ISSN 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

Available online at: http://www.iajps.com *Review Article*

APPROACHES IN DIAGNOSIS AND TREATMENT OF PANCOAST TUMOR (SUPERIOR SULCUS): MINI- REVIEW

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Abstract

Cancer is a Persistent, Purposeless and Proliferative growth which is a leading cause of death worldwide. Amongst all cancers lung cancer is most important world widely which is divided into small cell lung cancer (SCLC) and non-small cell lung cancer (NSCLC). Pancoast tumors (PTs) are primary lung carcinomas arising from the apex of the lung and are generally located in the superior pulmonary sulcus. In most cases, PTs are NSCLCs, most commonly squamous cell with prevalence of 52%, followed by adenocarcinomas and large cell carcinomas as 23% and 20% respectively; only about 5% of PTs are of small cell origin. PT cause characteristic symptoms, such as arm, shoulder, radicular pain and muscle weakness in the distributions of C8, T1, and T2 nerve roots. PTs are very difficult to diagnosis early on stage. Different diagnostic tools like radio graphs (X-rays), Computed Tomography (CT) scans, bronchoscopy, Magnetic Resonance Imaging (MRI) and biopsy. Traditional treatment of PTs includes localized approaches like chemotherapy, radiotherapy, surgery (anterior or posterior approach) or combination of these.

Keywords: Cancer, Lungs, Pancoast Tumors, SCLC, NSCLC, CT Scan, MRI

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Please cite this article in press as Bilal Aslam et al. **Approaches in Diagnosis and Treatment of Pancoast Tumor (Superior Sulcus),** *Indo American J of Pharm Sci 2015:2(1):548-551.*

INTRODUCTION

Normal human cells grow and divide into new cells and die in an orderly way. While in some parts of the body cells growth became out of control leads to cancer formation. All cancers start because out of control abnormal cell growth. Amongst all cancers lung cancer (LC) is most important world widely [1-2]. LC can be divided into small cell lung cancer (SCLC) and non-small cell lung cancer (NSCLC). NSCLC accounts for 80% of all LC cases [3-4].

Superior sulcus tumor (SST) also known as pancoast tumor (PT) was first time reported by pancost [5] with clinical and radiographic manifestations that PT originate from epithelial rest cells from 5th brachial cleft. After 8 years, pancost [6] correctly recognized that the primary cause was bronchogenic carcinoma. SST usually occurs in the lungs apex, and can invade the 2nd and 3rd rib, subclavian vessels, brachial plexus, adjacent vertebral bodies and stellate ganglion [7]. PT occurred in less than 5% of all cases of NSCLC [8]. Maximum occurrence between was found between 40 to 60 years old male with smoking history. PT symptoms includes, arms, shoulders, radicular pain and C8, T1 distribution of muscle weakness and T2 nerve roots and Horner's syndrome in case of sympathetic chain involvement [9]. This symptom complex is also known as Pancoast syndrome and include ipsilateral anhidrosis, which is described in contrast to lesions above the carotid bifurcation lack this feature. Under suspicious circumstances, instill cocaine drops in the affected eye will not cause mydriasis, if Horner's syndrome exists. Although these tumors represent a broad class IIB to Stage IV, [IIB grade (25-27%), IIIA period (6-8%), IIIB period (40-42%) and stage IV (21-23%)] it is the T3, T4, N0-N1 subgroup of this spectrum that could be amenable to surgical intervention [10].

For early diagnosis of lung cancer circulating microRNAs may have promising future applications [11]. While PT is difficult to diagnose in early stages because of low prevalence and differential diagnosis. Typical symptoms of LC includes cough, dyspnea and hemoptysis are less frequent [12].

Until the early 1990s, the standard treatment for PT based on the assumption that local therapy radiotherapy, surgery, or combination of both. PT is locally invasive disease and can be achieved through effective local control of major improvements [13-14].

Cancer is an important problem now days; especially PTs there is need to know about different diagnostic techniques and treatment approaches to control this

Diagnosis

Pain caused by the PT often lead to prolonged interval from initial diagnosis to clinical presentation.

Radio Graphs (X-rays)

PTs are difficult to diagnosis in the early stages on chest X-ray films. Radio graphs may be use to diagnose a large mass or a thin plaque at the apex of lung, depending on the stage when it is first diagnosed [15-16].

