The impact of spontaneous pneumothorax, and its treatment, on the smoking behaviour of young adult smokers

H. J. M. SMIT*, M. CHATROU† AND P. E. POSTMUS*

*Department of Pulmonary Medicine and
†Department of Medical Psychology, Free University Hospital, Amsterdam, The Netherlands

The pneumothorax, and its often invasive treatment, are impressive events in otherwise healthy young patients. The relationship between smoking behaviour and the idiopathic spontaneous pneumothorax (ISP) is explained to the patients. The objective of the study was to analyse whether smoking behaviour of patients is influenced by the ISP (re-)event, and its treatment. Of 145 consecutive ISP patients (1991–1995), 112 were tobacco smokers at time of the first ISP. Of the 112, 106 participated in a confidential telephone questionnaire survey combined with retrospective medical record analysis. Smoking cessation and reduction percentage related to ISP events, and its treatment, were the outcome measurements.

All patients (mean age 28.8 years at the first ISP) were aware of the relationship between smoking, and ISP at time of the first ISP. Age, pack years, and different treatment modalities had no influence on smoking cessation or reduction. Some 86.2% of the male and 80.8% of the female patients continued smoking after the first ISP, despite the known relationship between smoking, and contracting spontaneous pneumothorax, and despite its often invasive treatment. In the group of recurrent pneumothorax events 73.3% continued smoking.

Introduction

Idiopathic spontaneous pneumothorax (ISP) is defined as 'air in the pleural space between the parietal and visceral pleurae without any predisposing disease' (1). The air results from air leakage from the alveolar space, through the interstitium, to the ruptured visceral pleura (2). It is hypothesized that alveolar rupture might result from a check valve mechanism. Smoking causes peripheral airway inflammation, and therefore can cause the check valve (2). As shown in literature, ISP is a smoking related disease. Of all the Europeans aged 18–30 years in 1993, 33.1% of the men and 29.0% of the women smoked cigarettes (3,4). The prevalence of smokers among ISP patients is much higher (5,6). In a recently reported study from our hospital, 70% of the consecutive patients with ISP were smokers (7). ISP is typically found in the 20–40 year age group, and is less frequent in persons over 40 years (7,8). The incidence is approximately 0.05% per year (1).

Patients suffering from an ISP may feel the severe pain of pleural irritation, and the dyspnoea caused by the collapsing lung. The relapse rate is reported as being as high as 54% without proper treatment (like, for example, pleurodesis or bullectomy) (9–14). Treatment varies all over the world, from minimally invasive to highly invasive procedures (15). Introduction of a suction drain for several days into the chest to remove the air is considered as a minimally invasive procedure. This chest tube is often accompanied by the sensation of difficult breathing for several days, because of pleural irritation. It is considered a rather conservative treatment. A far more invasive approach is thoracoscopical pleurodesis under local anaesthesia. This is usually very painful during and up to 72 h after the procedure. Because the patient is usually awake, this may make more of an impression than general anaesthesia. If indicated, the thoracoscopical video-assisted bullectomy and pleurectomy or pleurodesis are performed under general anaesthesia usually followed by chest tube drainage, for at least 3 days so the patient has also to overcome general anaesthesia. The last treatment modality, thoracotomy, is seen as the most invasive treatment.

The experience of the pneumothorax and its subsequent treatment, are considered to be impressive events, in these relatively young patients. We wondered whether this, together with the strong advise of the pulmonologist to stop smoking, had any impact on the smoking behaviour of ISP patients after first and/or recurrent ISP.

We studied whether smoking behaviour of ISP patients is influenced by the ISP event, its treatment, the ISP re-events, as well as some patient characteristics.
TABLE 1. Patient characteristics

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>( \chi^2 ) (d.f.)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>80</td>
<td>26</td>
<td>3.3 (1)</td>
<td>0.07</td>
</tr>
<tr>
<td>Only FP</td>
<td>50</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RP</td>
<td>30</td>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: \( \chi^2 \) (d.f.), chi-square test (degrees of freedom); n.s., not significant; SD, standard deviation; FP, first pneumothorax; RP, recurrent pneumothorax.

