

Pleurodesis through Pleural Catheterization in Patients with Symptomatic Malignant Pleural Effusions: Which One is better? Talc, Bleomycin or Tetracycline?

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Abstract

Purpose: To analyze the results of pleurodesis through pleural catheterization using talc slurry, bleomycin, and tetracycline in patients with symptomatic malignant pleural effusion (MPE) and to compare the efficacy, reliability and outcomes of these agents.

Methods: Talc (4 g), bleomycin (60.000 U) or tetracycline (1 g) was used for chemical pleurodesis in 271 patients. Successful pleurodesis was defined as no fluid build up and lack of recurrence of symptoms within the first 30 days after treatment. Data were analyzed using SPSS 15.0 for Windows.

Results: Pleural catheterization was performed in a total of 368 patients. Eighteen patients were lost to follow-up. Seventy-nine patients were excluded due to either of the following factors; trapped lung syndrome or patient lost during the early post-catheterization period due to advanced disease. In 271 patients chemical pleurodesis was performed with talc slurry (17.3%), bleomycin (13.7%) or tetracycline (49.1%). In 19.9% of the patients, multiple chemical agents were used in different sessions as successful results were not obtained with one agent. Clinical and radiological success was achieved in 78.2% of patients. There was no significant difference among 4 groups (talc slurry, bleomycin, tetracycline and multiple agents) in terms of clinical success, complicang f, Mfulica⁴duMeti⁴Mar

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Between January 2003 and January 2010, all symptomatic patients with MPE who were referred to the department of Interventional Radiology for pleurodesis and were followed up at least for 1 month were included in this retrospective study. Clinical information was collected from our hospital database. The study was approved by the Institutional Review Board (B.302.HAC.070001/431.10-1270).

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All procedures were performed in interventional radiology unit under local anesthesia with or without intravenous sedation. Any coagulopathy was appropriately corrected before the procedure. All catheters were placed by an interventional radiologist using the Seldinger technique (Figure 1).

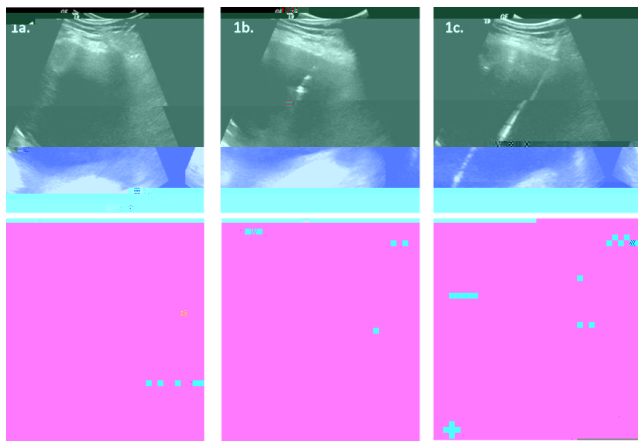


Figure 1: 54 years old female patient with gastric cancer: (a) Preprocedural US image of pleural space. (b) Puncture with 18 Gauge Seldinger needle under US guidance. (c) Introducing the guide-wire into the pleural space under US guidance. (d) Fluoroscopic view of the guidewire position in the pleural space. (e) Locking pigtail catheter insertion over the guidewire under guidance. (f) Expanded lung following the procedure.

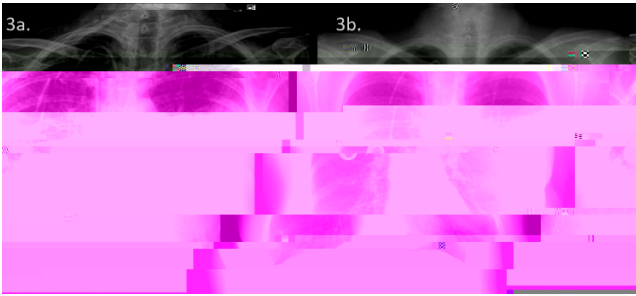


Figure 3 P-A Chest X-ray images of the patient with breast cancer: (a) Before pleurodesis, (b) successful pleurodesis.

