VIA MEDICA

PRACA ORYGINALNA

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Talc slurry pleurodesis *via* chest tube in department of pulmonology — a 24-case study

Pleurodeza zawiesiną talku przez dren na oddziale pulmonologicznym — prezentacja serii 24 zabiegów

The authors declare no financial support. Due to the retrospective character of the study and lack of medical experiment features, permission was not required from the Ethics Committee.

Abstract

Introduction: Chemical pleurodesis is an accepted palliative therapy for patients with recurrent and symptomatic pleural effusion. The aim of the study is to present our own experiences with a less invasive variant of this procedure performed with talc slurry administered via a chest tube under local anaesthesia. Available medical literature in Polish does not contain information about this type of pleurodesis.
Material and methods: During 2005–2011 in the Pulmonology and Respiratory Rehabilitation Department we hospitalized and diagnosed 162 patients with pleural fluid. Pleurodesis was performed in 24 patients (14.8%) with persistent pleural fluid. In this article we present retrospective analysis of safety, efficacy of treatment and patients' survival time. We also provide detailed information about this type of pleurodesis: clinical theory, indications, contraindications, patient's preparation, description of procedure with our modifications and use of chest X-ray and transthoracic ultrasound.
Results: The procedure was effective in 20 cases, partially effective in 3 cases and ineffective in one case. In-hospital mortality was 4.2% (one case). We frequently observed mild fever and local pain. Median hospitalization was 9 days. Median survival time was 32 days, whereas in the group of still living patients it was 96 days.
Conclusions: Talc slurry pleurodesis with adequate patient preselection is a relatively effective and safe procedure. The procedure can be performed in a non-surgical pulmonology unit.

Key words: pleurodesis, talc slurry, lung cancer, pleural effusion

Pneumonol. Alergol. Pol. 2013; 81: 439–447

Streszczenie

Wstęp: Pleurodeza chemiczna jest uznaną metodą paliatywnego leczenia uporczywych wysięków gromadzących się w jamach opłucnowych. Celem pracy jest prezentacja własnych doświadczeń z mniej obciążającą formą zabiegu wykonywanego za pomocą zawiesiny talku medycznego podawanego przez dren, wymagającego jedynie znieczulenia miejscowego. W piśmiennictwie polskojęzycznym brak pozycji opisujących doświadczenia z wyżej wymienioną modyfikacją pleurodezy.
Materiał i metody: W latach 2005–2011 hospitalizowano na Oddziale Pulmonologii i Rehabilitacji Oddechowej Wojewódzkiego Szpitala Chorób Płuc w Wodzisławiu Śląskim 162 chorych u których rozpoznano płyn w jamie opłucnej. Ze względu na uporczywe gromadzenie się płynu u 24 (14,8%) z nich wykonano pleurodezę. Praca zawiera retrospektywną analizę wykonanych zabiegów z uwzględnieniem bezpieczeństwa, skuteczności i przeżywalności pacjentów, podstawy teoretyczne, wskazania, przeciwwskazania, zasady przygotowania pacjenta, przebieg, ocenę skuteczności, własne modyfikacje zabiegu oraz ocenę wartości badania radiologicznego i ultrasonograficznego klatki piersiowej.

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Praca wpłynęła do Redakcji: 27.11.2012 r.

ISSN 0867–7077

Wyniki: Zabieg okazał się skuteczny u 20 chorych, częściowo u 3, u jednego chorego stwierdzono brak skuteczności, a u jednego zgon wewnątrzszpitalny. Najczęstszymi powikłaniami były ból i gorączka o niewielkim nasileniu. Mediana hospitalizacji wynosiła 9 dni. Mediana czasu przeżycia osób zmarłych wyniosła 32 dni, a wśród nadal żyjących chorych 96 dni.
Wnioski: Pleurodeza zawiesiną talku przez dren z odpowiednią selekcją pacjentów jest zabiegiem stosunkowo skutecznym i bezpiecznym. Zabieg jest możliwy do wykonania w warunkach oddziału pulmonologicznego.

