



Lung cancer surgical treatment during the pandemic: a challenging situation

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At the time of writing this paper, coronavirus disease 2019 (COVID-19) has taken the lives of over 6.3 million people around the world, and counting (1). The circumstances brought about by this pandemic have transformed every aspect of our lives. It has not only resulted in multitudes of deaths, but higher numbers of ill people (over 541 million cases worldwide) (1), which has consequently caused several waves of hospital admissions, thus saturating health services. At various points throughout the pandemic, some hospitals have been almost completely dedicated to COVID-19 patients and have reached hospital occupancies of over 100% and even 300% in intensive care units at expense of these patients (2). Consequently, this situation has forced health services to change and reorganize their procedures and set up new protocols (3).

As could be expected, every condition other than COVID-19 has, in some measure, been relegated in favor of respiratory patients. And cancer treatment has been no exception, with all phases of patient care being affected, including screening, diagnosis and treatment (both medical and surgical) (4,5). Of all types of cancer, lung cancer is the leading cause of cancer-related death (causing 1.8 million deaths in 2020, which is almost double the mortality rate of the second most lethal form of the disease) (6). Despite these figures, not even lung cancer patients were an exception to the forced reorganization and delays caused by this pandemic (7).

Regarding surgical treatment, and in order to minimize the deleterious effects of being unable to properly care for

lung cancer patients, national and international societies proposed protocols and triage guidelines (8–10) in an attempt to prioritize surgery for pathological stages at which waiting is not an option; i.e., in patients with potentially more aggressive diseases, those in need of staging to start treatment or postinduction treatment cancers. The objective of these guidelines was, on the one hand, to try to make use of the few operating rooms available as efficiently as possible, especially in the worst stages of the pandemic and, on the other, to try to avoid infected patients undergoing surgery. The latter was not only because of the risk posed to staff, but predominantly because of the problems this infection, at that moment in time, supposedly caused; problems that have indeed been demonstrated in patients who have undergone surgery (11). Despite these measures, lung cancer surgical treatment was affected by the entire situation (12,13).

In this context, even with all types of elective surgery being prohibited in their state, Dolan *et al.* reported their experience with their own triaging system (14). This triaging system attempts, like other published triaging guidelines, to prioritize patients with more aggressive forms of the disease in the case of cancer or patients most greatly affected by the disease. The most remarkable characteristic of their system is that only 3 of the more than 20 items make direct reference to oncological criteria, with all remaining items taking into account the clinical status of the patient (dyspnea, cough, pain, gastrointestinal reflux, anxiety, etc.) (14). This is in stark contrast to the published national and international

guidelines, as most of which use oncological criteria almost exclusively, with symptomatic criteria being limited to just one or two items out of a total of almost thirty (8,10) and some using no clinical items at all (15).

While applying this triaging system during the peak of the first wave of the pandemic, 53 surgeries were performed, compared to 107 in the same period of the previous year, with this decrease being specifically significant during April 2020. It can therefore be affirmed that during this period, only half of the surgeries that were expected to be performed went ahead. Despite such a large difference in the number of operated patients, no significant differences were seen among patients during March to May 2019 versus the same period of 2020 in the clinical oncological or pathological stages, changes of stage, time to surgery, or postoperative events. A significant trend towards downstaging was only detected during the three months period in 2020 when compared to the entire year of 2019 (14).

Regarding the proportion of surgeries performed, the figures showed by Dolan *et al.* are in line with other published papers, wherein the number of surgeries performed during the peak of the pandemic is about 50% less (12,16). This reduction was an unavoidable collateral effect of the lockdown measures around the world, which forced the closure of operating rooms for use as intensive care beds and the redirection of professionals to other tasks outside of thoracic surgery departments. Indeed, the most frequently observed effect on lung cancer surgery waiting lists was, almost always, an increase in waiting times for operations (12,13), with this delay also being observed in all necessary diagnostic procedures for cancer patients (16). Because of all these circumstances, many patients did not undergo the routine diagnostic-therapeutic algorithm. In many cases, it was not possible to discuss these patients on a multidisciplinary tumor board; in fact, many patients who would have usually been candidates for surgery were directed to other non-surgical treatments [such as stereotactic body radiotherapy (SBRT)] (12,13).

Despite Dolan *et al.* reporting an equivalent median waiting time from final clinic visit to surgery to the normal waiting time, they do report a clear decrease in the number of surgeries performed between March and May 2020 (14). This, as they note in their paper, might be due to a possible bias in the evaluation of their screening system, as in this study they were only able to recruit surgical patients and were unable to include patients whose diagnosis was delayed, who were referred for non-surgical treatments, or

those who were lost to follow-up and reappeared after the peak of the pandemic.

The expected consequence of such delays and changes in lung cancer diagnostics and treatment is a negative impact on patients' survival. Indeed, the impact of these delays on oncological patients has been demonstrated to be equivalent to an average loss of life of 0.97 years with a 3-month delay and 2.19 years with a 6-month delay. When focusing on non-small cell lung cancer, the estimated average of life-years gained per unit of healthcare resource when comparing surgery performed on time with surgery performed after a 6-month delay (based on 5-year survival) totals 1.1 years (17). It has been postulated that during the first year of pandemic there was up to 7.7% more deaths due to lung cancer, an increase which at 3 years will total up to 5.8% and 5.3% at 5 years (18).

The modern world had not faced a health situation like that caused by the spreading of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) during 2020. The previous most similar situation was the 1918 flu pandemic (19), but since oncological and, in particular, lung cancer diagnosis and treatment was markedly more limited in those days, its effect on such diseases was not as huge as the effect of this pandemic. Many strategies have been implemented to try to minimize its impact but, nevertheless, lung cancer patients have inevitably suffered delays and changes in their standard treatment. This—as far as we know—in the short-term has already affected outcomes and surely, as the years go by, we will be able to confirm its effect on overall survival. Therefore, we must welcome every effort to try to always offer the best treatment to patients and shorten their waiting times for treatment, such as Dolan's triage system—despite its specific characteristics—as potentially useful tools to improve the entire system of treatment administration, and thus, patient survival.

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