Incidence of chronic pain after minimal-invasive surgery for spontaneous pneumothorax

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Abstract

Objective: Recently, it has been shown that minimal-invasive surgical procedures like operations for spontaneous pneumothorax result in a reduction of pain in the immediate postoperative course. However, little is known on the influence of minimal-invasive thoracic surgery on long term disability. Therefore, we analyzed the incidence of chronic pain in patients after minimal-invasive operation for primary (PSP) or secondary (SSP) spontaneous pneumothorax.

Methods: In the study included were 78 patients (PSP: n = 59; SSP: n = 19; male: 58, female 20) who had been treated at our institution between 1992 and 1995. The median age was 37 years (range: 17–84). The patients were interviewed by a standardized questionnaire or alternatively by phone or in the outpatient clinic. Complete follow up data were obtained from 60 patients which were further analyzed.

Results: After a median follow up of 59 months (range 35–79) 41 (68.3%) patients were completely free from any complaints. However 19 (31.7%) patients suffered from chronic pain. Two of them (3.3%) required daily oral pain medication. The incidence of chronic complaints was more frequent in patients with pleurectomy (47.1%) as compared to patients with mechanical pleurodesis only (25.6%; P < 0.107). On a visual analog pain scale (ranging from 0 to 100) five (8.3%) patients described a pain intensity <10, 12 (20%) patients between 10 and 20 and two (3.3%) patients >50. In the majority of the patients the pain was located in the area of the trocar incisions. Six (10%) patients had a chronic complaints in the ipsilateral shoulder.

Conclusions: The incidence of chronic postoperative complaints after minimal-invasive procedures for spontaneous pneumothorax is relatively high. This has to be considered if minimal-invasive procedures are discussed to be an alternative to simple drainage therapy for the first episode of spontaneous pneumothorax.

Keywords: Postoperative pain; Spontaneous pneumothorax; Minimal-invasive techniques; Video-assisted thoracic surgery

1. Introduction

For many years the standard approach in thoracic surgery was an antero- or posterolateral thoracotomy. Since the early 1990s minimal-invasive techniques including video-assisted surgery (VATS) are used as an alternative approach. Established indications are the thoracoscopic resection of solitary pulmonary nodules, pleurectomies, atypical resections of bullae in spontaneous pneumothorax and even lobectomies for benign diseases. The usefulness of video-assisted resections of primary and secondary malignancies of the lung is discussed controversially [1–3]. In specialized centers for thoracic surgery 25–35% of all interventions are currently performed by using minimal-invasive techniques [4].

The most remarkable advantages of the minimal invasive approach are an improved cosmetical result and a reduction of the early postoperative pain. However, little is known on the effect of minimal invasive thoracic surgery on chronic postoperative complaints [5].

Therefore, we analyzed the incidence and characteristic of chronic complaints in 60 patients after minimal-invasive chest operations. In order to analyze a group of patients as homogeneously as possible, only patients with VATS for spontaneous pneumothorax were included into the study.

2. Patients and methods

2.1. Patients and data collection

Using the prospective documentation system for minimal-invasive operations at our institution all patients were
identified which were successfully operated for spontaneous pneumothorax between 1992 and 1995 (78 patients; 58 male, 20 female). A primary spontaneous pneumothorax (without underlying lung disease) was diagnosed in 59/78 (76%) patients and a secondary pneumothorax (pneumothorax due to underlying lung diseases, like emphysema etc.) in 19/78 (24%) patients. The mean age was 37 years (range: 17–84 years). The median observation time was 59 months (range: 35–79 months). Using a standardized questionnaire these patients were interviewed by telephone or in the outpatient clinic with respect to the presence and characteristic of chronic pain. The current pain medication was documented and the pain intensity was determined by using a visual analogue pain scale (ranging from 0 = no pain to 100 = maximal pain). The patients were requested to localize the pain (scar, with segmental radiation, upper arm, not definable) and to describe the pain characteristic by using terms like sharp, piercing, deep, penetrating, dull or cramping. Furthermore, to get an impression whether the quality of life was influenced by the surgical procedure patients were asked for general complaints. Complete follow up data were obtained from 60 (78%) out of 78 patients.

2.2. Operative technique

All procedures were performed under general anesthesia using a double lumen tubus to allow single lung ventilation. The patients were placed in a lateral position.

A 10 mm trokar was introduced through the sixth intercostal space in the midaxillary line just anteriorly the latisimus dorsi muscle for insertion of a 0-degree endoscope. Two additional ports were then inserted under direct vision: a 12 mm trokar parasternal through the fifth intercostal space and a 5 mm trocar more posteriorly through the fifth or sixth intercostal space. The lung was gently displaced with round tipped instruments looking for bullae or other pathological findings from its apex to the basis. Warm saline solution was instillated during slight pulmonary ventilation to identify the site of air leakage. Lesions were resected with an endoscopic linear stapler (Endo-GIA 30, Auto Suture, Tönisvorst, Germany). If no blebs were visible a small portion of the apical upper lobe was resected to obtain lung tissue for histopathological examinations. The mean number of stapler cartridges per patient was 2 (range: 2–8).