Słowa kluczowe: pleurodeza, zawiesina talku, rak płuca, wysięk opłucnowy

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Introduction

Under physiological conditions the pleural cavity is filled with approximately 10–20 ml of fluid, which ensures sliding during the change of volume and position of the lung [1]. Under pathologic conditions it becomes 'a third space', which enables accumulation of transudates, exudates, blood, air or lymph. Due to the limited volume of the chest, a great amount of fluid or gas in the pleural cavity causes symptoms connected with restrictive ventilatory disorders and compression of the right cardiac cavities and big venous vessels, which may result in patient death. A specific reaction causing the pleural laminae to enter an inflammatory state is agglutination, as also happens in another serous membrane covered with mesothelial tissue — the peritoneum. This leads to a beneficial limitation of infection and favours a spontaneous recovery, which can often be observed in tuberculous pleural effusion. Excessive intensification of fibrosis of the obliterated pleura may lead to fibrothorax, observed after exudates, pleural hematoma and asbestosis. Deliberately triggered adhesion of the pleural laminae is known as pleurodesis (obliteration of the pleural cavity). This is to eliminate the potential space in which fluid or air may be stored, and it was described for the first time in 1935 by Bethune [2]. In the beginning only endoscopic talc poudrage performed under sight control on a partially collapsed lung was used. An unquestionable advantage of this method, which is the thoracic surgeons' domain, is the possibility of one-time taking up of histopathological material; however, one disadvantage is its invasiveness, i.e. the need for general anaesthesia or deep sedation, selective intubation or ventilation. An even more effective method, but also invasive, is pleurectomy or mechanical rubbing of the pleura until drops of blood appear — the two procedures are possible during classic thoracotomy. In 1994 Lisa Kennedy et al. published the results of administering talc slurry *via* chest tube, used also as treatment for recurrent non-neoplastic fluids (bronchopleural fistulas, fluid in chronic constrictive pericarditis); additionally, she observed in 8 out of 58 patients that large doses of glycocorticosteroids did not influence the results of the procedure [3]. Contrary to fibrothorax, pleurodesis causes only small ventilatory restriction as adhesion of the pleural laminae is performed without intense fibrosis. For example, mean total lung capacity (TLC), assessed 22–35 years after pleurodesis due to pneumothorax, reached 89% of predicted values and only in one case was it lowered by up to 58% of the predicted value [4]. Thirty different obliterating agents have been described, but the most effective and the most frequently used remains medical talc. The mechanics of pleurodesis is not fully known. Research has shown that talc phagocytosis activates fibroblasts and coagulation cascade through neutrophilic granulocytes. Examination of the pleural fluid after talc insufflation in humans and animals confirms a transitory increase in the number of neutrophilic granulocytes, D-dimers, interleukin 8, vascular endothelial growth factor (VEGF), transforming growth factor β1 (TGF-β1) and endostatin. Concentrations of these markers in the pleural fluid measured *post factum* are predictors of the procedure's effectiveness [5–7]. Recognized predictive factors of an effective procedure include the biggest surface of the pleura covered with undamaged mesothelial tissue, regular or increased fluid pH, and the possibility of approachment of the pleural laminae, i.e. so-called expanded lung [8]. It happens this way because regular mesothelial cells are responsible for the creation of the inflammatory state and adhesions. Therefore, in pleurodesis performed because of pneumothorax, a smaller quantity of talc (3–4 g) is put on the unchanged pleura, causing pain and fever, than in patients with pleural exudate in the course of the pleura affected by neoplasm (5 g) [9]. Keeping a chest tube in the pleural cavity for a long time may cause spontaneous pleurodesis in the pathologically changed pleura. Such a fact was described in 64% of the 109 outpatients treated with tunnelled pleural catheter (TPC, Pleurx®, Carefusion), from

which a patient on his own takes the fluid up to a vacuum container [10, 11].

