Smoking Cessation and Lung Cancer Resection*

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**Study objective:** This study was designed to examine the extent of smoking cessation prior to thoracotomy for resection of a pulmonary malignancy and the relapse rate.

**Design:** Prospective, longitudinal study.

**Patients:** All patients presenting to the General Thoracic Clinic.

**Results:** The study included 362 patients, with an average age of 64.7 years; 95% with a smoking history were followed up for an average of 17.5 months. Five surgeons in the same practice group performed the procedures: pneumonectomy, 45; lobectomy, 288; and lesser resections, 29. Forty-two percent of patients had quit prior to 1 year; 6% quit 3 months to 1 year; 15% quit between 2 weeks to 3 months; 12% quit at 2 weeks; and 19% continued to smoke up to surgery. Postoperatively, 86% of previously smoking patients were nonsmoking; 13% of patients started smoking again. Of the restarted smoking patients, 61% had never quit preoperatively. Only 59% of smoking patients admitted that a physician had ever told them to stop smoking; however, 89% of patients who were smoking postoperatively acknowledged physician advice to stop smoking.

**Conclusions:** Long-term smoking cessation occurs in a large proportion of patients after resection of lung cancer. The longer the patient is nonsmoking preoperatively, the more likely he or she is to remain nonsmoking postoperatively. Conversely, patients who do not quit preoperatively are at significant risk of continuing to smoke postoperatively. (CHEST 1996; 110:1199-1202)

**Key words:** lung cancer resection; smoking; smoking cessation

Cigarette smoking accounts for at least 87% of deaths from lung cancer and significantly influences the pulmonary function of the smoker.1 The resultant emphysema and chronic bronchitis may preclude an operative resection or radiation therapy. Frequently, measurements of pulmonary function of FEV1, maximum voluntary ventilation, and diffusing capacity are adversely affected by smoking. Postoperative complications, including respiratory problems, have been correlated to preoperative smoking status and have been variable.2,4 In some studies, complications were elevated in patients who had a history of smoking.2,3 However, few studies have defined the appropriate or safe duration of smoking cessation to decrease complications. One study by the Mayo Clinic suggested that 2 months was required to achieve a decrease in postoperative pulmonary complications in patients undergoing coronary artery bypass surgery.5 Two months is believed to be too long to intentionally postpone potentially curative surgery for lung cancer.

In addition to attempting to decrease pulmonary complications postoperatively, smoking cessation is important for a myriad of other reasons: stabilization of pulmonary function,6,9 decrease risk of myocardial infarction,10-13 and potential improved response to other oncologic therapy.14-15

Few studies have examined a detailed smoking history, including duration of cessation preoperatively, number of pack-years, and the relationship of smoking status to pulmonary status and its subsequent effect on postoperative morbidity and mortality. While we cannot address all of these issues, this article will begin by addressing the issue of duration of preoperative smoking cessation and its effect on continued cessation after surgery.

**Materials and Methods**

Since February 1992, all patients presenting to or followed up in the General Thoracic Surgical Clinic at Washington University completed a survey delineating their smoking history. The questionnaire, developed in conjunction with the Center of Health Behavior Research (Washington University, St. Louis), contained 14 items designed with open-ended questions to determine the time of initiation, extent, and possible termination of their smoking habit. The questionnaire was self-completed by the patient and reviewed by the thoracic nurse for completeness with the patient. The operative records of all patients surveyed were reviewed to determine the subset of patients who underwent a thoracotomy for resection...
of a lung carcinoma. The data from this subset of patients with resection for lung carcinoma who had completed the smoking history questionnaire form the basis of this report.

All of the patients were seen by one of the five attending thoracic surgeons preoperatively and postoperatively. The practice of physician advice to stop smoking preoperatively and/or postoperatively varied from surgeon to surgeon. The surgeons all recommended cessation, but they were variable in the amount of time and emphasis on cessation. When advice was given to a smoking patient, the usual suggestion was to quit “cold turkey” and possibly, nicotine replacement was prescribed. (Cold turkey is commonly described as complete, immediate cessation of smoking.) The surgery was scheduled for 2 weeks after smoking cessation.

Patients were followed up postoperatively every 3 months for the first 2 years, and every 6 months thereafter. Patients would complete the smoking questionnaire at each visit. The physicians had immediate access to all information concerning the patient’s smoking status, if they wished to further advise the patient.

