadenopathy was noted (Fig. 2). Fiberoptic bronchoscopy showed smooth, rounded reddish pedunculated endobronchial mass in left main bronchus about 1.5 cm from the carina, almost completely occluding the bronchus. The mass was mobile and attached to a peduncle. Histopathology of the resected bronchial biopsy revealed a carcinoid tumour (Fig. 3). It was synaptophysin positive on immunohistochemical staining. The patient was unwilling for surgery, due to which the mass was resected with the help of diode laser via fiberoptic bronchoscope under local anaesthesia. The laser was initially applied in non contact fashion to coagulate the lesion and then in contact to char and vaporise it. The debris, clots and secretion were removed by suction and biopsy forceps. The patient has been asymptomatic and free from any recurrence during six months follow up.

Discussion

Bronchial carcinoid tumours are rare low grade malignant tumours of the lung comprising about one to

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Fig. 1 : Chest radiograph showing opaque hemithorax with volume loss suggesting collapse left lung

Fig. 2 : CT scan of the chest showing a rounded, well defined, endobronchial mass in the left main bronchus with associated collapse of left lung.

two percent of all pulmonary malignancies [1-4]. They occur with increased frequency in women with an earlier age of onset, as compared to other pulmonary carcinoma. Bronchial carcinoids represent about 25% of all carcinoid tumours [1-5]. The patients with central lesions are more likely to be symptomatic on presentation. These symptoms include cough (42%), haemoptysis (20%), stridor or wheeze (15% - 25%), or post obstructive pneumonia (20%). Symptoms of carcinoid syndrome are rare and are seen only with atypical carcinoids that have metastasized to the liver [4]. Fiberoptic bronchoscopy plays a major role in diagnosis of carcinoids. A raised, pinkish, vascular, lobulated lesion is classically seen endobronchially like in our case.

Most patients have an abnormal chest radiograph resulting either because of visualization of the tumour itself or as a consequence of airway obstruction. A rounded, smooth surfaced, highly vascular and well demarcated endobronchial lesion is typically seen on CT scan like in our case. Extraluminal extension, mediastinal

Fig. 3 : Histopathology of bronchial biopsy showed small rounded cells with uniform nuclei arranged in trabecular pattern with intervening bands of fibrous tissue (H & E stain 200 X). Insert – cells are synaptophysin positive.

invasion and lymph node metastases are infrequently seen [1, 4,5].

The treatment is surgical with a focus on lung sparing or bronchoplastic surgery [1-5]. Endoscopic resection of endobronchial tumours has been described, although recurrences require surgical excision [2]. Endoscopic laser resection also has a role [6-8]. It can be performed with a rigid or flexible bronchoscope. Most experts prefer rigid bronchoscope because open tube allows the laser fibre, suction catheters and forceps to be used simultaneously. The ventilation and excessive bleeding can be easily controlled and the bronchoscope can perform dilatation and mechanical resection, thus shortening procedure time. The disadvantages include increase in cost due to need for general anaesthesia, inapproachable upper lobe and segmental bronchi lesions. Most pulmonologists prefer flexible bronchoscope for laser photoresection [6]. Endoscopic laser resection is best utilized for patients who are not surgical candidates or who refuse surgery and for patients with post obstructive pneumonia. Stuteja et al [9], demonstrated a curative role for endoscopic therapy in carcinoids. They treated 11 patients with laser therapy for intraluminal typical carcinoids. Six of the 11 patients were then subjected to surgical resection and all the specimens were disease free [9]. Radiation therapy has a palliative role in disseminated disease, but its value as a curative therapy is limited.

In conclusion, bronchial carcinoid tumours are low grade malignant neoplasm with a good long term prognosis after surgical treatment. The survival of patients with carcinoid tumour depends on the histological type and the presence of distant metastasis. Routine

resection is the treatment of choice whenever possible. Palliative measures such as laser photoresection should be reserved for high risk patients with contraindications for surgery.