Methods

STUDY DESIGN

A confidential telephone questionnaire survey combined by a retrospective medical record analysis was performed after informed consent, on consecutive ISP patients of the Free University Hospital Amsterdam.

SUBJECTS

Between 1991 and 1995, 142 consecutive ISP patients were treated in our hospital. All three patients had the first as well as recurrent pneumothoraces treated in our hospital between 1985 and 1995. Of these 142 cases, 112 were tobacco smokers at the time of the first pneumothorax (FP), and were selected for our study. No information was obtained from the 30 non-smokers. One hundred and six of the 112 patients could be interviewed by telephone by a pulmonologist, following their informed consent in the same conversation, in September 1996. Exclusion criteria for the interview were: incomplete medical records (none), hard drugs abuse (one), lung disease at time of the FP (none), and age above 55 years (two patients). The age limit of 55 years is arbitrarily chosen but reflects the age for ISP in literature. The remaining three patients could not be reached. All 106 ISP patients agreed to the telephone interview. Table 1 summarizes the patient characteristics. The 30 non-smokers not interviewed were 26-9 years old at time of the FP, 21 were male and nine were female.

THE INTERVIEW

Patients were asked to complete questions regarding the date of the first pneumothorax and how it had been treated; recurrent pneumothoraces and their treatment; their former smoking behaviour (the quantity of cigarettes smoked per day at the time of the first pneumothorax); their smoking behaviour prior to the event (smoking history in pack years), their smoking behaviour 1 yr following the first pneumothorax, as well as their current smoking behaviour. Non-smokers were asked whether they had permanently stopped smoking within 1 yr following the first event or after recurrent pneumothoraces. They were asked whether they knew, at the time of the first pneumothorax, about the strong relationship between smoking and contracting pneumothoraces, and whether their treating doctor explicitly told them about this relationship.

MEDICAL RECORDS

There were complete medical records of all 106 patients, including surgical reports, lung function parameters [e.g. forced expiratory volume in 1 s, (FEV1), and diffusion capacity corrected for the alveolar volume (KCO)]. Since 1985 ISP patient records are used for research purposes and are therefore accurately made. Because many patients had their first ISP treated in the 1980s, there were five treatment modalities: (1) bed rest (11 patients) or suction drainage (31 patients) through the chest tube (at least 3 days in bed); (2) pleurodesis with dry talc powder during thoracoscopy under local anaesthesia (25 patients, and at least 2 days with drain in bed); (3) video-assisted thoracoscopy under general anaesthesia (39 patients) with bullectomy ( besides general anaesthesia, also at least 3 days in bed with the drain) or only pleurodesis (at least 2 days in bed with the drain), and finally; (4) thoractomy with bullectomy (no patients at time of FP, major surgery with a painful scar of weeks). Systematical pain scores were not made in the early patient group and are therefore not included here. Smoking cessation was related to the used treatment, and to RP.

STATISTICAL PROCEDURES

Statistical analyses were performed with SPSS for windows (version 6.1), including \( \chi^2 \) analyses for category variables, unpaired t-test for the continuous variables, and logistic regression analyses.

Results

Table 2 shows the relationship between smoking cessation, gender, and treatment modalities. Eighty-two percent of the patients had never been treated in a hospital prior to the FP event. All of the 106 patients were aware of the relationship between smoking and pneumothorax. They all (with one exception) confirmed that their treating physician explained this at the first pneumothorax event.

