

Lung Cancer Screening with a Background of Pulmonary TB in India: A Long Way to Go

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Abstract

India is recording a growing burden of lung cancer with associated deaths continue to be high. The nature of lung cancer is aggressive and heterogeneous and most of the cases are detected at advanced stage, thus there is low survival. Similarity of presenting symptoms and radiological similarity in case of lung cancer and tuberculosis, high incidence of tuberculosis, under-diagnosis and misdiagnosis on part of clinician, lack of information of latest technique to detect lung cancer among clinician, high cost and unavailability of high end diagnostic instruments make lung cancer detection difficult. Early detection of lung cancer may be beneficial in reducing the mortality. LDCT has found more effective in detecting lung nodules than simple chest radiograph in various studies. Yet, the one of the biggest hurdle is the cost effectiveness which will pose a high economic burden to any country who will implement the universal lung cancer screening program, apart from false positive finding and over diagnosis. Lung cancer screening should be a priority at national and local level in India. Implementation of screening for high risk individuals with aggressive awareness program can be beneficial and may save more lives.

Keywords: Lung Cancer; Tuberculosis; LDCT; Screening; Smoking

Introduction

Cancer is the second largest single cause of deaths in the world and lung cancer related deaths are on top in cancer related deaths [1,2]. India is recording a growing burden of lung cancer with associated deaths continue to be high. Most patients with lung cancer have smoked cigarettes but air pollution has emerged as an important risk factor in developing nations including India [3].

Lung cancer incidence and epidemiology varies with regions and recent trends have changed in many regions around the globe, even among non-smokers [3,4]. There has been much advancement in the field of oncology related specialities like radiation therapy, surgery,

chemotherapy, targeted therapy and immunotherapy, in last several decades, yet lung cancer related mortality remains poor [5]. Though, there have been remarkable works done on tobacco control and smoking control and there is decline in the deaths related to tobacco consumption and smoking, increase in non-smoking lung cancer cases is a matter of concern in many countries, including India [2,5,6]. The smoking cessation programs helpful in reducing the heavy smoking pattern in many countries, but still risk of developing lung cancer remains high in former and current smokers [5]. Lung cancer can be prevented but the lax in implementation by enforcement agencies of rules and law related to tobacco and smoking consumption needs to be tighten and effective implementation and enforcement along with mass awareness of risk factor related to lung cancer need to be intensified.

The nature of lung cancer is aggressive and heterogeneous and most of the cases are detected at advanced stage, thus there is low survival. Early detection of lung cancer may be beneficial in reducing the mortality [2,5]. Mass screening may have a potential benefit in reducing the mortality by detecting cancer at early stage, but in case of lung cancer is not feasible in many countries due to cost effectiveness. Also, there lack of a framework or guidelines related to lung cancer in many countries [2].

Many trials have been performed for lung cancer screening which include use of chest radiograph, with or without sputum examination; markers in blood, sputum and blood brushing; but except low dose computed tomography (LDCT), other trials have failed to show positive results [2,5]. LDCT has found more effective in detecting lung nodules than simple chest radiograph in various studies [5].

Many lung cancer screening trials have been conducted all over the world which include, but not limited to, Dutch-Belgian Lung Cancer Screening Trial (NELSON trial), National Lung Screening Trial (NLST), United Kingdom Lung Screening Trial (UKLS Trial), Lung Screening Study (LSS), Danish Lung Cancer Screening Trial (DLCST), Detection And Screening of early lung cancer with Novel imaging Technology (DANTE), First Brazilian Lung Cancer Screening Trial (BRELT1), Multi Slice Computed Tomography (MSCT) [2]. The two trials which established the use of LDCT to detect the lung cancer were NLST and NELSON trial.

In NLST, a randomized controlled trial, over 53,000 thousand individuals' participated age between 55 and 74 years from August 2002 to April 2004. All the individuals selected were either current or former smoker having smoking history of 30 or more pack years and if former smokers they have quit smoking latest since last 15 years. Previously diagnosed lung cancer cases were excluded in this trial and all the participants were randomized in two groups, one with screening by LDCT and other with chest radiograph. All the participants were screened thrice at 1 year intervals. Individuals who were detected lung cancer at first or second screening were not screened on subsequent schedule. Total 2001 cases of lung cancer were detected in this trial and 1060 cases were detected by LDCT. Overall reduction of 20% in mortality was found with LDCT in comparison with chest radiograph [5].

In NELSON trial over 15,000 individual participated age between 50 and 75 years. The smoking history taken was different form NLST. Current or former smokers with 15 or more cigarette per day for 25 or more years; or 10 or more cigarette for 30 or more years were included. Also, the criteria for former smokers were if they have quit smoking latest since last 10 years. Participants were randomized into two groups, one with screening by LDCT and other with no screening to determine if LDCT can reduce mortality by 25% or more than no screening at all after 10 years. The participants were screened 4 times in 6 years. The rate of lung cancer detection was found higher in NELSON trial than NLST [7]. The mortality benefit reported was 26% and 61% among males and females, respectively in 10 years [2]. These two trials have been summarised in table 1.