Material and methods

In the years 2005–2011, among patients hospitalized in the Department of Pulmonology and Respiratory Rehabilitation of the Provincial Hospital of Lung Diseases in Wodzisław Śląski, there were 162 patients with diagnosed pleural effusion. The majority of them were patients with reactive fluid, self-limiting or responding to treatment in the course of infection, pulmonary thromboembolism, after injury, circulatory insufficiency or pancreatic cyst. As a criterion for pleurodesis eligibility, recurrent pleural fluid in patients with several months survival was accepted. In this way a group of 24 (14.8%) patients, to whom the procedure was proposed and who gave consent to it, was selected. The following factors were assumed as contraindication against pleurodesis: lack of the patient's consent and cooperation, poor general condition, trapped lung (discussed later), active infection of the pleura or the lung, slow accumulation of the fluid with decompressions once a month or, more rarely, haemorrhagic diathesis and potential possibility of achieving rapid improvement due to other methods, e.g. beginning first-line chemotherapy for small cell lung cancer. An additional contraindication against pleurodesis seems to be the presence of thick fluid that is difficult to mix with talc slurry, as in the case of pleural amyloidosis, discussed later.

The following procedure scheme was used:

1. Selection and preparation of the patients: After admission to the Department, image and laboratory examinations were carried out. Following an accessible explanation, the patients gave consent to the procedure. Before drainage was inserted we did not take all of the fluid — leaving at least 500 ml, i.e. ≈ 6 cm on ultrasonography in horizontal measurement in sedentary patients, which increased the safety of the procedure. The dose of low-molecular-weight heparin was omitted on the day of the procedure, oral anticoagulants were omitted for the precedent 3 days, and the application of acetylsalicylic acid remained unchanged. Glycocorticosteroids administered in medium and large doses, i.e. over 10 mg of prednisolone per day, were discontinued. Patients had intravenous insertion of a needle, arterial blood pressure measured and were then recommended to have a light but filling meal in order to reduce the risk of vasovagal syncope. Thirty minutes before the procedure the patients were given subcutaneously 5 mg of morphine sulphate and intravenously 2500 mg of metamizole (1 ampule).
2. Insertion of pleural drainage: The procedure took place in the ultrasonography room with an ultrasonograph controlling the sedentary patient. The following equipment was prepared: sterile drape, vice, scalpel, Kocher's forceps and scissors, non-absorbable surgical thread 2–0 with a cutting needle (2 pcs), rubber tunica of the tube's ending from sterile dropper, leader for inserting drain, 10 ml of 2% lignocaine to anesthetize the skin, pleural drain 20F with trocar, resuscitation kit, disinfectants, sterile gauze swabs and gloves, and disposable waterproof apron. Mid or back axillary line forward from the widest back muscle border was usually chosen for drainage. Intercostal space for inserting the chest tube was chosen based on the quantity of fluid visible during ultrasonography in order to minimize rubbing organs against the chest tube and the consequent pain — after fluid removal the lower border of the lung was lowered and the phrenic dome was made higher; the second intercostal space above diaphragm was usually chosen for approximately 1000 ml of fluid. The place to insert a chest tube first underwent infiltration anaesthesia with lignocaine (consecutively skin, intercostal space muscles under the rib's border forward and backward, and the parietal pleura, until the fluid was aspirated). After the loss of pain sensitivity, usually with retained touch sensibility, the skin was incised with scalpel at the length of the chest tube circumference, then the leader with the chest tube in the groove was inserted into the opening. Slight rotary motion of the leader was used to help cut the tissues until the pleura was punctured, which was recognized by a decrease in resistance and the appearance of fluid in the groove (Fig. 1). Consecutively, the chest tube with 4 cut-out lateral openings through the guide's groove was inserted, then the leader was removed, and the chest tube ending was placed in the posterior costo-diaphragmatic recess under ultrasonograph control at a depth of approximately 16 cm, i.e. 10 cm from the last opening. Then the trocar was removed and two vertical mattress sutures and one horizontal mattress delayed suture were laid around the tube.