Conflicts of Interest

None identified

References

1. El Jamal M, Nicholson AG, Goldstraw P. The feasibility of conservative resection for carcinoid tumors: Is pneumonectomy ever necessary for uncomplicated cases? *Eur J Cardiothorac Surg* 2000; 18:301-6.
2. Kulke MH, Mayer RJ. Carcinoid tumors. *N Engl J Med* 1999; 340:858-68.
3. Soga J, Yakuwa Y. Bronchopulmonary carcinoids: An analysis of 1875 reported cases with special reference to a comparison between typical carcinoids and atypical varieties. *Ann Thorac Cardiovasc Surg* 1999; 5:211-9.
4. Modlin I, Sandor M. An analysis of 8305 cases of carcinoid tumors. *Cancer* 1997; 4:813-29.
5. Iglesias M, Belda J, Baldo X, et al. Bronchial Carcinoid Tumor: A retrospective analysis of 62 surgically treated cases. *Arch Bronconeumol* 2004; 40:218-21.
6. Avecillas JF, Mehta AC. Flexible bronchoscopy and the use of lasers. In: Wang KP, Mehta AC, Turner JF, editors. *Flexible Bronchoscopy*. 2nd edition. Massachesselts: Blackwell Publishing, 2005; 157-73.
7. Cavaliere S, Foccoli P, Farini PL. Nd:YAG laser bronchoscopy: A five year experience with 1396 applications in 1000 patients. *Chest* 1988; 94:15-21.
8. Van Boxem TJ, Venmans BJ, Van Mourick JC, Postmus PE, Stuteja TG. Bronchoscopic treatment of intraluminal typical carcinoid: A pilot study. *J Thorac Cardiovasc Surg* 1998; 116:402-6.
9. Stuteja TG, Vanderschueren RJ, Werf TS. Bronchoscopic therapy in patients with intraluminal typical bronchial carcinoid. *Chest* 1995; 107:556-8.

Journal Scan

Arezou Yaghoubian, Christian de Virgilio, Christine Dauphine, Roger J. Lewis, Matthew Lin. Use of Admission Serum Lactate and Sodium Levels to Predict Mortality in Necrotizing Soft – Tissue Infections. *Archives of Surgery* 2007; 142.

Necrotizing soft-tissue infections (NSTIs) are rapidly progressive infectious processes that primarily involve the fascia and the subcutaneous tissue. The infection often leads to thrombosis of the cutaneous microcirculation, severe sepsis, and multisystem organ failure. Studies show that an admission serum sodium level less than 135 mEq/L and white blood cell (WBC) count of 15400/uL or more are useful in distinguishing NSTI from non necrotizing infections. The mortality rate for NSTI remains high, ranging from 24 - 34%, and has not changed significantly for several decades. The prognosis depends on accurate diagnosis and immediate institution of appropriate treatment, which includes broad spectrum antibiotics and wide surgical debridement. This study determines the predictors of mortality for NTSI by means of univariate and multivariate analysis alongwith classification and regression tree (CART) analysis.

The authors did a retrospective analysis of all NTSI seen at Harbor – UCLA Medical Center between January 1, 1997, and December 31, 2006. The clinical data included age, race, medical history, physical examination findings, radiographic findings, cause of infections, and primary site of infection. Additional admission variables recorded were vital signs, level of sodium, potassium, chloride, bicarbonate, urea nitrogen, creatinine, glucose, lactic acid, and albumin; base excess or base deficit; white blood cell counts; anion gap and intraop cultures for various microbes. Other data

were duration of symptoms, length of time from Emergency Department (ED) to surgical consultation and total time from arrival to surgical debridement, and need for skin grafting. The number of debridement required or the need for amputations were recorded. The main outcome measure was in- hospital mortality. A secondary outcome measure was need for major extremity amputation.

On CART analysis, two admission variables, serum lactate and sodium levels, were predictors of mortality. Patients with a lactate level greater than or equal to 54.1 mg/dL had a mortality of 32%. Patients with a serum lactate level less than 54.1 mg/dL combined with a serum sodium level of less than 135 mEq/L had a mortality of 19%. On the other hand, the mortality was nil for patients with both a lactate level of less than 54.1 mg/dL and a serum sodium level greater or equal to 135 mEq/L. The model had a sensitivity of 100% and specificity of 28% with a corresponding positive predictive value of 23% and a negative predictive value of 100% for mortality.

A simple rapid test to identify high risk soft tissue infection patients would be extremely helpful in selecting patients for rapid aggressive therapy. The importance of serum lactate levels as an indicator of global hypoperfusion (resulting in anaerobic metabolism) and predictor of mortality is significant. The reason for hyponatremia as a significant predictor of mortality is not clear. Finally, we do not understand as to why some patients die due to cytokine cascade, even after major amputation while others survive after receiving seemingly similar therapy.

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