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SUCCESS RATE OF TALC PLEURODESIS IN PATIENTS WITH MALIGNANT PLEURAL EFFUSION

Original Research

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ABSTRACT

Background: Malignant pleural effusion (MPE) is a common complication in advanced malignancies, significantly impairing respiratory function and quality of life. It affects approximately 20% of cancer patients, with lung and breast carcinomas being the leading causes. Pleurodesis using talc is a widely accepted palliative intervention aimed at preventing recurrent fluid accumulation. Despite global data supporting its use, there is a lack of localized evidence evaluating its efficacy in specific population subgroups, warranting further investigation.

Objective: To determine the frequency of success with talc pleurodesis in patients with malignant pleural effusion.

Methods: This descriptive case study was conducted at the Department of Medicine, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, over six months (August 2, 2024 to February 2, 2025). A total of 100 patients aged 18–65 years with radiologically and clinically confirmed MPE were enrolled using non-probability consecutive sampling. Pleurodesis was performed with 5 grams of sterile talc (Steritalc® F2, France) in 90 mL of saline and 10 mL of 1% lidocaine instilled via chest tube. Success was defined as no radiological recurrence of effusion within 30 days post-procedure. Data were analyzed using SPSS version 20.0.

Results: Among 100 patients (mean age 47.5 ± 10.34 years; 69% female), the overall success rate of talc pleurodesis was 71%. A statistically significant association was observed with hypertension, where 81.4% of hypertensive patients experienced success ($p = 0.04$). No significant associations were found for age ($p = 0.29$), gender ($p > 0.99$), BMI ($p = 0.66$), disease duration ($p = 0.97$), smoking ($p = 0.63$), diabetes ($p = 0.33$), residence ($p = 0.32$), socioeconomic status ($p = 0.97$), or procedure time ($p = 0.49$).

Conclusion: Talc pleurodesis demonstrated considerable efficacy in controlling MPE, with hypertension appearing as a potential predictor of success. These findings support its continued use as a palliative intervention while highlighting the need for further exploration of clinical predictors.

Keywords: Hypertension, Malignant Pleural Effusion, Pleurodesis, Radiographic Monitoring, Talc Slurry, Treatment Outcome, Tumor-Associated Effusion.

INTRODUCTION

Malignant pleural effusion (MPE) is a common complication of advanced-stage malignancies and is associated with a poor prognosis. It is estimated that approximately 150,000 individuals in the United States are diagnosed with MPE annually (1). The condition arises when malignant cells infiltrate the pleural space, leading to the accumulation of fluid that compresses the lungs and causes significant respiratory distress. Dyspnea is the predominant symptom reported by patients, often accompanied by persistent coughing and chest pain, all of which severely impair quality of life (2). In cases where systemic anticancer therapy fails to control the effusion, local palliative interventions are considered essential to alleviate symptoms, prevent recurrence, and avoid the morbidity associated with repeated thoracentesis (3,4). Current local management options include pleurectomy, pleurodesis, pleuroperitoneal shunting, indwelling pleural catheter (IPC) drainage, chest tube placement, and therapeutic thoracentesis (5,6). Among these, pleurodesis is frequently employed as a palliative strategy due to its ability to induce adhesion between the visceral and parietal pleurae, thereby eliminating the pleural space and preventing fluid reaccumulation. This procedure can be achieved either chemically, through the introduction of sclerosing agents, or mechanically, by abrasion during thoracoscopy or thoracotomy (7,8). Talc has emerged as the most widely used and effective sclerosing agent due to its high success rate in achieving durable pleural symphysis (9). Studies have shown that talc pleurodesis, whether delivered as a slurry via tube thoracostomy or as poudrage during thoracoscopy, yields comparable outcomes in terms of efficacy (10,11). A systematic review reported a success rate of 86.6% with talc pleurodesis in MPE cases (12), while another study documented a 79.6% success rate (13).