Figure 1. Insertion of a chest tube to the pleura with the help of a guide

Figure 2. P.A. male 65 years of age, mesothelioma of the pleura, radiological control of the position of the chest tube

3. Radiological control in posteroanterior (PA) and lateral projection after complete fluid evacuation (Figs 2–4).
4. Submerged passive drainage with evaluation of ultrasonography of the pleura after 24 hours. If the amount of drained fluid dropped below 100–150 ml during 24 hours, pleurodesis was to be performed.
5. Talc poudrage of the pleura. Morphine sulphate was administered subcutaneously, metamizole — intravenously, as for drainage, then 10 ml of 2% lignocaine — intrapleurally, with subsequent changes of body position: prone, supine, on the left side and right side with the hips raised and whilst taking deep breaths. Subsequently, 5 g of sterile talc (COEL, Kraków) suspended directly before administration in 50 ml of 0.9% solution NaCl, heated to body temperature, was administered intrapleurally, and then 10 ml of warm solution of 0.9% of NaCl was administered so that the slurry left the chest tube completely. The chest tube was closed for 2 hours and then again deep breaths and changing of body positions took place similarly as during anaesthesia of the pleura, with repetition at least once after 30 minutes. After 2 hours the patient was connected to submerged passive drainage.
6. Evaluation of the amount of drained fluid after 24 hours: It was usually close to zero, which meant good effectiveness of the procedure. In such a situation after ultrasonographic and radiological control the chest tube was removed with clamping of the delayed suture. If the fluid continued to drain, further observation for 24 hours was applied and possible second pleurodesis performed.

The effectiveness of the pleurodesis was evaluated on the grounds of a radiogram performed

Figure 3. P.M. male 86 years of age, persistent exudate of unknown orygin with symptomatic treatment, radiological control of the position of the chest tube

Figure 4. U.G. male 70 years of age, mesothelioma of the pleura, radiological control of the position of the chest tube

after the insertion of the chest tube and fluid evacuation. In some patients fluid evacuation after drainage insertion and before pleurodesis was separated by a 1.5–3-hour break due to fluid drainage in the amount over 1200–2000 ml. The capacity at which fluid evacuation should be stopped in order to avoid pulmonary oedema after expansion was defined for each patient individually, taking into consideration their height, body mass, general condition and appearance of cough and pleurodynia.

The effectiveness of the pleurodesis itself was evaluated on the grounds of radiogram and ultrasonography made after chest tube removal. The following interpretation of the procedure's effectiveness was applied:

— good: chest radiogram in PA view close to normal, separation of the pleural laminae through the fluid in ultrasonography in posterior costo-diaphragmatic recess or the widest place close to 3 cm;
— partial: smaller, self-limiting or slower fluid accumulation than before the procedure;
— lack: without any influence on fluid accumulation.

Distant control of patients who were to be managed in other oncological centres was not planned, but patients were to notify about recurrence of ailments connected with pleural exudate. The remaining patients with primary lung cancer and mesothelioma of the pleura were still undergoing casual or symptomatic treatment in the local Department and Outpatient Clinic and were controlled ultrasonographically during subsequent cycles of cytostatic treatment, radiotherapy and post-hospital visits.

Information about the patients' date of death was obtained by phone based on contact with relatives from medical documentation; additionally, the question of whether the problem with fluid in the pleural cavity recurred before the patient's death was asked. The above-mentioned information was obtained on 25 January 2012, and this date was accepted for calculation of survival time of still living patients. When, as in 8 cases, there was no available phone number, information about the date of death was obtained via written application for personal data disclosure to the Offices of Civil Affairs in City Halls of Jastrzębie Zdrój, Rybnik, Pszów and Żory.

Results

All 24 patients who underwent the procedure met the criteria of exudate fluid (the median LDH concentration in fluid 789 IU/l, the median protein concentration 5.0 g/l). Neoplastic background in the fluid was found in 23 (96%) patients; cytological or histopathological tests confirmed neoplasm in 21 patients. Among the recognized neoplasms the most frequent was mesothelioma of the pleura (7 patients), lung cancer (6 patients, including adenocarcinoma — 3 patients, carcinomas: squamous, small cell, non-small cell, not differentiated — each type recognized in 1 patient), breast cancer (4 patients), malignant melanoma of the skin (2 patients), 1 patient with carcinoma of the kidney and 1 patient with papillary carcinoma of cancer of unknow origin. The median age of patients was 67 years, and the median volume of fluid evacuated before the procedure was 3975 ml (range 1500–12000 ml). Men constituted 59% of all patients. Right- and left-sided exudates amounted to 50% each (Table 1).

