

Clinical Statement on the Role of the Surgeon and Surgical Issues Relating to Computed Tomography Screening Programs for Lung Cancer*

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Background

The National Lung Screening Trial (NLST) recently provided the first definitive evidence that screening for lung cancer with low-dose computed tomography (LDCT) decreases lung cancer mortality in certain high-risk groups [1]. Several surgical and nonsurgical organizations, including the National Comprehensive Cancer Network (NCCN), International Association for the Study of Lung Cancer (IASLC), American Association for Thoracic Surgery (AATS), American College of Chest Physicians (ACCP), American Thoracic Society (ATS), and American Society of Clinical Oncology (ASCO), have outlined guidelines on lung cancer computed tomography (CT) screening, which have been recently published or are currently in print with the aim of addressing the specifics of the CT screening process while identifying the ideal target population for lung cancer screening [2–4]. Owing to the importance of the CT screening issue, The Society of Thoracic Surgeons (STS) Workforce on General Thoracic Surgery created the Task Force on CT Screening. This task force, made up of expert thoracic surgeons from around the world, was charged with assessing the role of the surgeon and surgical issues related to CT screening programs for lung cancer. After careful review of the literature, four concepts emerge that

are destined to impact the transition from CT trials to institutional or governmental programs and affect the quality of CT screening programs:

1. **High-risk population to be screened.** Computed tomography screening is recommended for lung cancer survivors starting 5 years after treatment [2, 4]. The NLST included at least 30 pack/year smokers aged 55 to 74 years who were current or former smokers that had stopped smoking for less than 15 years without signs, symptoms, or history of lung cancer [1]. A multisociety guideline (ACCP, ASCO, ATS) recommends screening this population and not others [3]. The NCCN recognized that additional groups were at high risk for lung cancer and recommended screening for the NLST patient population as well as patients 50 to 54 years old with at least a 20 pack/year smoking history if they also had additional risk factors for lung cancer (chronic obstructive pulmonary disease, pulmonary fibrosis, asbestos exposure, occupational exposures, previous smoking-related cancers) [2, 4]. In the 2013 revisions, the NCCN has also extended the screening age to include older patients who are “still candidates for definitive therapy,” and likewise recommend considering screening beyond the 3 years performed in the NLST as long as patients are eligible

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- for definitive therapy [4, 5]. The AATS guidelines closely followed the NCCN guidelines [2].
2. **Duration of LDCT screening.** The NCCN produced the first lung cancer screening guidelines after the publication of the NLST results [4]. In the 2012 version, they recommended that screening should continue for 3 years and until age 74 (ie, a person initiating screening at age 55 would continue until age 74, and a person initiating screening at age 74 would continue until age 76) [4]. In the 2013 revisions, the NCCN refined this to recommend 3 years of screening for the high-risk population as a level I recommendation, and to consider continuing screening as long as an individual is a candidate for definitive therapy as a level IIA recommendation [5]. The AATS guidelines recommended continuing screening until age 79 [2]. The ACCP, ASCO, and ATS guidelines recommend annual screening until age 75 [3].
 3. **Minimization of false-positive diagnoses and the morbidity of invasive procedures.** A review of recently published randomized controlled trials and cohort studies demonstrated that surgical biopsies were needed in as many as 5.6% of screen-detected nodules; of these, between 0.5% and 4.5% were found to be malignant [3]. Of the whole number of surgical procedures needed in the CT screening trials, the percentage of those yielding benign results varied between 0% and 45% (average, 25%) [3].
 4. **Optimization of the management of lung cancers detected during screening.** Other guideline groups have already nicely outlined the appropriate populations for lung cancer screening, the duration of screening, and algorithms for nodule management [1-5], as well as management of known lung cancer [3-5]. Therefore, The Society of Thoracic Surgeons (STS) chose to concentrate on the important issues of minimizing the morbidity of false-positive diagnoses and optimizing the management of screen-detected lung cancers, as these are predominantly managed by thoracic surgeons.

Scope and Aims of the Task Force on CT Screening

In January 2012, the STS Task Force on CT Screening was created to provide recommendations on the following issues relevant to CT screening for lung cancer:

- A. Involvement of thoracic surgeons in CT screening programs
- B. Training and clinical profile for surgeons participating in screening programs
- C. Allied components of a CT screening program (ie, smoking cessation programs, radiological interpretation, and pathology reports)
- D. Use of minimally invasive thoracic surgery in CT screening programs and analysis of surgical issues, such as the extent of the required resection for diagnosis or treatment, the need for mediastinal nodal dissection, and the approach to synchronous nodules.

The STS Task Force on CT Screening Makes the Following Recommendations Regarding the Surgical Issues Related to CT Screening Programs

Statement 1. CT Programs and Multidisciplinary Teams

The Task Force recommends that all CT screening programs include a multidisciplinary team, including thoracic radiologists, pulmonologists, pathologists, thoracic surgeons, medical and radiation oncologists, and smoking cessation counselors.

Statement 2. Surgeons' Participation in CT Screening Programs

The Task Force recommends that thoracic surgeons be involved early in the design and structure of CT screening programs. The Task Force also recommends active participation of thoracic surgeons in crafting the diagnostic and therapeutic decision-making algorithms.

