Assessment of Surgery Delay-Associated Risk in Resectable Stage I-IIIA Non-Small Cell Lung Cancer

Objective: Surgery delay is a common issue worldwide because of limited medical resources, which was further exacerbated by the COVID-19 pandemic. This study aims to assess the influence of surgery delay on the outcomes of patients with resectable stage I-IIIA non-small cell lung cancer (NSCLC).

Methods: Using Surveillance, Epidemiology, and End Results Program (SEER) database, we identified 50,522 patients with stage I-IIIA NSCLC who received standard pulmonary resection. Surgery delay was defined as the time interval between diagnosis date and surgery date which was recorded by month. For example, zero month represented 0-29 days, and one month represented 30-59 days, and so on. Association between the surgery delay and survival parameters was assessed with the restricted cubic spine (RCS) curve fitted for Cox proportional hazards models in which the shortest delay of zero month served as the reference. Overall survival (OS) and lung cancer-specific survival (CSS) were evaluated by Kaplan-Meier method and compared by log-rank test.

Results: The RCS curve demonstrated a non-linear association between the surgery delay and estimated survival. Both all-cause and cancer-specific mortality risks increased drastically and simultaneously within the delay range of three months (0-89 days), followed by a much slower increment after 90 days. All the included patients were classified into three groups based on the death risk stratifications of surgery delay: low-risk (delay ≤29 days), intermediate-risk (30-59 days), and high-risk (>60 days). Compared with low-risk group, all-cause and cancer-specific mortality risk increased by 6.2% (95%CI: 3.0%-9.5%) and 17.6% (95%CI: 10.3%-25.5%) in the intermediate-risk group, and by 18.3% (95%CI: 14.8%-21.9%) and 40.5% (95%CI: 32.1%-49.5%) in the high-risk group, respectively.

Conclusion: Only one-third of patients could receive surgery within the first month after diagnosis. Surgery delay could significantly increase all-cause and cancer-specific mortality risk even beyond only one month (>30 days). The surgery delay-related mortality risk increased the fastest within a three-month delay while the risk increased more slowly when the surgery delay ranges from four to twelve months. Controlling the surgery delay within one month is essential for resectable NSCLC patients to avoid worse outcomes.

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