The median hospitalization was 9 days (range 3–42 days). Hospitalization of patients was longer due to their general condition, which did not allow the procedure to be performed, or was caused by waiting for results of cytostatic treatment that would cause them to resign from pleurodesis. In the case of planned admission for pleurodesis, hospitalization for the majority of patients did not exceed 4 days. The effectiveness of the procedure was evaluated as good in 20 patients, as partial in 3 patients, and as lacking effectiveness in one patient. One death in hospital occurred after 3 days from the procedure, it was not connected directly with the condition of the patient's respiratory system. The median survival time from the day of procedure among the patients who died was 32 days (range 3–292 days), and among living patients it is 96 days (range 78–629 days). The longest survival time among patients who died was noted in one man (P.A.) at 65 years, with mesothelioma of the pleura treated with 2 cycles of pemetrexed with cisplatin and without inhibition of fluid production, and in another man (C.I.) it was 44 years, with dissemination of malignant melanoma of the skin, who died after 277 days from the procedure due to brain metastases. Among the living patients 629 days passed from the procedure in one man (U.W.), who was 68 years old, with mesothelioma of the pleura and had pleurodesis due to carcinoma progression despite the administration of two cycles of chemotherapy with pemetrexed and cisplatin. Currently the patient is being prepared for pleurodesis of the opposite pleural cavity because of chylothorax with progressing cachexy. On the evening of the procedure a slight fever and pain was noted in fewer than half of the patients (Table 2).

Table 1. Characteristic of the study group

Age (years)	67 (43–83)	
Sex (F/M)	10/14 (58% vs. 42%)	
Time from diagnosis of the disease to pleurodesis (months)	3 (0–72)	
Patients with exudate / transudate	24/0	
Fluid evacuation before pleurodesis [ml]	3975 (1500–12000)	
Causes of exudate	Adenocarcinoma of the lung	3
	Malignant mesothelioma of the pleura	7
	Breast cancer	4
	Malignant melanoma of the skin	2
	Papillary carcinoma FPI	1
	Squamous cell carcinoma of the lung	1
	Non-small cell lung cancer NOS	1
	Small cell lung cancer	1
	Carcinoma of the kidney	1
	Amyloidosis of the pleura	1
	Lack of diagnosis	1

Data are presented in the form of median with the range in brackets
NOS — not otherwise specified; FPI — focus primarius ignotus

Table 2 . Effectiveness and safety of talc slurry pleurodesis *via* chest tube

Time of hospitalization (days)	9 (3–42)
Living patients/deceased, who underwent pleurodesis	19/5
Survival time after pleurodesis in patients who died (days)	32 (4–292)
Evaluation of pleurodesis effectiveness (good/partial/lack)	21/2/1
Evaluation of safety (lack of symptoms or mild symptoms after pleurodesis/serious symptoms/death)	22 /1/1

Data are presented in the form of median (range)

Discussion

Pleurodesis of the pleural cavity results in a significant improvement in the patient's life quality, especially in cases of progressing neoplastic disease. Fluid in the pleural cavity in the amount which gives the patient the feeling of dyspnoea causes additional psychological discomfort and anxiety as, in popular opinion, lung cancer is associated with death from suffocation. Additionally, the insufficient number of physicians in Poland, difficulties in consulting a medical specialist, and busy working times in outpatient clinics and home hospices despite the best intentions of the medical staff, do not favour care for patients who need decompressions at times that are difficult to predict. Repeated fluid evacuation in neoplastic disease with intense catabolism deepens protein deficiency — theoretically 2 punctures, each of 1500 ml of exudate of protein concentration close to the plasma, deprive the patient of the same amount of protein as is contained in his/her whole plasma, assuming that blood volume constitutes 7% of body mass and plasma constitutes 60% of blood volume. Such protein, especially albumin, has to be synthesized again in the liver.