Statement 3. Diagnostic Protocols and CT Screening Programs

The Task Force considers that a diagnostic protocol conceived and judiciously implemented by the multidisciplinary group is an essential requirement for any successful screening program. The protocol should outline well-defined criteria for positive findings and indications for invasive and noninvasive diagnostic/therapeutic interventions. The Task Force recognizes that such diagnostic protocols will inevitably be modified as new technology and knowledge is available, but metrics evaluating performance of the protocol should be defined and carefully tracked in order to minimize potential harm of excessive testing or follow-up imaging on the screened population. Surgeons should participate in the decisions of follow-up, further imaging and staging, biopsy, or resection, and provide guidance to the best modality of tissue diagnosis or resection.

Statement 4. Training and Clinical Profile for Surgeons Participating in Screening Programs

The Task Force recommends that thoracic surgeons participating in CT screening programs be adequately trained in thoracic surgery – as exemplified by the American Board of Thoracic Surgery or, if outside the United States, its equivalent credentialing body. Thoracic surgeons participating in the CT screening programs should have expertise in the fields of lung cancer management, including radiological interpretation of pulmonary nodules, working knowledge of various diagnostic options, surgical treatment that preferably includes minimally invasive thoracic surgery (MITS), as well as alternative nonsurgical methods for the diagnosis and treatment of pulmonary nodules in nonsurgical patients.

Statement 5. Minimally Invasive Thoracic Surgery

The Task Force strongly recommends that CT screening programs have ready access to minimally invasive diagnostic/therapeutic procedures, such as transbronchial and percutaneous techniques and minimally invasive thoracic surgery. Although different interpretations of the concept

of minimally invasive thoracic surgery exist, the Task Force recommends the least parenchymal resection compatible with current diagnostic and oncologic principles performed through the least invasive surgical approach for the diagnosis and treatment of screen-detected nodules. In this setting, the Task Force strongly encourages the use of MITS, inclusive of both video-assisted thoracoscopic and robotic approaches, whenever available and feasible, for the diagnosis and treatment of screen-detected pulmonary nodules. Although the Task Force recognizes that the availability of these techniques may vary, it strongly urges that access to MITS be made available to patients requiring surgery for screen-detected nodules whenever possible.

Statement 6. Pathologic Reporting After Surgery

The Task Force strongly recommends standardized pathology reporting on surgical specimens, according to the criteria expressed in the 2004 World Health Organization (WHO) classification and in the 2011 IASLC/ATS/European Respiratory Society adenocarcinoma classification. Although this WHO classification will likely evolve in the future, the Task Force believes that the use of the terms adenocarcinoma in situ or minimally invasive adenocarcinoma referring to preinvasive or minimally invasive adenocarcinoma should be used at this time and may have an impact on future strategies for lung cancer management [6, 7]. In addition, the Task Force supports obtaining adequate tissue samples for biomolecular studies.

Statement 7. Additional Surgical Issues in CT Screening Programs

The Task Force recommends the following for the evaluation and surgical management of a screened patient undergoing surgical resection:

- A. Assessment before surgical resection should involve a protocol for assessment of cardiopulmonary risk.
- B. When invasive malignancy is confirmed, central lesions should be treated by lobectomy or segmentectomy, depending on cardiopulmonary reserve. Smaller, peripheral ground glass opacity (GGO) lesions may also be treated with wedge resections (at least 1 cm free margins calculated from the uninvolved staple lines – see below). Intraoperative frozen section cytology should be obtained on parenchymal margins after wedge resection or segmentectomy to confirm absence of malignancy at the margins. In any case, the extent of resection for screen-detected invasive malignancy should be in accordance with existing guidelines and emerging evidence for the management of lung cancer in general.
- C. Systematic lymph node sampling or dissection is recommended in all patients with resectable and operable lung cancer.
- D. Management of GGO findings creates some of the most challenging treatment decisions. Initial radiologic observation is recommended to exclude an inflammatory etiology. Management thereafter is the subject of current research and guideline development. The Task Force believes that CT screening

programs should follow a formal algorithmic approach to standardize management. Small, peripheral GGO lesions without a solid component or with a solid component less than 25% of the size of the opacity may be treated with wedge resections. Multiple, bilateral pure GGOs that are technically not completely resectable or in patients at high risk for surgical resection can be managed by radiologic surveillance, particularly when follow-up imaging has established stability or very slow growth. Sometimes, one of these lesions shows an increase in size or in the solid component of the GGO while the other lesions remain stable. In this setting, the enlarging lesion should be treated independently as a presumed lung cancer. Same-lobe malignant lesions are usually best managed by lobectomy. When bilateral synchronous malignant lesions are present, the amount of cardiopulmonary reserve of each patient will determine the extent of lung resection.

Statement 8. Quality Monitoring and Education

The Task Force recommends that formal quality monitoring of all aspects of the CT screening program be implemented. Specifically, surgical quality should be evaluated using accepted parameters for outcome measurement. In addition, the Task Force strongly encourages STS to implement future educational activities aimed at facilitating surgical participation in CT screening programs.

Conclusions

A recent systematic review concluded that individuals at an increased risk for lung cancer may benefit from CT screening, but uncertainty remains about the potential harms of screening and the generalization of results [3]. The STS Task Force on CT Screening releases these recommendations aiming at improving quality and safety of CT screening programs for patients. The Task Force believes that the involvement of a thoracic surgeon in CT screening programs will assist in minimizing unnecessary surgical procedures and procedure-related morbidity, and in determining the best surgical technique for resection.

(Adopted by the STS Executive Committee: December 12, 2012)

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