Editorial Commentary

Quality assurance in thoracic oncology: the surgeon's perspective

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Keywords: Quality; surgery; lung cancer; oncology

Received: 01 April 2022; Accepted: 06 April 2023; Published online: 17 April 2023.

doi: 10.21037/pcm-22-10

View this article at: https://dx.doi.org/10.21037/pcm-22-10

Thoracic malignancies, and specifically lung cancer, have historically been considered a considerable burden in health (1). Nevertheless, constant advances in clinical oncology and surgical practice have led to many shifts and changes in the way we as healthcare providers manage these conditions. There has been a considerable widening in the spectrum of the available tools to treat lung cancer. The detailed knowledge (2) of lung cancer molecular features and its interaction with the immune system have led to the development of many new pharmacological protocols. The subsequent widening in treatment options has led to a more precise therapeutic intervention and, thus, substantial improvement in patient survival (3,4). Radiation therapy has also experienced great advances in instrumentation power and effectiveness and has expanded and improved its application in thoracic oncology (5). For what concerns surgery, we have witnessed a constant trend toward the reduction of the physical trauma related to surgical therapy without compromising its efficacy (6). Eventually, advances in therapeutic strategies together with a better understanding of neoplastic pathophysiology determined a more precise patient prognostic stratification and definition of new treatment protocols, such as multimodal radical treatment for oligometastatic lung cancer (7,8). From all these different professional perspectives, the main common objective has been to improve the quality of care we offer and make the treatment itself more tolerable for patients.

From a surgical point of view, the main indicators of treatment quality considered are the perioperative morbidity and mortality rates and long-term oncological outcomes after surgical treatment. The main problems related to thoracic surgery for lung cancer treatment are postoperative complications and worsening of quality of life (QoL) after surgery (9,10). Open surgical approaches have been historically linked to a prolonged reduction in QoL and increased pain postoperatively (11). Concerning these aspects, the main advance in our daily practice as surgeons has been the introduction of minimally invasive techniques such as video-assisted thoracic surgery (VATS) and robot-assisted thoracic surgery (RATS). Both have proved to have a lower postoperative complication rate and both better postoperative QoL and pain control compared to thoracotomy (12-15). More recently, prospective and randomized studies have confirmed these findings. Bendixen *et al.* (16) demonstrated that VATS provides better QoL and less pain postoperatively than anterolateral thoracotomy. The superiority of VATS in terms of recovery, QoL and patient satisfaction seems to be preserved regardless of the number of ports utilized (17), which also extends to robotic surgery (14). Most importantly, oncological outcomes are not compromised with minimally invasive surgery (18,19). Indeed, robotic surgery has demonstrated to yield comparable results to the open technique, especially regarding the completeness of lymphadenectomy (20,21). The elderly are the class of patients that has particular benefits from the adoption of VATS for lung cancer resection. Older individuals treated with a minimally invasive approach have lower homecare needs and are more likely to spend more time at home (22), suggesting that minimally invasive surgery should be adopted whenever

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it is clinically feasible in this class of patients; this latter consideration underlines the importance of also considering patient-centered outcomes because of their connection to long-term burden on morbidity and mortality.

Finally, increasing attention has been drown in the last decades to the long-term outcome of pneumonectomy. Even with the modern improvement in healthcare, mortality after pneumonectomy can still be as high as 26% (23,24). The impact on QoL after such treatment is also considerable (25). These findings have so driven the efforts of many thoracic surgeons in avoiding pneumonectomy and resorting to parenchymal-sparing procedure such as bronchial sleeve or arterial sleeve lobectomies. In selected cases, these procedures have shown a clear advantage in long term survival over pneumonectomy, without compromising oncological results (26,27).