Despite its proven efficacy, talc pleurodesis is not without risk. Complications such as acute respiratory distress syndrome (ARDS), pneumonitis, and even mortality have been associated with its use, prompting ongoing debate regarding its safety and appropriate application in clinical practice (10,11). Furthermore, the cost-effectiveness of talc slurry, particularly in settings with limited access to thoracoscopic surgery, has made it a preferred option in resource-constrained healthcare systems (11). While international data supports the use of talc pleurodesis, there remains a scarcity of region-specific evidence evaluating its effectiveness and safety profile. This lack of local data limits the ability of clinicians to confidently adopt and standardize this approach in their practice. Therefore, the present study aims to determine the success rate of talc pleurodesis in patients with MPE within the local population. Establishing this evidence will not only fill an important knowledge gap but also inform clinical decision-making and improve patient care in the regional context. The objective of this study is to determine the frequency of success with talc pleurodesis in patients with malignant pleural effusion.

METHODS

This descriptive case study was conducted at the Department of Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, following the approval of the institutional ethical review committee. The study duration spanned six months, from August 2, 2024, to February 2, 2025. A sample size of 100 patients was determined using the World Health Organization (WHO) sample size calculator, based on a confidence level of 95%, a margin of error of 8%, and an expected success rate of 79.6% for talc pleurodesis in patients with malignant pleural effusion (MPE) (13). Patients were enrolled using a non-probability consecutive sampling technique. The inclusion criteria consisted of adult patients aged 18 to 65 years, of either gender, with a confirmed diagnosis of malignant pleural effusion and deemed suitable candidates for talc pleurodesis. Patients were excluded if they had underlying cardiac conditions, hepatic impairment (defined as ALT or AST levels >40 IU/L, hepatitis B or C infection, or cirrhosis), renal failure (serum creatinine >2 mg/dL or requiring dialysis), or if the malignant effusion was associated with non-pulmonary primary tumors.

Eligible patients were recruited from the hospital's medical wards after providing informed written consent. Baseline demographic and clinical information, including age, gender, BMI, medical and family history of pleural effusion, residence, and socioeconomic status, was collected and recorded in a structured proforma. All patients underwent talc pleurodesis using a standardized technique performed by a single team under the supervision of the primary investigator to ensure procedural consistency. The procedure involved instillation of a talc slurry composed of 5 grams of sterile, asbestos-free talc (Steritalc® F2, Novatech, France) mixed with 90 mL of sterile saline and 10 mL of 1% lidocaine through a chest tube. Following instillation, the chest drain was clamped for six hours. Drain removal criteria included satisfactory lung re-expansion on chest radiography and a 24-hour drainage volume less than 150 mL, with no air leak. The

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duration required to complete the procedure was also documented. A follow-up chest X-ray was performed a few hours after chest drain removal. If radiological findings remained satisfactory, patients were discharged. Post-discharge, all patients were followed up for a period of 30 days to evaluate the success of pleurodesis. The procedure was considered successful if there was no radiographic evidence of fluid reaccumulation during the follow-up period or until patient death, whichever occurred first. All collected data were entered and analyzed using SPSS version 20.0. Success of pleurodesis was described in terms of frequency and percentage.

RESULTS

The study included a total of 100 patients with malignant pleural effusion who underwent talc pleurodesis. The mean age of the participants was 47.5 ± 10.34 years. Among them, 31% were male and 69% female. The mean body mass index (BMI) was recorded as 24.1 ± 5.48 kg/m². The average duration of disease prior to intervention was 6.51 ± 3.52 years. A total of 9% of patients were smokers, 51% were diabetic, 43% had hypertension, and 18% reported a family history of pleural effusion. Regarding residential distribution, 24% resided in rural areas, 22% in urban settings, 29% in semi-urban localities, and 25% in industrial zones. Socioeconomic analysis showed that 50% of patients were from low-income backgrounds, 43% from middle-income groups, and only 7% from high-income households. The mean duration of the pleurodesis procedure was 20.6 ± 3.14 minutes. Overall, the success rate of talc pleurodesis was 71%, with 29% of cases experiencing recurrence or failure. In age-wise analysis, success was achieved in 76.9% of patients aged 20 to 45 years and in 67.2% of those above 45 years, though the association was not statistically significant ($p = 0.290$). Gender-wise distribution revealed identical success rates of 71% in both male and female patients ($p > 0.999$). Success based on BMI showed rates of 68.8% in underweight, 75% in normal-weight, and 80% in obese patients, with no significant difference ($p = 0.66$). Duration of disease also had no notable effect, with 70.8% success in patients with disease duration of 1 to 6 years and 71.2% in those with 7 to 12 years ($p = 0.97$).