Results

Three hundred sixty-two patients have been followed up for an average of 17.5 months (range, 1 to 67 months) postoperatively. (Average cessation rates for preoperative smokers are given as 17.5 month quit rates.) All had completed the questionnaire at least once detailing their smoking history, including at sequential postoperative follow-up visits. All patients had operative resection as the primary modality for their lung carcinoma. Procedures included the following: 288 lobectomies; 45 pneumonectomies; and 29 lesser resections (wedge or segmentectomy). The average age was 64.7 years; 63% were male and 37% female.

Three hundred forty-five (95%) patients undergoing operative resection of their lung cancer had a history of smoking. The average amount smoked per day was 1.52 packs (men, 1.69; women, 1.24). Forty-two percent of patients quit smoking at least 1 year prior to resection, 15% quit between 2 weeks and 3 months, 12% quit at 2 weeks, and 19% continued to smoke up until their surgery (Table 1).

Of the 345 patients with a smoking history, 296 (86%) remained nonsmoking postoperatively. Forty-four (13%) patients remained or started smoking again postoperatively (Table 2). Of these 44 patients, 27 (61%) had never stopped preoperatively; 4 (9%) had stopped between 2 weeks and 3 months. Only 3 patients who had stopped smoking prior to 3 months restarted smoking postoperatively. Persistent or restarting smokers averaged 1.04 packs per day.

Patients deemed to have operable conditions with a lung malignancy were imminently resected. To try to evaluate the effect of physician advice and imminent surgery, results were examined among those who were smokers at the time of diagnosis and then quit within 2 weeks to 3 months prior to their surgery. Ninety-five (27.5%) patients who had a smoking history stopped smoking between 2 weeks and 3 months prior to their surgery. Eighty-one of these 95 patients (85%) who quit between 2 weeks and 3 months preoperatively remained nonsmoking postoperatively.

Of all patients who were smoking at the time of their diagnosis of lung cancer, 58.5% acknowledged physician advice to stop smoking. Of those patients who restarted smoking postoperatively, 89% acknowledged that they had received physician advice previously to stop smoking. The range of initiation time of patients restarting smoking was immediately to 12 months postoperatively (Table 3).

Table 2 also describes the relapse rates as related to the period of smoking cessation preoperatively. Most patients who resumed or persisted in smoking postoperatively had the shorter to nonexistent cessation period preoperatively.

Sixty-six patients did not quit smoking at all preoperatively. Thirty-eight of these patients (58%) did not resume smoking postoperatively. However, 27 of the 66 patients (41%) remained persistent smokers postoperatively. Twenty-three of the 27 (85%) persistent smokers acknowledged physician advice to stop smoking.

Table 1—Time Periods of Smoking Cessation Preoperatively*

<table>
<thead>
<tr>
<th>Time Periods</th>
<th>No. (%) of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;2 yr</td>
<td>131 (38)</td>
</tr>
<tr>
<td>1-2 yr</td>
<td>14 (4.1)</td>
</tr>
<tr>
<td>&gt;3 mo-1 yr</td>
<td>21 (6.1)</td>
</tr>
<tr>
<td>2 wk-3 mo</td>
<td>53 (15)</td>
</tr>
<tr>
<td>2 wk</td>
<td>42 (12)</td>
</tr>
<tr>
<td>&lt;2 wk</td>
<td>14 (4.1)</td>
</tr>
<tr>
<td>Never quit</td>
<td>66 (19)</td>
</tr>
<tr>
<td>Total</td>
<td>341</td>
</tr>
</tbody>
</table>

*Status of four patients is unknown.

Table 2—Relapse Rate in Relation to Cessation Period

<table>
<thead>
<tr>
<th>Time Quit Before Surgery</th>
<th>No. (%) of Patients</th>
<th>No. (%) of Patients Who Had Relapse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=341)</td>
<td>(n=44)</td>
</tr>
<tr>
<td>1-2 yr</td>
<td>145 (42)</td>
<td>0</td>
</tr>
<tr>
<td>3 mo-1 yr</td>
<td>21 (6)</td>
<td>3 (7)</td>
</tr>
<tr>
<td>&gt;2wk-3 mo</td>
<td>53 (15)</td>
<td>4 (9)</td>
</tr>
<tr>
<td>≤2 wk</td>
<td>56 (16)</td>
<td>10 (23)</td>
</tr>
<tr>
<td>Never quit</td>
<td>66 (19)</td>
<td>27 (61)</td>
</tr>
</tbody>
</table>

