

# Comparison of Video Assisted Thoracoscopic Talc Pleurodesis to Pleurodesis through Chest Tube for Malignant Pleural Effusion

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## ABSTRACT

**Objective:** To compare the efficacy of Video-assisted Thoracoscopic Talc Pleurodesis (VATP) to pleurodesis through chest tube for cases having Malignant Pleural effusion

**Design :** Controlled clinical Trial

**Setting:** Combined Military Hospital Rawalpindi , 1200 bedded, tertiary care hospital.

**Duration:** The study was conducted from Jun 2006 to Jun 2007.

**Sampling technique:** Purposive non-probability

### Patients and Methods:

The study was conducted at Combined Military Hospital Rawalpindi from Jun 2006 to Jun 2007. After informed consent and approval from hospital ethical committee, 60 patients with proven diagnosis of malignant pleural effusion were included in the study. Minimum criteria for diagnosis of malignant pleural effusion were radiological evidence of pleural effusion on Plain X-Ray and CT-scan and presence of malignant cells in the pleural fluid. Patients with secondarily infected effusions, trapped lungs, and those with renal, hepatic, cardiac causes of effusions were excluded from the study.

Patients who were fit for GA [ ASA-grade  $\leq$  III ] were subjected to video-assisted thoracoscopic insufflations of talc ( labeled as VATS Pleurodesis-Group A) while other had conventional pleurodesis through chest tube using talc solution (Slurry Pleurodesis-Group B). Outcome was measured along three parameters: improvement in chest pain and dyspnoea, and duration of chest tube placement. Data was entered on SPSS-10; Chi-square test and paired-sample t-test were applied to compare extubation time and level of dyspnoea and pre and post-operative pain respectively. Values, less than 0.05 were considered statistically significant [P< 0.05].

**Results:** Group A (VATS) had 87.5 % (14/16) (n = 16) successful pleurodesis as far as duration of chest tube drainage was concerned whereas Group B had only 54 % (13/24) (n = 24) successful pleurodesis indicating significant difference (P value < 0.05 for extubation timing). However there was no significant difference in reduction of post procedural chest pain and dyspnoea in two groups (P value > 0.05).

**Conclusion:** Video-assisted thoracoscopic Talc pleurodesis is a better therapeutic procedure than tube thoracostomy pleurodesis for cases of malignant pleural effusion.

**Keywords :** Talc pleurodesis , VATP pleurodesis , Slurry Pleurodesis

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## INTRODUCTION

Malignant pleural effusion is a challenging clinical problem for medical oncologists and thoracic surgeons. Currently lung cancers in men and breast cancer in women is the most common cause for malignant pleural effusion. Since malignant pleural effusion is frequently a pre-terminal event [30-day mortality rate of 29 to 50%] treatment is directed toward symptomatic relief only so that there is minimal discomfort, inconvenience and expenditure for the patient<sup>1</sup>. Pleurodesis is considered to be the

optimal treatment for malignant pleural effusion, as repeated thoracocentesis is usually a temporizing measure and carries the risk for pneumothorax and pleural cavity infection<sup>2</sup>. It is conventionally carried out by instilling the prepared talc solution into the pleural cavity through a chest tube under topical anesthesia. The same procedure, however, can be carried out by insufflations of medicated talc in pleural cavity under vision using video-assisted thoracoscopy and is considered superior to the conventional method. It is claimed that latter offers greater reduction in dyspnoea, early extubation and better pain control<sup>3</sup>.

Though, the technique was introduced many years ago and the therapeutic efficacy of the

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procedure is well documented, this procedure has not replaced the conventional slurry technique through the chest tube in our set-up. Despite extensive search we could not find any local reference on this topic. This may be because of various reasons such as lack of VATP equipment, fear of complications or perhaps the reluctance for giving the general anesthesia. We carried out this study to compare the result of two techniques in our population so that based on results, VATS is selected with confidence and can replace conventional slurry technique patients of malignant pleural effusion in suitable patients.

## PATIENTS AND METHODS

The study was conducted at Combined Military Hospital Rawalpindi from Jun 2006 to Jun 2007. After informed consent and approval from hospital ethical committee, 60 patients with proven diagnosis of malignant pleural effusion were included in the study. Minimum criteria for diagnosis of malignant pleural effusion were radiological evidence of pleural effusion on Plain X-Ray and CT-scan and presence of malignant cells in the pleural fluid. Patients with secondarily infected effusions (pH < 7.29, Cell count > 5000/cm<sup>3</sup>), trapped lungs (as determined by Plain X-Ray and CT-scan) and those with renal, hepatic, cardiac causes of effusions (as determined by serum urea creatinine levels, deranged ALT > 80 iu and 2D echocardiography) were excluded from the study.