Among smokers, 77.8% experienced successful outcomes compared to 70.3% of non-smokers ($p = 0.63$). Diabetic patients showed a success rate of 66.7%, while non-diabetics achieved 75.5% ($p = 0.33$). The only statistically significant factor associated with success was hypertension, where hypertensive patients had an 81.4% success rate compared to 63.2% in non-hypertensives ($p = 0.04$). A family history of pleural effusion was not significantly associated with success, with 77.8% achieving positive outcomes compared to 69.5% without such history ($p = 0.48$). Regarding residence, the highest success was seen among urban dwellers (81.8%), followed by industrial (76.0%), semi-urban (69.0%), and rural (58.3%) areas, though this association was not statistically significant ($p = 0.32$). Socioeconomic status also showed no significant effect, with success rates of 72.0%, 69.8%, and 71.4% in low, middle, and high SES groups, respectively ($p = 0.97$). Lastly, when categorized by procedure time, pleurodesis lasting 15 to 20 minutes yielded a slightly higher success rate of 73.6% compared to 67.4% for those taking 21 to 25 minutes, though this difference was not statistically significant ($p = 0.49$).

Table 1: Demographics of patients enrolled

Age	**Statistics**
N	100
Mean	47.5 ± 10.34
Gender	
Male	31 (31%)
Female	69 (69%)
BMI	24.1 ± 5.48
Duration of disease	6.51 ± 3.52
History of	
Smoking	9 (9%)
Diabetes Mellitus	51 (51%)
Hypertension	43 (43%)
Family history of pleural effusion	18 (18%)
Residence	
Rural	24 (24%)
Urban	22 (22%)

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Age	**Statistics**
Semi-urban	29 (29%)
Industrial Area	25 (25%)
Socioeconomic status	
Low	50 (50%)
Middle	43 (43%)
High	7 (7%)
Duration of procedure (min)	20.6 ± 3.14

Table 2: Comparison of success with effect modifiers

	Success		**p-value**
	Yes	No	
Age: 20 to 45	30(76.9%)	9(23.1%)	0.290
Age >45	41(67.2%)	20(32.8%)	
Male	22(71.0%)	9(29.0%)	>0.999
Female	49(71.0%)	20(29.0%)	
BMI			
Underweight	53(68.8%)	24(31.2%)	0.66
Normal	6(75%)	2(25%)	
Obese	12(80%)	3(20%)	
Duration of disease			
1 to 6	34(70.8%)	14(29.2%)	0.97
7 to 12	37(71.2%)	15(28.8%)	
Smoking			
Yes	7(77.8%)	2(22.2%)	0.63
No	64(70.3%)	27(29.7%)	
Diabetes mellitus			
Yes	34(66.7)	17(33.3%)	0.33
No	37(75.5%)	12(24.5%)	
Hypertension			
Yes	35(81.4%)	8(18.6%)	0.04
No	36(63.2%)	21(36.8%)	
Family history of pleural effusion			
Yes	14(77.8%)	4(22.2%)	0.48
No	57(69.5%)	25(30.5%)	
Residence			
Rural	14(58.3%)	10(41.7%)	0.32
Urban	18(81.8%)	4(18.2%)	
Semi-urban	20(69.0%)	9(31.0%)	
Industrial Area	19(76.0%)	6(24.0%)	
Socioeconomic status			
Low	36(72.0%)	14(28%)	0.97
Middle	30(69.8%)	13(30.2%)	
High	5(71.4%)	2(28.6%)	
Procedure time			
15 to 20	39(73.6%)	14(26.4%)	0.49
21 to 25	31(67.4%)	15(32.6%)	

