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Commentary

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Advanced Lung Cancer Treatment Developments

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Abstract

The prognosis for people who are diagnosed with lung cancer has historically been dismal. However, significant developments in detection and therapy over the past ten years have led to the first rises in lung cancer survival rates. The significant developments in palliative care, systemic targeted medicines, curative treatments, and early lung cancer diagnosis are highlighted in this overview. We cover the key studies that support these novel approaches/strategies and where they stand in clinical practice now.

Keywords: Lung cancer; Curative treatment; Targeted therapies; Early diagnosis; Lung cancer management

Introduction

Lung cancer has been the most prevalent cancer worldwide for a number of years. Lung cancer was identified in 46,403 new cases in the UK in 2014. Despite having the highest percentage of all cancer-related deaths (22%), it is the third most prevalent cancer after breast and prostate. 2 Over the past 40 years, the age-standardized incidence has somewhat decreased overall, reflecting both a significant fall in men and an increase in women. At the time of diagnosis, 62% of patients have advanced illness. Combining all lung cancer stages in England, the 1-year survival rate has increased from 24.5% in 1995-1999 to 36.7% at present. The advancements in lung cancer treatment are credited with a large portion of this improvement, which has happened since 2010.

Stage: It's critical to correctly stage lung cancer patients since it affects prognosis and therapy options. The accuracy of lung cancer staging has improved with improved access to Positron Emission Tomography with Computed Tomography (PET-CT) scanning and Endobronchial Ultrasound (EBUS) for mediastinal lymph node sampling. The eighth edition of the staging project from the International Association for the Study of Lung Cancer (IASLC) was approved by the American Joint Committee on Cancer in January 2017. This edition superseded the prior one, which was released in 2009. The 77,156 evaluable cases of NSCLC with histological confirmation that were diagnosed between 1999 and 2010 from 35 sources in 16 countries are used to create the 8th edition.

Tumour: T1a cm >1 cm, T1b cm >1 cm to 2 cm, T1c >2 cm to 3 cm, T2a >3cm to 4 cm, T2b >4 cm to 5 cm, T3 >5 cm to 7 cm, and T4 cm >7 cm are the new subgroups for the primary tumour categorization. Adenocarcinoma in situ and minimally invasive adenocarcinoma were given the names Tis and T1mi. Endobronchial tumours that are less than 2 cm from the main carina have been downgraded from T3 to T2, as they have a better prognosis. The classification for complete lung atelectasis and pneumonitis is now T2. The stage of diaphragmatic invasion has advanced to T4. The term "mediastinal pleural invasion" is no longer used.

Node: N1 ipsilateral hilar node, N2 ipsilateral mediastinal or sub carinal node, and N3 contralateral mediastinal or supraclavicular/scalene node remains the nodal station descriptions.

Metastases: M1a, which refers to intrathoracic metastases, is unaltered. The classification of extra thoracic metastases has been changed to M1b, which refers to a single extra thoracic metastasis in a single organ, or M1c, which refers to numerous extra thoracic metastases in a single organ or many organs. Curative therapies were typically only used for stages I-IIIA in the past, but there has been an increase in interest in treating oligo metastatic disease, which is roughly defined as having fewer than five metastases in a single organ. A number of observational studies have suggested that the 1-year survival rate for oligo metastatic lung cancer is 35-56% when the disease is aggressively treated with ablative radiation or resection. In the UK, the general 1-year survival rate for those with stage IV lung cancer is 14%, therefore this is a major improvement.

Discussion

The standard of care for those with early stage lung cancer who are declared fit enough is thoracic surgery. The limits of surgical fitness are shifting as a result of contemporary surgical procedures, such as less invasive Video-Assisted Thoracoscopic Surgery (VATS) for lung resections. In several trials, it has been demonstrated that VATS lobectomy is superior to open surgery in terms of perioperative mortality and long-term survival. In-hospital mortality after VATS lobectomy was reported to be 1%, compared to 1.9% for open lobectomy, in a significant European retrospective cohort research. In a similar vein, a systematic review and meta-analysis indicated that early stage lung cancer patients who underwent VATS lobectomy had an 80.1% 5-year survival rate compared to 65.6% for open lobectomy. Surgery resection rates have climbed from 9% to nearly 17% over the last ten years, and doctors are now more willing to operate on patients who are over 70 (The median age of lung cancer diagnosis is 73 years). The prevalence of pneumonectomy, an operation with a roughly 11% mortality risk within 90 days, has decreased as a result of greater usage of lung-sparing surgery. Although laparoscopic robotic surgery is being developed, it is not yet advised in the United Kingdom.

Different methods are currently being utilized to treat lung cancer with the intention of curing it thanks to the ongoing evolution of radiotherapy. Stereotactic Ablative Radiotherapy (SABR), which has been developed for use in lung cancer since the early 2000s but was not widely used in the UK until the late 2000s, can deliver high doses of radiation with a high degree of precision of 1 mm to 2 mm to small lesions of less than 1 cm3. It does this by using an external 3D coordinated system that is linked with movements during the respiratory cycle. It has mostly been used for patients with early-stage

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cancer who are unable or unable to have a surgical resection because of concomitant medical conditions. According to a meta-analysis of observational studies, SABR has a higher 2-year survival rate than conventional radiotherapy with a curative goal (70% vs. 53%). In T1-2 N0 M0 lung tumors, a phase II prospective cohort research also discovered a 3-year survival rate of 55.8% with SABR. In addition to having a higher rate of overall survival, SABR has a higher rate of local disease control at 3 years (87.2% SABR versus 43% conventional radiation).