Pleurodesis was performed by pleural abrasio using a swab mounted to the tip of a standard curved dissector. Additionally, in 17 out of the 60 patients a partial parietal pleurectomy form the apex to the fifth or sixth intercostal space was done. At the end of the procedure one 28F chest tube was inserted through the middle port site; the other port sites were closed in two layers. Suction with a negative pressure of 15 cm H₂O was applied for at least 24 h or until the air leakage stopped.

2.3. Statistical analysis

All procedures were performed using statistical software package SPSS (SPSS software, Munich, Germany).

3. Results

3.1. Frequency and intensity of chronic complaints

After a median observation time of 59 (range: 35–79) months 41 (68.3%) out of 60 patients were completely free from any complaints. However, 19 (31.7%) patients suffered from chronic pain (Table 1). Two of them (3.3%) required daily oral pain medication. On a visual analog pain scale (ranging from 0 to 100) five (8.3%) patients described a pain intensity <10, 12 (20%) patients between 10 and 20 and two (3.3%) patients >50.

The incidence of chronic complaints was more frequent in patients with additional pleurectomy (8/17 patients; 47.1%) compared to patients with mechanical pleurodesis only (11/43 patients; 25.6%). However, this difference was statistically not significant (P = 0.107). The duration of postoperative drainage did not influence the frequency of long term complaints. The incidence of chronic complaints was 30.8% in the group of patients with a drainage time of less than 3 days and it was 32.4% in patients with a drainage time of 3 days or more.

3.2. Pain characteristics and localization

The majority of the patients characterized the pain as sharp and piercing (12/60 patients; 20%); three patients described the pain as deep and penetrating and two patients had a discomfort which was classified best as dull and...
unspecifc (Table 1). Cramping pain was described by two patients.

In most of the patients, the pain was located in the area of the trocar incisions (18.3%; Table 1). A segmental radiation of the pain was described in five (8.3%) patients. In one patient the pain was exclusively located in the upper arm. Chronic complaints in the ipsilateral shoulder were mentioned by six (10%) patients.

4. Discussion

Major advantages of the minimal-invasive approach in thoracic surgery are an improvement of the cosmetical result, a shorter hospital stay and drainage time as well as a reduction of the postoperative pain. Different groups have demonstrated that the minimal-invasive technique results mainly in a reduction of the early postoperative pain [6–9]. Landreneau and colleagues demonstrated that patients undergoing minimal invasive procedures required less narcotics and the need for intercostal/epidural analgesia was reduced as compared to patients with limited lateral thoracotomy [6]. Our group observed also a significantly reduced use of analgesics in the early postoperative course in patients with primary spontaneous pneumothorax [9]. However, there are hints that the advantages of the minimal invasive approach are not longer detectable in the further postoperative course [10,11]. Therefore, we analyzed in the present investigation the incidence of chronic complaints more than five years after minimal invasive thoracic operations. In order to analyze a group of patients as homogeneously as possible, only patients which were operated for a spontaneous pneumothorax [9] were included into the analysis. One limitation of our study might be that we obtained the complete set of data from only 78% of the initial group of patients. This might have caused a selection bias. However, the incidence of chronic complaints in our study is very similar to those reported from other authors for patients after VATS [10,12].

A standardized measurement of chronic postoperative complaints is difficult and influenced by a number of external factors like the age and the socio-professional status [5,15]. In our investigation we observed that almost 30% of the patients suffered from chronic complaints after minimal invasive operations for spontaneous pneumothorax. In the majority of the patients the pain intensity was low and only two patients required daily anagetics. After anterolateral or posterolateral thoracotomy the incidence of chronic postoperative pain is reported to be between 30 and 55% [10,13,14] (Table 2). For a direct comparison of the VATS approach with the thoracotomy approach we interviewed a limited number of patients (n = 27) after antero-lateral muscle sparing thoracotomy for benign diseases (chondroma, lung sequester, aspergilloma) 18–36 months after the operation using the same questionnaire as for the VATS patients. In the thoracotomy group the incidence of chronic complaints was 51.8%. Therefore, the VATS approach compares favorable to antero-lateral thoracotomy. However, the absolute number of chronic pain for the minimal invasive operation (31.7%) still appears to be relatively high.

Since most of our patients described the persistent pain as sharp and piercing it might be of neuropathic origin. Neuropathic pain is characterized by continuous or paroxysmal burning and electrical sensations. Often the pain is accompanied by hypoaesthesia, hyperalgesia or alldynia [16]. In surgical patients neuropathic pain is general caused by peripheral nerve injuries. In case of the minimal invasive approach the intercostal trauma might be the major reason for this type of pain. Some of our patients were already operated in the early days of minimal invasive thoracic surgery at a time when instruments were used which were originally constructed for minimal invasive abdominal operations. Most of these instruments including the trocars were rigid and inflexible which may result in a damage to the intercostal nerves and to the ribs.