After pleurodesis we observed one death, which happened during the third day after the procedure. It was the patient S.J., 59 years of age, who was treated for chronic schizophrenia. The patient was diagnosed with non-small cell cancer of the right lung. First he was ordered to undergo irradiation of neoplastic metastasis in the eighth thoracic vertebral body of spine. During ambulatory radiotherapy rapid renewal of fluid, which needed pleurodesis, was observed. 24 hours after the partially effective procedure (300 ml of fluid in adhesions), despite the lack of fever, the patient started to be delirious (which required additional administration of sedative) and was able only to maintain poor logical contact. Neither circulatory nor respiratory insufficiency were observed, and the patient died suddenly during the night three days after the procedure. Autopsy was abandoned upon request of the patient's family. It is known that talc after intrapleural administration in rats in doses corresponding to 2.5 g and 5.0 g for a 70 kg man accumulates in internal organs, in greater concentration in the brain than in kidney or spleen (a test with the use of traditional non-ca-

librated talc particles) [12]. Whereas Fraticelli et al. repeated the experiment on rats with calibrated talc and discovered its significantly smaller distribution to organs from outside the chest [13]. It is possible that systemic distribution of talc could have contributed to deterioration of the patient's mental state, and in the case of the repeated complication in the future psychiatric disorders or neurological defects could be a new, thus far unknown contraindication against pleurodesis with traditional talc. The talc that is used in our Department has particles of size below 75 μm, it is portioned and sterilized with dry and hot air, which is permitted in the guidelines. Guidelines permitted optionally sterilization with use of ethylene oxide and gamma rays, comparing the cost with traditional sterilization [14]. The norm for microbiological purity before sterilization, i.e. < 500 CFU/g, is also met — the producer of the talc gives < 100 CFU/g. Talc still remains the most effective, least expensive and well-tried agent for pleurodesis. Nevertheless, it has been attributed to at least 32 cases of acute respiratory failure syndrome [15], which may be also associated with systemic activation of the coagulation system [16].

The procedure was ineffective only in the patient — E.R, 68 years of age, who was undergoing long-standing haemodialysis due to end stage renal disease in the course of rheumatoid arthritis with epilepsy and heart disease. The presence of a thick, protein rich fluid with LDH 1541 IU/l and negative rheumatoid factor was discovered in the patient's left, and recently also right, pleural cavity and in the pericardium, which was diagnosed as pleural amyloidosis. In macroscopic testing the fluid was characterized by pronounced stickiness — it was flowing to the aspirator's container, without dividing into drops or creating froth, in which it resembled syrup. The patient was disqualified from thoracic surgery (pleurostomy with local anaesthesia). Although in the chest radiogram in posteroanterior projection a lack of total lung expansion after thoracocentesis was observed, pleurodesis was performed due to recurrent effusion but turned out to be ineffective probably because of immiscibility of talc slurry and the thick fluid. After the procedure some complications developed: pleural haematoma, which needed red bood cells tranfusion, appeared — to which uremic haemorrhagic diathesis contributed with more than two times prolonged prothrombin and activated partial thromboplastin time. The patient still has the pleural fluid twice a month it is removed by pleurocenthesis.

After observations we assumed that during thoracocentesis in order to force evacuation of the fluid the trapped lung needs hypotension greater than — 0.2 bar on the aspirator's manometer. It should be emphasized that the pressure on the aspirator's manometer does not correspond to intrapulmonary pressure because it does not take into account the difference between levels, the drop in pressure in the hose, and above all in the 1.2 × 40 mm needle used routinely for thoracocentesis. During removal via chest tube the above-mentioned resistance does not occur, the aspirator is not turned on, and additionally, too rapid removal of the fluid has to be inhibited, usually by partial bending of the chest tube. In the guidelines of the American Thoracic Society failure of complete lung expansion is defined by the value of difficult to measure intrapulmonary pressure –10 cm H_2O at the beginning of thoracocentesis or –20 cm H_2O after evacuation of 1 litre of exudate [14]. This logical contraindication, i.e. lack of possibility of obliteration of the pleural cavity, may result from obstruction of the main bronchus or extensive pleural infiltration, and is observed on chest radiographs as a lack of contralateral mediastinal shift [14].

