Smoking Cessation Before Lung Resection

[Editorials]

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A relationship between cigarette smoking and postoperative pulmonary complications has long been recognized. Both smoking-associated lung diseases and smoking itself have been shown to pose an increased risk for respiratory complications in the postoperative period, as variably defined in different studies,1,2 but usually including some combination of pulmonary infection, atelectasis, bronchospasm, and prolonged ventilation. The development of pulmonary complications has, in turn, been associated with a higher postoperative mortality rate.3 Former smokers have a lower rate of complications than current smokers, and, while it is logical to assume that getting our patients to quit smoking before surgery would translate into a lower rate of postoperative pulmonary complications, reality proves more complex. When it comes to smoking, smoking cessation, and perioperative complications, it’s not just if you quit, but when you quit, that matters.

The benefits of smoking cessation on the incidence of perioperative pulmonary complications are not immediate. A reduction in the rate of perioperative complications is not seen until a period of abstinence of 5 to 8 weeks in duration.4 However, more concerning than a delayed benefit from quitting smoking preoperatively is the potential for an adverse effect among recent quitters. Several studies have documented that smokers who cut back but do not quit entirely,1 or quit but have been abstinent for < 2 months,4-6 may have a higher rate of complications postoperatively—a higher rate not only in comparison to nonsmokers and those who quit in the more distant past, but a higher rate than continued smokers. While this is not an intuitive finding, it is one for which there is some basis in physiology. For example, sputum volume has been found to be an independent risk factor for pulmonary complications,7 and smokers who have been abstinent for < 2 months have been demonstrated to have higher volumes of intraoperative sputum than those who have been abstinent for longer periods.8 When one also considers the delayed improvement in the microbicidal and inflammatory functions of alveolar immune cells after cessation of smoking,9 delayed recovery of ciliary function, and possible reduction in irritant-induced coughing that may occur with smoking cessation, the
counterintuitive finding of increased complications in the first weeks to months after smoking cessation doesn’t sound so odd.

The possibility of an increased rate of postoperative pulmonary complications among recent quitters has posed something of a dilemma for physicians caring for patients requiring surgeries for which a several-month delay may be imprudent. For emergent surgeries, of course, there is no opportunity for preoperative smoking cessation, making the point moot. For entirely elective surgeries with no pressure of time, waiting until at least 8 weeks after smoking cessation is recommended, to ensure that the full benefit of smoking cessation on risk reduction for perioperative complications has been achieved. However, for patients who require elective surgeries for which a several-month waiting period may be disadvantageous—such as our patients with lung cancer potentially curable by resection—the best advice concerning smoking cessation has been less clear. Do we advise them to quit immediately, and operate right away, knowing the interval between cessation and surgery will be < 8 weeks, potentially increasing the risk of postoperative complications? Do we advise them to quit and then wait 8 weeks before operating, risking the potential for tumor growth, upstaging, and worse outcome? Do we advise them not to quit until the day prior to surgery—long enough to decrease carboxyhemoglobin levels, but not long enough to increase the risk of complications?

For patients with lung cancer, smoking is not just a risk factor for perioperative pulmonary complications. It is also the cause of their cancer, a factor associated with decreased survival \(^1^0\) and poorer quality of life after cancer diagnosis,\(^1^1\) and a risk factor for subsequent cancers.\(^1^2\) In addition, smoking is a risk factor for nonpulmonary postoperative morbidities, including cardiovascular events, infections, and wound complications, and the incidence of at least some of these complications has been shown to decrease after only brief periods of smoking cessation.\(^1^3\) The imperative and motivation to quit, and the practical and symbolic implications of quitting at the time of a diagnosis of lung cancer, are sizable. A cancer diagnosis presents a “teachable moment” for patients, and rates of smoking cessation shortly following a cancer diagnosis, particularly in conjunction with an intensive cessation program, are substantially higher than quit rates in the general population.\(^1^4\) Given the teachable moment posed by the diagnosis of cancer, the long-term benefits of cessation, and potential benefits in terms of postoperative complications in organ systems other than the lung, there is a strong incentive to advise patients to quit immediately, even when the interval before surgery is < 8 weeks. Nonetheless, I’ve done so with some misgivings, given the potential for increased perioperative pulmonary complications in the recent quitter, and the imperative to “above all do no harm.”

The study by Barrera and colleagues reported in this issue of CHEST (see page 1977) is an important one, taking on the issue of smoking cessation and perioperative complications specifically in patients undergoing pulmonary resection. With an enrollment of 300 patients, this study was not only the largest to date focusing specifically on patients undergoing lung resection, but was also methodologically very sound. It was prospective, enrolled consecutive patients, and considered only pulmonary complications of clear clinical significance: respiratory failure requiring intubation or ICU admission; pneumonia; atelectasis requiring bronchoscopy; pulmonary embolism; and need for supplemental oxygen at hospital discharge. Less clinically important pulmonary complications such as minor atelectasis or bronchospasm not resulting in respiratory failure were not included. Patients were categorized as never-smokers, past quitters (> 2 months previously), recent quitters (< 2 months previously), and ongoing smokers. The majority of patients were past
quitters, with relatively few recent quitters and ongoing smokers. Pulmonary complications developed in 17% of the study cohort. The overall rate of pulmonary complications differed between never-smokers and smokers (in aggregate), but it did not differ among subgroups of smokers. Those who were recent quitters did not have an increased risk of pulmonary complications compared to those who continued to smoke. The absence of an increase in significant pulmonary complications among recent quitters undergoing lung resection provides valuable reassurance to the pulmonologists and thoracic surgeons caring for such patients.

The study does have some methodologic shortcomings that warrant mention. Smoking status was by self-report, and was not biochemically confirmed (though data collection methods minimized patients’ incentive to mislead). The study was powered to detect a difference in the incidence of pulmonary complications between smokers (as a group) and nonsmokers, rather than between recent quitters and either ongoing smokers or nonsmokers, and there were relatively few patients in the subgroups of greatest interest: recent quitters and ongoing smokers (also true of many other studies of this question). Whereas the overall incidence of pulmonary complications did not differ between the recent quitter and ongoing smoker subgroups (23% in each group), the types of complications did differ; all of the complications in the ongoing smoker subgroup were pneumonias, whereas in the recent quitter subgroup there were fewer pneumonias but 10% of the patients were discharged on oxygen (vs none in the ongoing smokers) and respiratory failure developed in one patient. It is certainly possible that, for any particular complication, a true difference might exist between the recent quitters and continued smokers, but the small number of patients in each of these groups precluded detecting such an effect. To examine the comparative incidence of particular postoperative pulmonary complications would require a much larger study than is reasonably feasible.

Does this study definitively lay to rest questions about smoking cessation, its timing, and pulmonary complications after thoracic surgery? No. But it’s good enough to allow us, as clinicians caring for and advising patients who smoke and who require lung resection surgery, to strongly advise them to quit, without concern that we may be doing harm if the interval before surgery is < 1 to 2 months. We can maximize the value of the teachable moment posed by a lung cancer diagnosis without serious concern that we are exposing patients to an increased risk of clinically important postoperative pulmonary complications. So when it comes to smoking cessation before pulmonary resection surgery, the answer is yes, and the time is now.

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References


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