Table 3—Time Periods of Restarting Smoking Postoperatively (44 Patients)

<table>
<thead>
<tr>
<th>Time Period, mo</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤1</td>
<td>61</td>
</tr>
<tr>
<td>≤3</td>
<td>6.5</td>
</tr>
<tr>
<td>≤6</td>
<td>16</td>
</tr>
<tr>
<td>≤9</td>
<td>9.6</td>
</tr>
<tr>
<td>≤12</td>
<td>6.5</td>
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DISCUSSION

Previous studies have demonstrated that patients diagnosed as having lung cancer are often former smokers having quit smoking greater than 1 year prior to their diagnosis. The percentages of former smokers (quit > 1 year) may vary from 40% to 51%. Our results of 42% of patients quitting greater than 1 year prior to their diagnosis confirms these findings. Patients who have quit smoking in years past give a wide spectrum of reasons, from “My doctor told me to,” to self-perceived health reasons, to family or spousal encouragement. Unfortunately, though smoking cessation decreases the risk for lung cancer, the incidence does not approach a nonsmoker’s baseline risk for many years.

Although many patients have quit smoking prior to their presentation to a thoracic surgeon, a significant number remain smokers. Sridhar and Raub retrospectively reviewed the smoking status of 100 patients with lung cancer. In their review, 18% of patients continued to smoke after their diagnosis. Interestingly, this study also addressed the issue of patient-completed questionnaires. They concluded that patients were not as accurate or complete as physicians in assessing an accurate smoking history. However, the patient questionnaire and types of questions queried were not stated. Previous data have described a good correlation between patient self-report cessation rate and metabolite determination of nicotine byproducts. Laboratory determinations of cessation, however, are more accurate and should be utilized in future studies.

Another study by Ockene et al. found that 36% of patients with a smoking-related disease continue to smoke and that women were more likely to quit smoking than men in the presence of a smoking-related diagnosis. In a study by Davison and Duffy in 1982, patients with lung cancer who were long-term (5 years) survivors after resection, 34% of previous smokers started smoking again postoperatively. In this prior study, most patients quit only within 4 weeks prior to their surgery. Our present study clearly demonstrates an improved quit rate, at least out to 17.5 months average follow-up, of 85% persistent cessation in patients who quit smoking between 2 weeks and 3 months preoperatively. It is difficult to compare these two studies, one from 1982 and the present from 1995, as we cannot assess the effect of societal influences on cessation rates. In today’s environment, much more knowledge is generally available and accessible concerning the known dangers of smoking cigarettes.

Still though, achieving cessation in these patients often requires active physician involvement. Usually the patients understand the need to stop and do want to stop smoking. Because of the necessity to cease smoking rapidly in a 2-week period, the method recommended is usually cold turkey. The nicotine patch in significantly addicted patients may also be a valuable adjunctive aid. Possibly the necessity for imminent surgery for resection of their lung cancer is a sufficiently powerful incentive to provide the impetus for successful cessation or, postoperatively, the recent operative intervention for the resection of a lung cancer is sufficient reason not to restart smoking. This study was not able to delineate which factor—the diagnosis of lung cancer, the operative procedure, physician advice, or a combination of factors—was responsible for the significant cessation rate of 85%. Previous studies have suggested that the severity of disease correlates with cessation success and may affect the self-report rates.

Future studies are necessary to better delineate the actual effects of smoking cessation in the postoperative patient. It may be critical to determine the timing of cessation to achieve the optimal postoperative beneficial results. In addition, further studies need to examine the effect of smoking cessation on increasingly frequent adjuvant or neoadjuvant therapy. Current studies are ongoing, examining the effect of an aggressive vs routine intervention for smoking cessation in patients presenting for treatment for malignancies. Much work is required to determine the most efficacious method to assist physicians to aid their patients to stop smoking. However, it will probably be extremely difficult to discriminate the efficacy of physician advice vs importance of the diagnosis of lung cancer in the respective effects on cessation rates.

In this study, we found an excellent rate of smoking cessation both preoperatively and long term. Physician advice and assistance to stop smoking may be highly successful and should be a routine part of the preoperative assessment of the patient. Further work still needs to be done to address the persistent and/or restarting smoker who still does not quit despite physician advice or the diagnosis of lung cancer.

REFERENCES

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