Computed Tomography (CT) Scan

CT scan is a diagnostic tool which helps the doctor to determine either tumor has invaded the brachial plexus, vertebra, chest wall etc. The involvement of trachea, vena cava and esophagus can be diagnosed by this technique. While the involvement of blood vessels can be assessed by contrast CT scanning using radioactive dyes [15,17].

Magnetic Resonance Imaging (MRI)

In identifying the extent of the tumor involvement MRI findings are more accurate than CT scan. MRI of thoracic inlet is important diagnostic tool through which we can demonstrate accuracy of invasion of brachial plexus, vascular structure and vertebral column [18-19].

Bronchoscopy and Biopsy (Tissue Diagnosis)

For the evaluation of the bronchial and tracheal cavities most important diagnostic tool is bronchoscopy. However, bronchoscopy does not usually help the doctor to make a diagnosis of PTs because these form on the periphery of the lungs. Diagnostic quality is usually organized by percutaneous CT-guided fine-needle biopsy (FNB), which is successful in more than 90% of cases. Therefore, it is a preferred diagnostic method. The quality of ultrasound-guided percutaneous FNB is another option [16,20].

TREATMENT

PTs are one the most challenging thoracic malignancies regarding treatment as they invade the apical chest wall and adjacent vital structures such as brachial plexus, vertebral column and subclavian vessels. In addition, PTs are frustrating and painful tumores and the treatment of symptoms of Tobias syndrome have extreme priority and importance to patients [19].

Traditional treatment of PTs includes localized approaches like chemotherapy, radiotherapy, surgery (anterior or posterior approach) or combination of these while adverse outcomes resulting from incomplete removal. Surgery followed by concurrent radiotherapy and chemotherapy on the type and stage IIB-IIIB PT patients receiving induction chemotherapy. After restaging, eligible patients go for surgery in 4-6 weeks after radiation [21].

Chemotherapy

The primary importance is to treat the pain either with NSAIDs or by short-acting potent opioids. Cell proliferation and growth inhibition are used in treatment of different cancers including breast, neck, head, ovarian and testicular cancer. Alkylating agent lead to DNA strand breakage at intrastrand and interstrand cross-linking. It has a broad range of antitumor activity and forms backbone of currently available approved chemotherapy. Semi synthetic derivative of podophyllotoxin inhibit DNA synthesis by interfering with topoisomerase II function [8, 22].

Radiation Therapy (RT)

Radiation therapy may be use as single modality or multimodality therapy. Generally poor results with 5-year survival rate of 23% reported in monotherapy [23-24]. Modern RT techniques allow a more accurate delivery of the radiation without increasing morbidity. Alternate forms of RT have been used with and without external beam RT [24-25].

Surgical Treatment and Approaches

The main objective of surgery for PTs is to completely restrict disease through a combined resection of lung parenchyma with the adjacent invaded structures of thoracic inlet, such as vertebrae, apical chest wall, sympathetic chain and the subclavian vessels. The surgery may include different approaches including

Posterior approach

When the tumor situated posteriorly in the superior sulcus and does not invade the anterior structures of the thoracic inlet the posterolateral approach will use for the surgery. In this type of the tumor the invasion may be by vertebral bodies or the brachial plexus, C8 and T1 nerve roots. For such situation it is important to assess the patient's neurologic function preoperatively and to inform him properly concerning postoperative neurological morbidity [26-27].

Anterior approach

In case of PTs to optimize the exposure anterior surgical approach is used. Two basic incisions are given depending on size and location the tumor as hemi-clamshell incision with supraclavicular extension and transclavicular incision. The transclavicular incision is used with the patient with neck hyperextended and the head turned toward normal side [28].

Surgical Complications

Surgical resection of PTs involve similar complications those reported for routine pulmonary resections e-g; bronchopleural fistula, wound infection and empyema. Ulnar nerve deficits and Horner's syndrome which confer significant morbidity are expected surgical complications to PTs. Meningitis due to violation of the dura are a rare complication.

Induction Chemotherapy, Concurrent Chemoradiation and Surgery

Surgery followed by concurrent radiotherapy and chemotherapy on the type and stage IIB-IIIB may be an effective treatment. PT patients receiving induction chemotherapy (split dose cisplatin and etoposide or paclitaxel three courses). After restaging, patients met criteria underwent surgery 4-6 weeks after radiation. For PTs such intensive integrated treatment is feasible compared with the historical series to improve the local resectable rate and long-term survival [21].

Conclusions

Authors' Statements

Competing Interests

The authors declare no conflict of interest.

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