Data were analyzed using SPSS 15.0 for Windows (SPSS Inc., Chicago, IL). Kruskal-Wallis test was used to compare more than two independent groups and Mann-Whitney U test was used to compare two independent groups for non-normally distributed variables. Percentages were compared by Pearson's chi-square test or Likelihood ratio chi-square test, depending on the frequencies. Descriptive statistics are reported as frequency and percent for qualitative variables.

tetracycline (n=133, 49.1%). In 19.9% (n=54) of the patients multiple chemical agents were used in sessions as successful results were not obtained with one agent.

were no cases of respiratory failure or death that could be directly attributed to the pleurodesis agents. There were 10 patients (3.7%) with major complications (iatrogenic empyema treated with drainage and intravenous antibiotics). Minor adverse reactions to sclerotherapy were observed 60 times in 44 patients (16.2%). There were fevers lasting less than 24 h (24 times), nausea-vomiting (11 times) and mild to moderate pleuritic chest pain or shortness of breath (25 times).

Clinical success was achieved in 78.2% (n=212) of patients with sclerotherapy. All of these patients were discharged without a catheter. For these patients mean catheter duration was 8 days (range: 4-22 days) and median symptom-free life period was 5 months (between 2.2 and 9.3 months). Clinical success was not achieved in 59 of the 271 patients (21.8%). Of those patients, 19 (7%) had low lung reserve without pleural re-accumulation, 10 (3.7%) had resistant re-accumulation, however symptoms were regressed, 10 (3.7%) had iatrogenic empyema treated with intravenous antibiotics, the remaining 20 (7.4%) had recurrence within 1 month of the procedure. Mean catheter duration was 24 days (range: 14-66 days) and median symptom-free life period was 2.1 months (between 1 and 3.4 months) in these patients.

There was no difference among 4 groups (talc, bleomycin, tetracycline and success rates, minor-major complication rates and median symptom-free life periods) in pleurodesis (Figure

6). Mean catheter duration in multiple agent group (13.3 days) was longer than other groups (7.2 days for talc group, 7.8 days for bleomycin group and 8.3 days for tetracycline group, P < 0.001). There was no difference among 5 groups (breast cancer, lung cancer, ovarian cancer, stomach cancer, leukemia and other cancer groups) in terms of mean ages, clinical success rates, minor-major complication rates, mean catheter durations, and median symptom-free life periods in pleurodesis. Statistical analysis results are summarized in Tables 1 and 2.

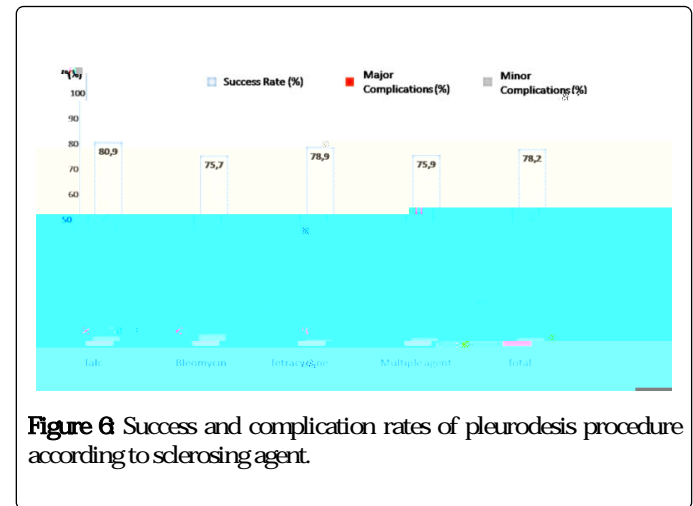


Figure 6 Success and complication rates of pleurodesis procedure according to sclerosing agent.