S. No.	Trial	Inclusion Criteria	No. of LDCT screening	Outcome
1.	NLST	Age: 50 - 75 year Current Smoker and former smokers, if they have quit smoking latest since last 15 years 30 or more pack years	3	Reduction of 20% in mortality with LDCT in comparison with chest radiograph
2.	NELSON	Age: 50 - 75 year Current Smoker and former smokers, if they have quit smoking latest since last 10 years 15 or more cigarette per day for 25 or more years; 10 or more cigarette for 30 or more years	4	mortality benefit: 26% and 61% among males and females, respectively in 10 years

Table 1: Lung cancer screening trials with mortality benefit.

Based on the finding of these and other lung cancer screening trials, many nations have formulated guidelines for lung cancer screening with LDCT for high risk group. Yet, the one of the biggest hurdle is the cost effectiveness which will pose a high economic burden to any country who will implement the universal lung cancer screening program. Another issue which come in the way of adopting lung cancer screening at mass level is misdiagnosis [2]. High number of false positive findings also a hurdle in implementing lung cancer screening apart from over diagnosis and long term radiation exposure radiation [2].

Lung cancer screening in a background of pulmonary tuberculosis

Cases of lung cancer are on rise in developing countries inclining India. Lung cancer is on fourth place in term of overall cases and third in term of deaths due to cancer, also there is an increased trend of lung cancer cases in women after breast and cervical cancer [2]. Yet, apart from the cost of implementing lung cancer screening, there is also misdiagnosis of lung cancer cases with pulmonary tuberculosis, again, of which incidence is high in India.

Similarity of presenting symptoms in case of both lung cancer and tuberculosis like fever, cough and weight loss is not uncommon and tuberculosis patients is at risk of developing lung cancer. Also, there is radiological similarity in both diseases, which makes it difficult to diagnose at right time [8-10]. Though, smoking history, hoarseness and superior vena cava obstruction may point out to be a suspected case of lung cancer, high incidence of tuberculosis and high patient load make it difficult for a clinician to think in that direction and refer patients for further investigation and refer to higher centre [2,9,10]. Thus, many of the lung cancer cases are treated as tuberculosis by clinician [10].

Tuberculosis related morbidity and mortality is high in India [11]. According to a study, over 40% cases of cancer is misdiagnosed or underdiagnosed and many patients were being treated with anti-tubercular treatment (ATT) which later turned to be case of lung cancer on further investigation [12]. Lack of information of latest technique to detect lung cancer among clinician, high cost and unavailability of high end diagnostic instruments is also a reason of misdiagnosis [9].

Over diagnosis and false positive findings in lung cancer screening may add more cost to any screening program in India and anxiety and worriedness to patients and their caregiver, as the cost of the treatment is high and many of the families spend out of pocket to give their loved one's best treatment available after lung cancer diagnosis [2].

Keeping in view the above mentioned and other facts, implementation of lung cancer screening recommendations are underway. For lung cancer screening, identification of high risk individuals, using lowest possible dose of LDCT, guidelines for clinician when they find intermediate lung nodules, pathological reporting of suspected case and surgical and/or therapeutic interventions and inclusion of smoking cessation programs are some of the recommendations for future programs [6].

Feasibility of lung cancer screening in India

Based on the findings of various lung cancer trials, countries and organisations like USA, Canada, Japan, Saudi Arabia, International Association for the Study of Lung Cancer (IASLC), American College of Chest Physicians, American Society of Clinical Oncology have recommended the lung cancer screening with LDCT for high risk individuals [2].

In India, there is screening program for cervical and breast cancer by government of India. Despite high incidence, high mortality, diagnosis at advanced stage and low survival, there is debate about the lung cancer screening program [2,6]. After assessing the risk of individuals, recommendation for lung cancer screening can be cost effective but implementing it at a large scale is not feasible in India due to large population size and number of cases of lung cancer and smoking pattern of population.

Poor condition of public health infrastructure and high cost of treatment at private sectors may leads to missed follow-up of diagnosed cases after they are screening positive of lung cancer.

Reducing burden of lung cancer

Cost effective screening program through aggressive research can reduce the burden in developing India. Aggressive campaign to inform about risk factors of lung cancer like smoking and high air pollution should be implement at large scale especially at schools and colleges level [13]. Individuals should be educated about the lung cancer prevention and clinician must come forward to teach them about it while the visit for any modalities. Public awareness program for smoking cessation and tobacco control is of much importance to reduce the burden of lung cancer [14]. Strict enforcement of rules and regulations smoking should be done.

Training of health care providers is an important issue, so the chance of under-diagnosis and misdiagnosis of lung cancer can be minimised. Periodical training program can be conducted at local level or at higher centres to train then to report and investigate further if any patient is suspected of having lung cancer and differentiate it with other chest related morbidities including pulmonary tuberculosis [12].

Conclusion

Lung cancer screening should be a priority at national and local level in India. Implementation of screening for high risk individuals with aggressive awareness program can be beneficial and may save more lives. Also, there should be proper follow-up and treatment strategy after screening, if any individuals of diagnosed. India needs to invest in research for cost effective and highly sensitive modalities to detect lung cancer at early stage which will also be suitable to implement at large scale without much financial burden on public.

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