Treatment modalities in the 45 patients with recurrent pneumothorax (RP) were compared in relation to smoking cessation. Twenty patients had one recurrent pneumothorax, 17 had two recurrences, three had three recurrences, two had four recurrences, two had five, and one had six recurrences.
TABLE 2. Relationship between smoking behaviour at time of the first pneumothorax, gender, and treatment modalities

<table>
<thead>
<tr>
<th></th>
<th>Stopped</th>
<th>Continued</th>
<th>$\chi^2$ or $t$-test (d.f.)</th>
<th>Continued $&lt;$50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) at time FP ± sd</td>
<td>29.4 ± 8.1</td>
<td>28.7 ± 7.7</td>
<td>0.3 (20)*</td>
<td>27.4 ± 6.4</td>
</tr>
<tr>
<td>Pack years ± sd</td>
<td>7.5 ± 6.3</td>
<td>8.1 ± 8.3</td>
<td>-0.4 (25)*</td>
<td>5.5 ± 5.2</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11 (13.8%)</td>
<td>69 (86.2%)</td>
<td>4.6 (1)*</td>
<td>15 (18.8%)</td>
</tr>
<tr>
<td>Female</td>
<td>5 (19.2%)</td>
<td>21 (80.8%)</td>
<td>2 (7.7%)</td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suction drainage or bed rest</td>
<td>5 (11.9%)</td>
<td>37 (88.1%)</td>
<td>0.62 (2)*</td>
<td>9 (21.4%)</td>
</tr>
<tr>
<td>Thoracoscopical talcage (LA)</td>
<td>5 (20.0%)</td>
<td>18 (72.0%)</td>
<td>1 (4.0%)</td>
<td></td>
</tr>
<tr>
<td>VATS (GA)</td>
<td>6 (15.4%)</td>
<td>33 (84.6%)</td>
<td>7 (17.9%)</td>
<td></td>
</tr>
</tbody>
</table>

*Continued smoking $<$50% is included in the group 'continued'.

$\chi^2$, chi-square; $t$, unpaired $t$-test; d.f., degrees of freedom; LA, local anaesthesia; VATS (GA), all video-assisted thoracoscopical procedures performed under general anaesthesia.

Of all FP events in the group that later contracted RP, the initial treatment existed of drainage or bedrest in 32 patients, thoracoscopical talc pleurodesis under local anaesthesia (LA) in four, video-assisted thoracoscopical surgery (VATS) under general anaesthesia (GA) in nine, and none had a thoracotomy. Of all RP events, 35 times patients received drainage or bedrest, 22 times VATS under GA and five times a thoracotomy was performed. In the RP group, six (13.3%) patients stopped smoking after the FP; four after drainage or bedrest, one after thoracoscopical talc pleurodesis under LA, and one after VATS under GA.

The difference in smoking cessation after the FP, and after the RP was significant. The percentage of smokers who ceased smoking after the FP in this RP group was the same as in the group without RP. Six extra patients (total of 26.7%) finally stopped smoking after two or more events. Compared with smoking cessation after FP in this subgroup of 45 this difference is significant ($\chi^2$=19, d.f.=1, $P<0.0001$). Therefore 73.3% continued smoking despite recurrences. Twenty percent of the whole RP group continued smoking but reduced the amount of cigarettes per day by at least 50%. After the FP (in the RP group) 17.8% continued smoking by $<$50% cigarettes per day. The invasiveness of the treatment was not of influence here, nor was the number of RP. Three patients, who stopped smoking after RP, had only suction drains following a pneumothorax event, three had pleurodesis under LA, four had VATS under GA, and none had a thoracotomy.

A logistic regression analysis was carried out with smoking (yes or no 1 yr after the FP) as the dependent variable, and gender, age, the treatment modality, and RP (ipsilateral or contralateral) as predictor variables. None of these predictors significantly contributed to the model, which means that none of the variables can give information about the chance, that a smoker, who suffers an ISP will stop or continue the smoking behaviour.