Sclerosing Agent	Age (Year) Median (min-max)	Gender (%) Male/Female	Primary Disease (%)	Success Rate (%)	Complications (Minor)(%)	Complications (Major)(%)	Symptom free duration (month) Median (min-max)
			Breast: 31.9				
			Lung: 12.8				
			Over: 19.1				
Talc			Stomach: 12.8				
17.3% (n=47)	52 (34-82)	38.3 /61.7	Lymphoma, etc: 23.4	80.9	19.1	4.3	4.7 (1.3-9.3)

			Stomach: 13				
			Lenfoma etc: 9.3				
TOTAL 100% (n=271)	53 (34-82)	32.1/67.9	Breast: 32.5	78.2	16.2	3.7	4.5 (1.3-9.3)
			Lung: 22.1				
			Over: 15.5				
			Stomach: 11.8				
			Lymphoma etc: 18.1				
p value	0.533	0.727	0.701	0.91	0.9	0.92	0.884

Table 1: Clinical outcomes of the study population pleurodesis procedure according to sclerosing agent.

Primary Disease	Age (year) (min-max)	Median	Gender (Male/Female)	(%) Agent (%)	Success Rate (%)	Complications (%) (Minor)	Complications (%) (Major)	Symphom free duration (month) Median (min-max)
				Talc: 17				
				Bleomycin: 12.5				
				Tetracycline: 47.7				
Breast 32.5% (n=88)	53 (34-82)		0/100	Multipl: 22.7	73.9	18.2	3.4	3.7 (1.3-9.3)
				Talc: 10				
				Bleomycin: 16.7				
				Tetracycline: 48.3				
Lung 22.1% (n=60)	52 (36-80)		76.7/23.3	Multipl: 25%	76.7	16.7	0	3.8 (1.3-8.6)
				Talc: 21.4				
				Bleomycin: 14.3				
				Tetracycline: 47.6				
Ovarian 15.5% (n=42)	55 (38-80)		0/100	Multipl: 16.7	76.2	14.3	7.1	4.1 (1.5-8.7)
				Talc: 18.8				
				Bleomycin: 6.3				
				Tetracycline: 53.1				
Stomach 11.8% (n=32)	54.5 (40-80)		53.1/46.9	Multipl: 21.9	84.40%	12.5	6.3	5.1 (1.8-8.3)
Lenfoma and others 18.1% (n=49)	54 (36-78)		9/51%					

P value	0.527	<0.001	0.616	0.479	0.951	0.188	0.532
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Table 2

drainage of the pleural cavity, the most important requirement for successful pleurodesis is satisfactory apposition of the parietal and visceral pleura [4]. However in cases with MPE, the situation could be more problematic, as the visceral pleura can become very thick, the lung parenchyma can be very secondary to tumor involvement or central mass may be present. In turn, leads to incomplete lung re-expansion, a phenomenon called as trapped lung syndrome [18,32,33]. Full lung reexpansion can't be achieved in patients with trapped lung despite complete drainage of the pleural

Up to 30% of patients who are evaluated for pleurodesis are unsuitable candidates because of trapped lungs [32,33]. Patients evaluated for pleurodesis, therefore, require a careful radiographic evaluation in order to identify the likelihood of lung reexpansion [17]. In a patient with MPE, the observation of pneumothorax (pneumothorax ex vacuo) after a large-volume thoracentesis or placement of chest catheter concerned as trapped lung syndrome, especially if the distribution of the pneumothorax space simulates the distribution of pleural fluid before thoracentesis [34,35]. Once a lung has become noncompliant or any space in the pleural cavity is partially filled with a pleural fluid. If the pleural fluid is removed, the lung is unable to reexpand fully. A pneumothorax will, therefore, develop not from a puncture and air leak but from the vacuum induced in the pleural space [32,33]. Two hypotheses have been suggested for the failure of the lung to reexpand including underlying restriction by pleural disease and depletion of pulmonary surfactant preventing aeration and lung reexpansion [32,33,35]. Gas originates either from pulmonary venules or from

10. Bloom AI, Wilson MW, Kerlan RK, Gordon RL, LaBerge JM, et al. (1999)
Talc pleurodesis through small-bore percutaneous tubes