However, the incidence of chronic complaints in our patients was very similar over the years. It was 31% for the first year (1992) and remained in the same range even after the introduction of modern flexible and curved thorascopic instruments (1993: 27%; 1994: 33%; 1995: 35%). Furrer et al. [10] reported in a recent series of patients after video thoracoscopy for pulmonary wedge resection a comparable frequency of chronic pain of 36%. These numbers indicate, that even by using the currently available instruments chronic discomfort is still a clinically relevant problem and that further efforts should be undertaken in order to better protect the intercostal space.

Table 2

Incidence of chronic pain after standard thoracotomy

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Patients</th>
<th>Patients with chronic pain (%)</th>
<th>Follow up (months)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furrer et al. [10]</td>
<td>1997</td>
<td>15</td>
<td>33.0</td>
<td>3–18</td>
</tr>
<tr>
<td>Katz et al. [17]</td>
<td>1996</td>
<td>30</td>
<td>52.0</td>
<td>18</td>
</tr>
<tr>
<td>Kalso et al. [14]</td>
<td>1992</td>
<td>150</td>
<td>44.0</td>
<td>12–48</td>
</tr>
<tr>
<td>Dajczman et al. [13]</td>
<td>1991</td>
<td>54</td>
<td>55.0</td>
<td>19.5</td>
</tr>
</tbody>
</table>

* Range or median.
Recently, it has been demonstrated that the efficiency of the immediate postoperative pain management influences the incidence of chronic postoperative pain [5,17]. Katz and colleagues were able to show that after thoracic operations the intensity of early postoperative pain correlates very well with the occurrence of chronic postoperative complaints [17]. Therefore an optimal postoperative pain management might be useful to reduce the incidence of chronic postoperative complaints.

The unexpected high incidence of chronic postoperative pain in patients with minimal invasive thoracic operations might also influence the controversy whether patients with the first episode of a spontaneous pneumothorax should be treated by minimal invasive approach. This strategy is advocated by some authors but might result in an ‘over treatment’ in a number of the cases, since more than 50% of the patients remain recurrence free after simple drainage therapy [18,19].

References


Appendix A. Conference discussion

Dr G. Cardillo (Rome, Italy): I would like to stress another factor we have to deal with when you talk about VATS and pain. I mean that not every operation for pneumothorax is equal to the other. I wonder how many ports you have used, and what is the size of the ports? Have you used a staple, and if you did, have you put it in the posterior side of the chest or in the anterior side? Pain following VATS is much more related to the use of a staple and the size of the port used. For example, if you use a big 11.5 mm port in the posterior side of the chest or in the anterior, it makes a difference. What is your opinion about that?

Dr B. Passlick: I agree, with you that it makes a great difference where the trocars are placed. In the beginning we used some different methods. During the last years we used in general three ports, one 11.5 mm port in the parasternal region of the fifth intercostal space and additionally two 5 mm ports in the sixth and seventh intercostal space, more or less in a triangle form. If it is possible, we avoid entering into the thorax in the posterior region.

Dr I. Trojan (Szeged, Hungary): Do you use pleurectomies in the VATS procedures for prevention of recurrences or any other form of pleurodesis? This may be associated with the so-called pleural pain.

Dr Passlick: It might be true that some of the postoperative discomfort observed in our study might be related to the so-called pleural pain. In our study we were not able to differentiate between the pain which is related to the access into the thorax and pain which results from the irritation of the pleura. In general we performed pleurectomy from the first or second down to the fifth intercostal space, and in the other areas of the pleura we performed a mechanical pleurodesis by using a swab.

Dr H.-B. Ris (Lausanne, Switzerland): The study you cited was done in Bern, with the same results as you had, with about the same number of patients with postthoracotomy pain following thoracotomy and VATS. We got the impression that many of these late problems are not really related to the chest wall but due to cerebral perception, just like phantom pain following amputation. We also got the impression that it’s very important to have good pain control in the early postoperative period to avoid these late complications. Can you comment on these reflections?

Dr Passlick: I think what you said is very true. We always observe after these minimally invasive operations some patients who have absolutely no pain and need no pain medication at all and some of them need a lot of the standard pain medications. There are some papers in the literature concerning postoperative pain in thoracic surgery, showing that it’s very important to treat the pain of the patient in the first hours and days immediately after the
operation in order to prevent long-term complaints in these patients. It has been shown that those patients who had absolutely no pain or minor pain directly after the operation do not have pain in the long-term follow-up.

Dr. V. Sa Vieira (Lisbon, Portugal): What kind of trocars do you use, rigid trocars, not rigid trocars, or don’t you use trocars except for the camera?

Dr. Passlick: In the beginning we used rigid trocars when these data were generated, at least for the first 2 years. Right now we are using flexible trocars.

Dr. Sa Vieira: Are the results different between the two types?

Dr. Passlick: We don’t know that yet. We should do another study to analyze these patients which we operated during the last 2 or 3 years.

Dr. Sa Vieira: We don’t use trocars except for the camera. I prefer to make the thoracostomy and after to remove the trocar and introduce the instruments without the trocar. So it’s probably one solution to get less pain.