The patient-centered paradigm is indeed becoming an important factor concerning improvement in the quality of surgical care, moving beyond the strict analysis of the overall survival and disease-free survival. In recent times there has been an increasing utilization of patient-reported outcomes systems. They focus on aspects and factors related to treatment considered purely from the patient's point of view and without medical interpretation; this tool can provide us with a more thorough insight into "the other side of the coin" in the complex framework of an oncological treatment plan. Integration of this information with clinical data could help to understand further the treatment outcomes and hence to better define patient counseling, prediction algorithm, and possibly new therapeutics guidelines (28).

Another aspect to consider is that recent advances in surgical techniques have led to surgery on patients with many comorbidities that would have previously been excluded (29). This extension in patient selection leads to new challenges in the identification of the best treatment setting for every single patient (29); despite technical advances, complication rates remain high and QoL preservation is still a matter of discussion when considering frail patients. In a review by Pedoto *et al.* (30), the authors suggest that this issue is a consequence of the interaction of several factors that concern both different specialists (i.e., surgeons, anaesthetists, etc.) and healthcare facilities; given these multiple possible causes, a multidisciplinary approach is needed to optimize all the variables.

Complex management involving a multidisciplinary team has indeed become a healthcare standard in oncology, but defining quality in this setting is still an open debate. Again, quality measurement for each speciality involved is well defined, usually considering follow up data (disease-free survival) and functional parameters (pulmonary function tests, pain scales, etc.), but tools for quality-of-care assessment of multidisciplinary management are still lacking. Concordance of defined treatment according to current guidelines has been proposed for this purpose; on the other hand, given the heterogeneity of the patients involved, these findings could be at least partially misleading (31). Nevertheless, Numan *et al.* (32) reported that when the multidisciplinary approach is systematically integrated into the pathway of care after a clinical audit, significant improvements in both perioperative and long term QoL outcomes can be achieved.

In recent times, the new coronavirus (COVID-19) pandemic has posed new and sometimes unprecedented challenges in thoracic oncology (33,34). Patients with lung cancer are more prone to develop severe clinical scenarios related to COVID-19 infection and are, therefore, considered a high-risk population in this context (35). Moreover, Garassino *et al.* (36) demonstrated that not only do thoracic cancer patients show higher mortality related to COVID-19 disease, but also are more likely to be excluded from intensive care treatment. This lower rate of admission in intensive care units seems to be related to the presence of concurrent oncological condition itself. On the other hand, new targeted therapies and immunotherapy have deeply changed prognosis even in patients with systemic disease. Decisions regarding whether to undertake or not intensive treatment in such patients should therefore be discussed in a multidisciplinary setting, rather than be based on preconception alone (36). Limitations in access to healthcare institutions during the pandemic can also lead to significant diagnostic and therapeutic delays, an ominous occurrence in a condition such as lung cancer (33). Adoption of alternative strategies such as telemedicine have led to satisfactorily results, avoiding treatment postponement regardless of disease stage and treatment modality (i.e., surgery, radiation or chemotherapy) (37).

In conclusion, modern thoracic oncology has become a dynamic and complex area of expertise, involving many different specialist healthcare providers and challenging old dogmas with constant breakthroughs into the boundaries of defined treatment strategies. Patient-centered outcomes are increasingly considered to furtherly refine and optimize the quality of treatment.

Acknowledgments

The authors wish to thank Dr. Paul Van Houtte and Dr. Dirk Van Gestel for their invitation to write this paper on such a crucial topic.
Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the Guest Editors (Paul Van Houtte and Dirk Van Gestel) for the series "Quality Assurance in Radiotherapy" published in *Precision Cancer Medicine*. The article has undergone external peer review.

Peer Review File: Available at https://pcm.amegroups.com/article/view/10.21037/pcm-22-10/prf

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://pcm.amegroups.com/article/view/10.21037/pcm-22-10/coif). The series "Quality Assurance in Radiotherapy" was commissioned by the editorial office without any funding or sponsorship. The authors have no other conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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doi: 10.21037/pcm-22-10
Cite this article as: Lyberis P, Femia F, Ruffini E. Quality assurance in thoracic oncology: the surgeon's perspective. Precis Cancer Med 2023;6:20.