All patients were subjected to initial gradual decompression of pleural cavity in 24 hours by chest intubation under local anesthesia. Steroid medication if already administered was stopped 05 days prior to the procedure. Patients who were considered fit for GA according to ASA-criteria [risk ASA < grade III] were subjected to VATS Pleurodesis (Group A). The procedure was performed under general anesthesia, with double lumen endotracheal tube and using front viewing Carl Storz Telescope and insufflator; insufflations of 05 grams of sterilized talc over the visceral and parietal pleura using insufflator under direct vision was done.

All patients who were declared high risk for general anesthesia (ASA III and above) were selected for tube pleurodesis (Slurry Pleurodesis-Group B). It was performed by instillation of talc solution (50ml solution containing 05 grams of sterilized talc, injection Lignocaine 2% 10ml, injection Abocaine 0.5% 10 ml and normal saline solution to constitute 50ml) via chest tube. Chest tube was clamped for 02 hours after pleurodesis in both procedures with no postural changes in group B. Postoperatively negative suction was not applied in

any of the group. All patients were observed over a period of 10 days and assessed twice daily at the morning and evening round, roughly 12 hours apart. Outcome was measured along three parameters: improvement in chest pain and dyspnoea, and duration of chest tube placement. Pain score and grade of dyspnoea was noted at the start of trial and compared with the same at the time of removal of chest tube or day 5, whichever was earlier.

Dyspnoea was assessed on NYHA dyspnoea scale (Grade 1 to grade 5). [ ] An improvement by 2-grades on dyspnoea scale, within 05 days after the procedure, was considered as improvement i.e. positive result.

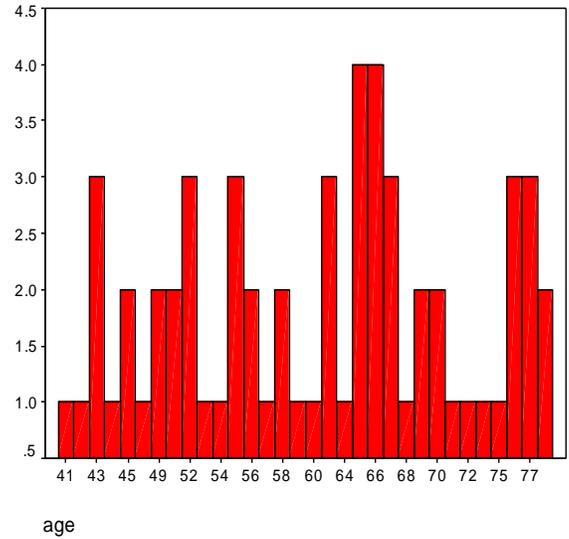
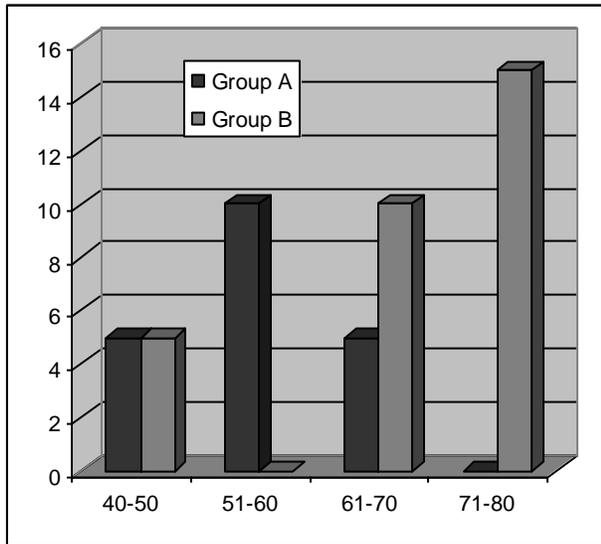
Pain was assessed on VAS [ Visual analogue scale] and was rated from grade 1 to 10. The patient marked his/her pain severity ranging from mild pain (grade 1) to the most severe pain (grade 10). Chest tube was removed once the fluid discharge through chest drain was less than 100 ml/24 hrs and post procedure X rays of chest confirmed absence of pleural fluid. Patency of chest drain was ensured before every measurement. Extubation was considered to be early, if tube could be removed before completion of 5 days and vice versa. In cases of failure, patients were subjected to repeat pleurodesis by slurry and in resistant cases by a small bore indwelling catheter for continuous drainage.