Using a guide for the chest tube has many advantages: minimal tissue injury, very good tightness of the chest tube, easy perforation of the hardened pleura, a short time of manipulation (less than 10 seconds), and easy cleaning and sterilization. Insertion of the chest tube in a traditional way, e.g. with the help of scissors, especially in obese patients, results in poorer tightness but lasts significantly longer (Fig. 5).

Figure 5. A guide which serves to insert a chest tube to the pleura

It should be emphasized that in our research pleurodesis was effective with passive submerged drainage, without recommended active drainage under suction 20 cm H_2O [3, 14, 16].

Some patients with fluid in the pleura have psychogenic dyspnoea and they request frequent thoracocentesis and numerous visits in hospital. It is typical that their dyspnoea abates directly after insertion of a needle into the pleura and the removal of just a minimal quantity of the fluid (own observation of several patients). The appropriate treatment is drugs — benzodiazepines and weak neuroleptic and anti-depressive drugs, which are usually effective during monotherapy, and give an accessible explanation of the problem by the physician. In our opinion these are patients who cannot manage neoplastic disease and who function using patterns of thought such as 'I have fluid — I have cancer, I do not have fluid — cancer withdrew, it is under control'.

Due to the retrospective character of this paper, a lack of remote control, and evaluation of the influence on life quality and interference of sequentially used cytostatic treatment or radiotherapy, the assessment of the influence of the procedure on patients' length of life in such a small group seems to be pointless. Another disadvantage of retrospective character of this paper is the means of evaluation of pleurodesis effectiveness, which consists in noting the lack of exudate or its failure to accrete in adhesions during the 24–48 hours after the procedure. With personnel shortages and remote dates of control in the Outpatient Clinic, this way of doing it is logistically sufficient as patients with delayed ineffectiveness of pleurodesis will report to the Admission Room with intensive dyspnoea, which was also recommended during discharge from hospital. A well-planned retrospective study would need scheduled controls, e.g. 30, 90 and 180 days after the procedure, with radiogram and standardized ultrasonogram of the chest. An example of a Polish prospective study concerning the comparison of videothoracoscopic pleurodesis using talc and doxycycline is the study carried out by Kudżał et al., in which the authors used, similarly as we did, a simplified three-phase means of evaluation of effectivenes the procedure [17].

Conclusions

Although pleurodesis does not belong to symptomatic treatment of the disease, it relieves the patient of the problem and it was always seen by patients and their families as positive and useful. It is possible to perform the procedure in a pulmonological departments as ours, without experience or equipment for medical thoracoscopy, which in Poland is performed only in a few non-operative departments. In comparison to directing the patient to Thoracic Surgery Department, talc slurry pleurodesis *via* chest tube allows the patient to avoid travelling, subsequent hospitalization, and general anaesthesia and offers a near date for the procedure — even the following day after making the decision. Medical staff save the time that they would spend on arrangements concerning directing the patient. If the procedure starts in the first half of the week, the patient is discharged from hospital without chest tube on Thursday or Friday. Based on our experience, we think that talc slurry pleurodesis via chest tube is a safe and useful procedure worth spreading. Pulmonological departments in multidisciplinary hospitals may count on general surgeons' support while inserting drainage, and pulmonologists will be left with pleurodesis, which does not differ from the procedure of washing the pleura.

Acknowledgements

This study was introduced by the author in the form of a presentation at XXII Meeting of the Polish Group of ERS in Krynica Zdrój on 8 May 2012.

Special thanks to Adam Lis, MD from the Department of Thoracic Surgery of the Specialist Group of Tuberculosis and Lung Diseases in Rzeszów, the originator and author of the prototype of the guide for the chest tube.

Conflict of interest

The Authors declare no conflict of interest.

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