Discussion

Smoking is known to be a health endangering habit (16–20), and smoking cessation lessens this danger (20,21). Although in general people still do not recognize the severity of the health risk (22), all 106 young patients were aware of this risk to their general health. When asked for, all 106 patients knew the relationship between smoking and the pneumothorax at the occurrence of the first event. Despite these facts, most patients continued smoking. It is also seen in other studies, that the awareness of risky behaviour does not change the behaviour. In the study among 16 000 people aged 18–30 years in 21 European countries, with about 33% of the men and 29% of the women smoking, the awareness of the link between smoking and lung cancer and smoking and heart disease was uniformly high. Smokers were even more aware of the risks than non-smokers in this study (3), though some other studies dispute the last remark (22).

It was said before that the relationship between knowledge and behaviour is a very weak one (23). The relationship between attitude and behaviour is stronger. This means that it is not enough when the doctor tells the patient he/she should stop smoking, and why it is important to do so. It is however, strange, that the subjective experience of such a potentially life threatening event as an ISP, does not seem to change the patients’ attitudes about smoking. A myocardial infarction can be seen as a similar situation of threat for the, mostly older, patients. It is known, that approximately 50% of the patients stop smoking after a myocardial infarction or coronary bypass grafting at least for some time (20,24,25). Perhaps it can be concluded that (1) ISP is seen as a less threatening experience than a myocardial infarction, or (2) the treatment for ISP is seen as a complete cure by the patient. It is very likely that (3) the information people receive following a myocardial infarction is more directed towards stopping the smoking habit (including
changing people's attitudes about smoking) (26), than after an ISP event. A similar comparison can be made for long-term lung cancer survivors where approximately 50% of the patients continued smoking (27,28).

Females in general show a greater impact of smoking related disease on their smoking behaviour than men (29). Of the ISP patients we reported, 75-5% are male. Females showed a slightly greater (non-significant) tendency towards stopping smoking, than the males in our study group, which supports these reported findings. Compared to lung cancer and myocardial infarction patients, ISP patients are younger, and have a shorter smoking history. This apparently does not affect the level of addiction. The number of pack years smoked before the FP was not significantly different in the group who stopped smoking compared with the group who continued smoking.

A critical note has to be made towards the self-reports, which were used in this study. Biochemical validation is supposed to be more accurate, but was not possible in this retrospective study. A 1992 paper by Velicer et al. shows that biochemical validation is not always the ultimate mode, because subjects may refuse biochemical validation for reasons unrelated to smoking status (30). They also make clear, that as long as self-reports are not used for intervention studies, they are accurate enough. Therefore, major differences in the results were not to be expected, if we had been able to control the self-reports with biochemical validation. ISP is a potentially life-threatening event, usually seen in people between the ages of 15 and 40 years (7,8). Because pain and dyspnoea often accompany a pneumothorax, we expected it to be an impressive experience for these young patients. Besides the event itself, many of the treatment modalities were expected to be impressive as well. Many of these ISP patients had never been hospitalized for any treatment before.

It is difficult to quantify the subjective experience of threat, or the ‘impressiveness’ of the pneumothorax and its treatment. From clinical experience, it can be confirmed that these pneumothorax events are experienced as very impressive by the patients. Forty-five patients had one or more RP. All of these patients have had more than simply a chest tube for treatment, at least once, at the time of the interview (this means at least thoracotomy or thoracotomy). At the time of the FP, 13-3% of this RP group stopped smoking, and at the time of the interview, after one or more recurrences, 26-7% finally stopped, a statistically significant difference. The six additional patients who stopped smoking were not the ones with more pneumothorax events or more invasive treatments, but were randomly scattered over the RP group. Nevertheless, only six extra patients were convinced enough to stop smoking after the recurrences of the pneumothorax.

In conclusion 84-9% of the smoking patients continued smoking after the first idiopathic spontaneous pneumothorax. Of the men, 18-8% reported to have reduced smoking by more than 50%, as did 7-7% of the women. In the group with more than one pneumothorax, 73-3% continued smoking. Knowledge of the health hazard or invasiveness of its treatment does not change the smoking behaviour of young spontaneous pneumothorax patients.

References