Data was entered on SPSS-10; time of chest tube removal and change in dyspnoea level were compared using Chi-sq test while paired t-test was applied to compare the pre and post-op pain score. Values less than 0.05 were considered statistically significant [P < 0.05].

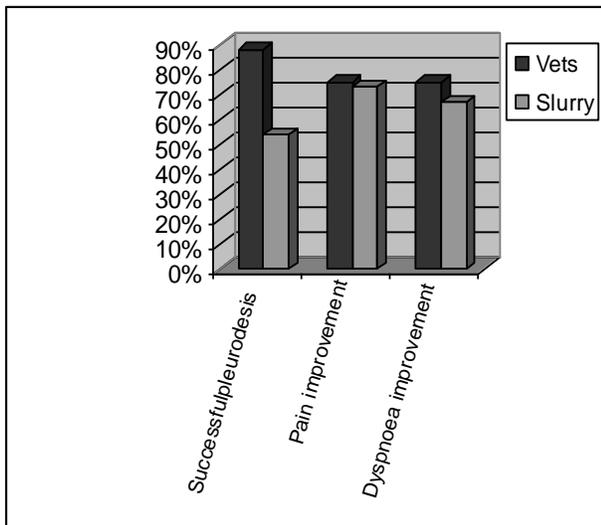
## RESULTS

Mean age of our patients was 60.9 ± 10.9 ranging from 41-80 years. Among them 44 (73.3%) were males while 16 (26.7%) were females. Detail of demographic characteristics is shown in table 1-3. The predominant symptoms were dyspnoea and chest pain in all patients except 02 (5%) patients who were asymptomatic for chest pain.

In group A [ VAP-group] extubation could be done early [with in five days] in 22 out of 30 patients; in group B [conventional group] early extubation was done only in 10 out of 30 patients. There was significant difference in two groups regarding time of chest extubation [p= 0.004]. Improvement in dyspnoea was seen in 22/30 in group A while only in 13/30 in the other group [ p=0.035] There was no significant difference in pain till 5<sup>th</sup> post-op day in two groups [p=0.209] Detailed results are shown in table 4-6.

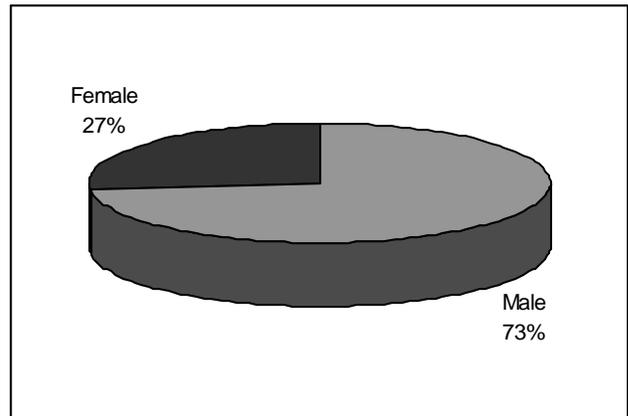


Comparison VATS to Slurry Pleurodesis



Gender:

Valid	Frequency	%	Valid %	Cumulative %
Male	44	73.3	73.3	73.3
Female	16	26.7	26.7	100.0
Total	60	100.0	100.0	



Difference in pain score , dyspnoea and time for extubation are shown in Table 4-6

Demographic characters of population:

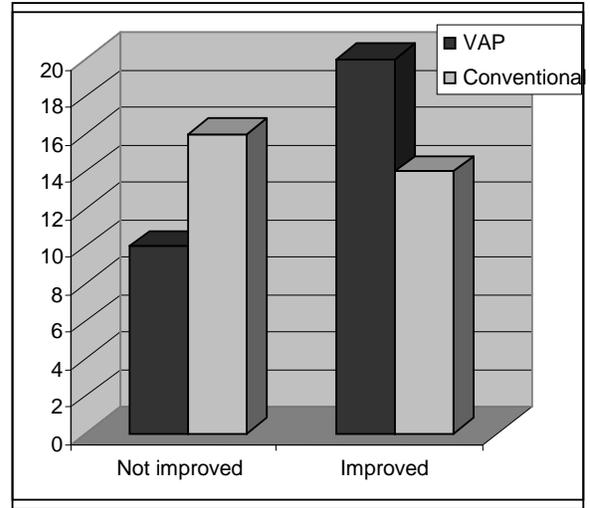
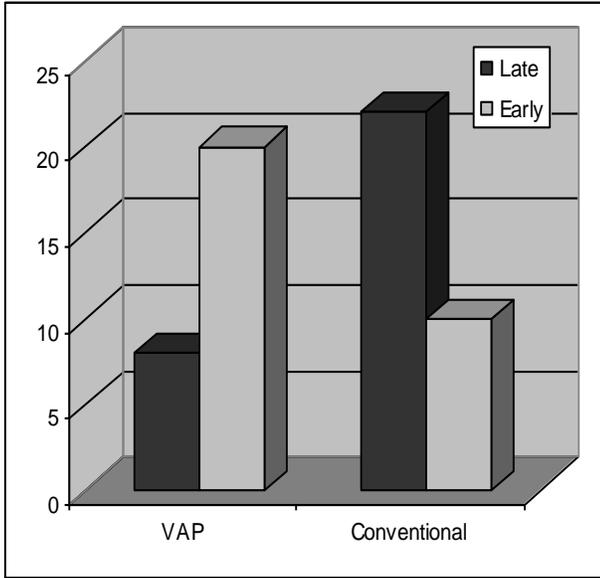
N	Valid	60
Mean	Missing	0
Mean		60.90
Median		61.00
Mode		65 <sup>a</sup>
Std. Deviation		10.96
Minimum		41
Maximum		80

a. Multiple modes exist. The smallest value is shown.

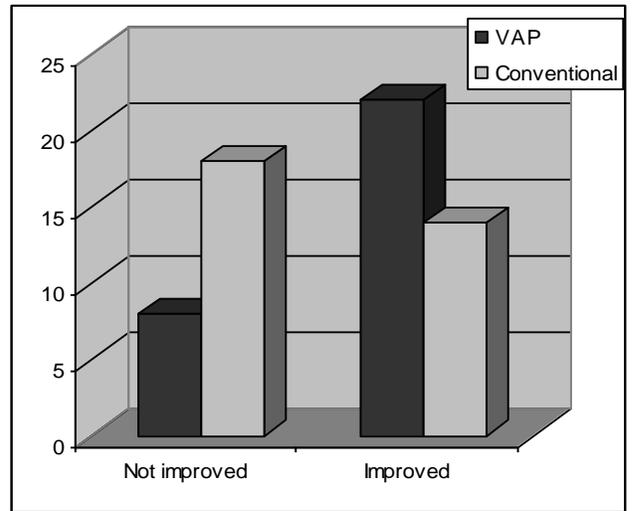
EXTUBATION TIME

Crosstab

	Extubation time		Total
	Late	Early	
Procedure VAP	8	22	30
Performed conventional	20	10	30
Total	28	32	60



	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.643 <sup>b</sup>	1	.002		
Continuity correction	8.103	1	.004		
Likelihood ratio	9.925	1	.002		
Fisher's Exact Test				.004	.002
N of Valid Cases	60				



- a. Computed only for a 2x2 table
- b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.00

Procedure performed

**DYSPNOEA:** Crosstab

	Dyspnoea		Total
	Not improved	Improved	
Procedure VAP Performed	8	22	30
conventional	17	13	30
Total	25	35	60

**PAIN:** Paired samples statistics

Pair 1	Mean	N	Std. Deviation	Std. error mean
Painpre	5.57	60	1.66	.21
Painpost	5.28	60	1.69	.22

Paired samples test

	Paired difference					t	df	g. tailed (2)
	Mean	Std. deviation	Std. error mean	95% confidence interval of the difference				
				Lower	Upper			
Pair 1 Painpre - Painpost	.28	1.73	.22	-.16	.73	1.270	59	.209

	Value	Df	Asymp. Sig (2-sided)	Exact Sig (2-sided)	Exact Sig (1 sided)
Pearson Chi-Square	5.554 <sup>b</sup>	1	.018		
Continuity correction	4.389	1	.036		
Likelihood ratio	5.654	1	.017		
Fisher's Exact Test				.035	.018
N of Valid Cases	60				