Percutaneous Radiofrequency Ablation (RFA) was originally used for the treatment of primary or secondary hepatic tumors in 2000. It is utilized in patients who are medically unable to have surgery for early-stage peripherally based lung tumors or metastases. An extendable needle with several electrodes is percutaneously introduced into the lung lesion under CT guidance. Following that, a sinusoidal current is run across the electrodes, triggering thermal cell death and coagulation necrosis. The similar ablative effect can also be obtained with a microwave probe. Pneumothorax is the most often reported consequence, but only 4% to 16% of patients need to have a chest drain inserted. Despite case series reporting a 75% overall survival rate in stage I inoperable lung cancer, there are no studies comparing the results of RFA with surgical resection.

A considerable improvement in early detection could have a large impact on lung cancer outcomes. In general, this can be improved by implementing screening programmers, raising awareness of lung cancer, and creating better referral channels. The UK National Screening Committee is now debating the use of low dosage CT scanning for lung cancer screening. When compared to chest X-rays, it has been demonstrated to be a useful method for detecting lung cancer in its early stages and improving mortality. The National Lung Cancer Screening Trial (NLST), which was the largest trial, was carried out in the USA. It randomly assigned 53,454 smokers between the ages of 55 and 74 who had smoked 30 packs or more in the previous 15 years to have a CT chest scan or a plain x-ray. The authors discovered a 20% decrease in the mortality rate specifically related to lung cancer and a 6.7% decrease in the mortality rate overall in the CT group. The UK Lung Cancer Screening Trial (UKLS), a similar pilot study, was carried out in the UK. It used a more selective method of selecting patients for CT screening by sending a questionnaire to find high-risk individuals (defined as having a risk of lung cancer of 5% or greater over the next five years). They were then randomly assigned to receive CT or no treatment. 2.1% of lung cancer cases were detected, and 86% of those cases were stage I and stage II. The resection rate was 83%, with benign disease accounting for 10% of resections (less than half that in other screening trials). Other European trials have been carried out with conflicting outcomes, in part because of poor research design. The results of the Dutch-Belgian experiment NELSON, which is set to report on mortality outcomes soon, could determine whether lung cancer screening is implemented in the UK.

Many questions need to be answered before screening can be put into practice, and a lot of research has been done to address the issues of cost effectiveness, screening intervals, selection criteria, participation rates, ideal diagnostic workup, minimizing harm, and incorporating effective smoking cessation. Although there is no national screening program, numerous localized CT screening pilots have been established throughout the UK as part of Cancer Research UK's "Accelerate, Coordinate, and Evaluate" project and with the help of other funding sources. These pilots are still in operation. Early detection has been aided by raising awareness through national media initiatives like 2012's "Be Clear on Cancer." When the campaign's effectiveness was assessed, it was determined that 700 more cases of lung cancer than the previous year were projected to have been diagnosed, with 400 more cases being discovered at an earlier stage. Both patients and healthcare providers need to be made more aware. According to research, patients who pass away within 90 days after receiving a lung cancer diagnosis communicate with their doctor more frequently than those who survive longer, suggesting that earlier possibilities to diagnose the disease may be lost owing to lack of awareness.

Clear and effective referral mechanisms are also necessary for enhancing early detection. To help commissioners balance the hub and spoke disparities in lung cancer care, NHS England's Clinical Expert Group for Lung Cancer has created recommendations. A National Optimum Lung Cancer Pathway has also been designed. The chest X-ray should be reported while the patient is in the radiology department, and if it is abnormal, the patient should have a CT chest the same day or within 72 hours. This is one of the new pathway's recommendations. The new route would also make CT scanning directly accessible to primary care. As they avoid the natural delays of the report reaching the GP and the subsequent GP referral/further secondary care CT scan, these modifications potentially shorten referral times by weeks. As individuals are identified earlier, this may also result in a decrease in emergency presentations. Several lung cancer risk scores have been developed in order to select patients for referral from primary care in the most effective way; however, they all need to be compared side by side to determine which performs best so that radiology services are not overloaded with requests for chest X-rays and CT scans once the pathway is introduced.

Conclusion

Over the past ten years, numerous technical, pharmaceutical, and service advancements have been made in the staging and treatment of lung cancer, but doubts about how to most effectively use these advancements and their cost-effectiveness persist. To determine whether newer radiation methods are similar to surgery for lung cancer in its early stages, more research is required. The cost-effectiveness of the more recent targeted medicines is still a hot topic, as is the question of whether investing more money on early supportive care would be wise. Even if there are novel therapies available, access to them is uneven, and more thought needs to be given to resource commissioning to address the hub and spoke effect. The introduction of CT screening in the UK has not yet occurred, despite the fact that it is arguably the most effective advancement in terms of improving lung cancer outcomes.

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