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Original Article

Changing Modalities in the Management of Lung Cancer after the Invention of Computed Tomography

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Abstract

Introduction: Lung cancer is the leading cause of cancer-related mortality in both men and women. The prevalence of lung cancer is second only to that of prostate cancer in men and breast cancer in women. Lung cancer recently surpassed heart disease as the leading cause of smoking-related mortality. Most lung carcinomas are diagnosed at an advanced stage, conferring a poor prognosis. The need to diagnose lung cancer at an early and potentially curable stage is obvious. In addition, most patients who develop lung cancer smoke and have smoking-related damage to the heart and lungs, making aggressive surgical or multimodality therapies less viable options.

Aim: This study aims to access the role of computerized tomography in the surgical management of carcinoma of the lung.

Materials and Methods: This is a prospective study from 2014 to 2019, a period of 5 years. A total of 22 cases entered in the study. In this study, we compare both pre-operative computed tomography (CT) image and intraoperative findings and level of operability.

Results: CT imaging will continue to play a major role in the evaluation of lung cancer. With the advent of non-invasive imaging modalities like multi-slice/spiral CT scan, the use of invasive screening and staging procedures including bronchography has been pushed to the periphery of staging workup; a total of 35 patients with carcinoma lung were studied. Seven patients were with carcinoma lung Stage II, one patient with carcinoma Stage III, and 27 were in Stage IV. Seven patients underwent primary surgical treatment. Other patients were treated appropriately with chemotherapy or radiotherapy or a combination of both.

Conclusion: CT is still the cornerstone of imaging studies in the pre-operative staging and post-therapeutic evaluation of lung cancer. Treatment of lung cancer depends on the cancers specific cell type, how far it has spread and the patient's performance status. CT is very useful for this purpose.

Key words: Carcinoma of the lung, ChemoRT, Computed tomography scan, Pneumonectomy

INTRODUCTION

Carcinoma of the lung is the leading cause of cancer death. Lung cancer incidence in males has been decreasing since the early 1980s. Incidence and mortality rates for lung cancer tend to mirror one another because most persons who are diagnosed with lung cancer eventually succumb to it. In woman, lung cancer incidence rates have been stable since 1991.[1] Cancer of the lung and bronchus still accounts for 31% of cancer deaths in men and 25% of cancer deaths in women. The overall 5-year survival rate for lung cancer remains a dismal 14%.[2] Cigarette smoking is associated with 70% increase in the age-specific death rates of men and a less increase in the death rates of women.[3] Cigarette smoking is found to be causally related to lung cancer in men. The magnitude of the effect of cigarette smoking far outweighed all other factors leading to lung cancer.[4] The risk of developing lung cancer increased with the duration of smoking and the number of cigarettes smoked per day. The report estimated that the average male smoker had an approximately 9- to 10-fold risk of developing lung cancer, whereas heavy smokers had at least a 20-fold risk.[5] The major cell types of cancer are small-cell lung cancer (SCLC) and non-SCLC (NSCLC), with the latter category comprising several histological subtypes, the major ones being squamous cell cancer, adenocarcinoma, and large cell cancer.[6] The cell types with the strongest association with cigarette smoking are SCLC and squamous cell lung

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cancer, but there is growing evidence that adenocarcinoma is also strongly associated with smoking.[7] In 1979, squamous cell lung carcinoma was significantly more common than adenocarcinoma, at a ratio of approximately 17:1. In the past 30 years, there has been a greater increase in adenocarcinoma relative to squamous cell cancer such that the ratio of the two cell types has become 1.4:1.[8-10]

Aim

This study aims to access the role of computerized tomography in the surgical management of carcinoma of the lung.

MATERIALS AND METHODS

This is a prospective study from 2014 to 2019, a period of 5 years, in the Department of Cardiovascular Thoracic Surgery, Government Rajaji Hospital, Madurai. All patients with biopsy-proven lung cancer are taken up for the study. For all patients, chest X-ray and computed tomography (CT) chest were taken.

Inclusion Criteria

All patients with biopsy-proven lung cancer are taken up for the study irrespective of their operability and their staging.

Exclusion Criteria

Patients with inconclusive biopsy reports, tuberculosis proved patients, and patients with lung secondaries are excluded from the study.