**DISCUSSION**

Talc is the most effective chemical pleurodesis agent for patients with malignant pleural effusion<sup>4</sup>. Despite concerns for safety such as development of acute respiratory distress syndrome after it's intrapleural application , it is generally considered to be safe and effective.<sup>5</sup> Pleurodesis with slurry technique is considered to be effective in malignant effusions<sup>6,7</sup>. It is a convenient bedside procedure performed in high risk cases with poor lung functions and ejection fraction less than 50%. Potential disadvantages of slurry pleurodesis include lack of uniform distribution, accumulation in dependent areas of the pleural space and decreased direct contact time due to the liquid suspension, resulting possibly to incomplete pleurodesis and loculations. It should be performed where thoracoscopy is unavailable and is considered to be the next best option<sup>5</sup>.

Video-assisted talc pleurodesis (VATP) is a relatively newer technique; It is performed under general anesthesia, with one lung ventilation resulting in collapse of lung. It offers distinct advantages; for example it provides full view of pleural cavity, adhesionolysis can be performed with drainage of loculated fluid, insufflations of talc under direct vision and finally full expansion of lung can be confirmed before withdrawl of scope. Several technical details should be taken into account in order to achieve good pleurodesis and avoid complications i.e. all pleural fluid should be removed before spraying talc. Other important considerations include hemorrhage during adhesionolysis, persistent postoperative air leaks and port site infection.

Various studies have demonstrated that VATP is a better technique as compared to slurry technique when compared along different clinical parameters. In study conducted Erickson et al in 2002 it was concluded that VATS pleurodesis is superior to slurry talc pleurodesis in reduction of malignant pleural fluid formation and ultimately relief of symptoms like dyspnoea and persistent pleuritic chest pain<sup>3</sup>. Tan C; Sedrakyan demonstrated 87.5% and Stefani A; Natali 91% success rate respectively, for thoracoscopic talc pleurodesis<sup>8,9</sup>. Tan and associates in 2006 have demonstrated that Thoracoscopic talc insufflation is associated with fewer recurrences of effusions compared with bedside talc slurry, though this is based on two small studies.<sup>5</sup> Shaw P; Agarwal R in a meta-analysis of large number of case series have

concluded that efficacy of thoracoscopic pleurodesis is superior to conventional procedure<sup>10</sup>.

VAT pleurodesis is not without complications, however. In a study carried out by Laissar and associates in 2006 on 98 patients as many as 28 had complications. 17 had fever while pleurodesis was ineffective in number of patients. Despite it's limitations it offers good survival rate, even in advanced cases of malignancy<sup>11</sup>.

In our study comparison of the results of VATS with slurry pleurodesis there was a significant statistical difference in successful pleurodesis as far as extubation timing is concerned. Compared to Erickson study, who achieved a success rate of 100 % with VATS talc pleurodesis<sup>3</sup>, we achieved 88% successful pleurodesis with the same procedure. This difference in success rate can be attributed to differences in inherent characteristics of our sample. Studies have demonstrated that pretreatment clinical data and pleural fluid parameters can predict the outcome of pleurodesis as well as the survival of patients with malignant pleural effusion<sup>12</sup>.

The other possible reasons for the different success rate may be due to the variable dosage of Talc (5-15 grams), poor nutritional status of Asian population, variable particle size of Talc used and the time of presentation of patient with effusion (late diagnosed cases respond poorly to pleurodesis).

Difference in physical characteristics of the talc preparations used for pleurodesis is also considered to be very important determinant of the outcome of the procedure<sup>13,4</sup>. Similarly Steger and colleagues have demonstrated that the most favorable outcome after talc pleurodesis is seen in women whose lungs are fully expandable, in patients whose body mass index was greater than 25 kg/m<sup>2</sup>.<sup>15</sup>

Since there are no published studies on this topic in Pakistan, we do not have results for comparison in our population. Where facilities for VATP are available, we think it is time to shift to the newer technique, as it offers distinct advantages over the conventional technique. At the same time there is need to explore and clarify the potential role of different intra-pleural therapeutic interventions other than sclerosing agents, such as chemotherapeutic agents and immune modulators.

## CONCLUSION

We conclude that VATP is better therapeutic procedure than Slurry Talc pleurodesis for Malignant Pleural Effusion in our setup. Therefore it is recommended that in all patients who can tolerate general anesthesia VATS Talc Pleurodesis should be used as it offers quicker and more effective resolution of malignant pleural effusion.

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