Patients fulfilling the above criteria were enrolled in the study after taking informed consent. A detailed history with special emphasis on symptoms were collected. Chest X-ray, CT thorax, routine hematological, biochemical investigations, and serological test for human immunodeficiency virus/hepatitis B surface antigen were done in all cases. For all patients, CT-guided biopsy or lymph node biopsy or biopsy of the secondaries was done.

RESULTS

The total number of patients was 35. Seven patients were with carcinoma lung Stage II, one patient with carcinoma Stage III, and 27 patients were in Stage IV. Seven patients underwent primary surgical treatment (Right pneumonectomy – 1, left pneumonectomy – 4, and right lower lobectomy – 2). Other patients were treated appropriately with chemotherapy or radiotherapy or a combination of both;[11-13] male-to-female ratio is 3:1. The age range affected by carcinoma of the lung was between 22 and 69 years, with the mean age of 59 years; about 77% of cases were male (27 patients) and 33% of cases (8 patients) were female [Table 1].

In my study, the right lung upper lobe was commonly involved in 43% of patients, followed by the left lower lobe 23%, right lower lobe 17%, left upper lobe 14%, and right middle lobe 3% [Table 2].

In my study, nearly 77% of the cancer was in Stage 4, Stage 2 in 20%, and Stage 3 in 3%. Of which seven patients undergo curative surgery, remaining 28 undergo chemo or radiotherapy or both [Table 3]. In this group, 29 patients had NSCLC, remaining 6 had SCLC [Table 4].

DISCUSSION

The effectiveness of various lung cancer screening programs in high-risk patients has been assessed in multiple studies in the past decade. Some of these programs were based on chest radiography, while others on low-dose CT (LDCT).[11,12] Two large clinical trials have shaped the current view of lung cancer screening. The non-randomized International Early Lung Cancer Action Program (I-ELCAP) published in 2006 showed that it was possible to detect early Stage IA lung cancer using LDCT with a predicted 10-year survival rate of 88%.[13,14] The study enrolled over 31,000 smokers, including former and passive smokers, aged 40–90 years. Nodular changes were detected in 30% of the participants and lung cancer in 2–3%.

In this study, population had a male predominance, of which 96% of them were smokers. About 94% of the patients

Table 1: Baseline characteristic

Total number of patients	35
Male	27
Female	8

Table 2: Site of involvement

Site of involvement	Percentage
Right upper lobe	43
Left lower lobe	23
Right lower lobe	17
Left upper lobe	14
Right middle lobe	3

Table 3: Stage of lung carcinoma

Stage I	0
Stage II	20%
Stage III	3%
Stage IV	77%

Table 4: Histological type

Non-small-cell lung cancer	Small-cell lung cancer
29	6

belong to the low socioeconomic group. About 78% of the patients in my study were presented in Stage IV. In my study, the right lung upper lobe was commonly involved. Dyspnea and chest pain were the most common presenting symptoms. The predominant type of lung tumor was non-small-cell type followed by small-cell lung tumor. Stage IV patients were treated with chemotherapy followed by radiotherapy.

The detection rate of LDCT diagnosed lung cancer reached 2.4% over a period of 3 years, and the positive and negative predictive values of LDCT were, respectively, 1.2% and 100%.[15]

About 20% reduction in mortality rate demonstrated in NLST became a major supporting argument in the debate on the effectiveness of LDCT screening and its implementation into everyday clinical practice.[16-20]

Chest LDCT is a safe non-contrast diagnostic procedure involving 10–30% lower radiation doses that do the standard CT examination. The dose absorbed by the individual is 2 mSv.[21] The purpose of the scan is to detect non-calcified nodules suspicious for lung malignancy based on their morphology and size. The high sensitivity of this method is associated with the potential for the detection of small-sized nodules.[22,23]

CONCLUSION

CT is still the cornerstone of imaging studies in the pre-operative staging and post-therapeutic evaluation of lung cancer. Treatment of lung cancer depends on the cancers specific cell type, how far it has spread and the patient's performance status. CT is very useful for this purpose. Imaging will continue to play a major role in the evaluation of lung cancer. Mutual recognition of the need for a cohesive multidisciplinary team approach is crucial in the detection and treatment of lung cancer. With the advent of non-invasive imaging modalities like multi-slice/spiral CT scan, the use of invasive screening and staging procedures including bronchography has been pushed to the periphery of staging workup.

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