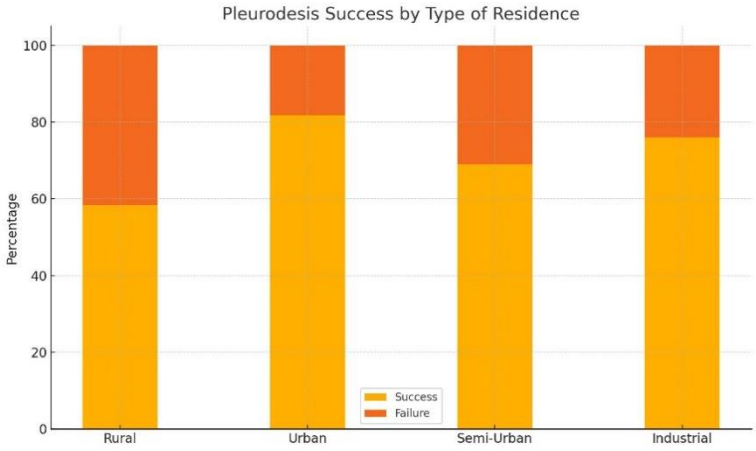

Figure 1 Pleurodesis Success by Type of Residence

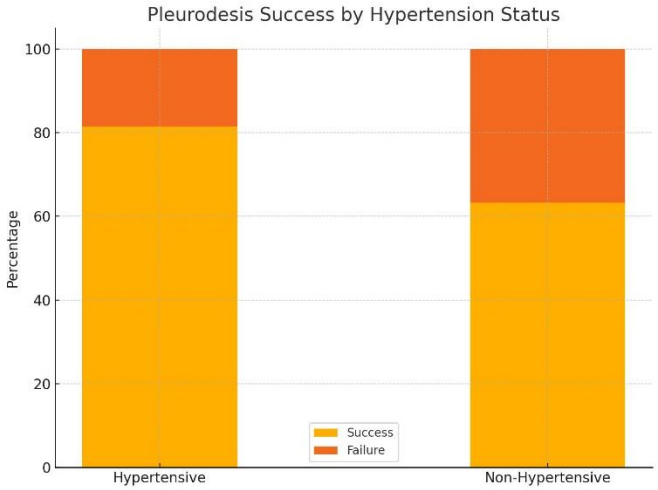

Figure 2 Pleurodesis Success by Hypertension Status

DISCUSSION

Malignant pleural effusion (MPE) remains a significant contributor to cancer-related morbidity, often manifesting as progressive dyspnea, non-productive cough, and chest pain, which collectively impair physical functioning and reduce quality of life (14,15). With an estimated annual incidence of 500,000 cases across the US and Europe, MPE is a common complication of advanced malignancy, particularly lung and breast cancer, which together account for approximately 75% of all cases (16,17). Despite systemic treatments such as chemotherapy and radiation, effusions frequently recur, necessitating effective local interventions for symptom palliation (18,19). The pathophysiology of MPE varies based on the underlying malignancy; for instance, non-small cell lung carcinoma disrupts pleural lymphatic drainage indirectly, whereas small cell carcinoma can infiltrate the pleura directly (20,21). In this study, the success rate of talc pleurodesis was 71%, demonstrating its clinical utility in the palliative management of MPE within the local population. This finding aligns with previous research, where success rates have ranged between 68% and 86%, depending on the method of talc administration, patient selection, and disease characteristics (12,13). Notably, a systemic review reported an average success rate of 86.6%, while another retrospective study observed 79.6% effectiveness, with better survival outcomes among patients who did not experience recurrence (12,13). These findings reinforce talc pleurodesis as a robust method for symptom relief and fluid control in advanced cancer patients.

Interestingly, this study identified a statistically significant association between pleurodesis success and the presence of hypertension, with hypertensive patients experiencing an 81.4% success rate ($p = 0.04$). Other variables, including age, gender, BMI, smoking status, diabetic status, duration of disease, residence type, socioeconomic status, and procedure time, did not show significant correlations with treatment outcomes. This pattern is consistent with earlier findings that failed to identify strong predictive factors for pleurodesis success based on patient demographics or pleural fluid characteristics (13,22). However, the association with hypertension observed in this cohort may reflect complex physiological interactions that warrant further exploration in larger, stratified studies. Comparative literature has highlighted differences between talc slurry and talc poudrage. A retrospective cohort analysis found that talc poudrage achieved a higher success rate at one month (85%) compared to slurry (68%), though this difference diminished by the third month (22). While talc poudrage appears advantageous in short-term outcomes, especially in non-thoracic MPE, the ease, cost-effectiveness, and safety of talc slurry make it a pragmatic choice, particularly in settings with limited thoracoscopic capabilities. Moreover, the current study's success rate for slurry pleurodesis falls within the expected range, underscoring its practical effectiveness in the real-world clinical setting.

One of the strengths of this study is its structured protocol, consistent procedural technique, and follow-up period, which enhances internal validity. All procedures were performed by a single team, minimizing operator variability. Additionally, the sample was drawn from a tertiary care oncology center, ensuring that all participants met rigorous diagnostic and treatment criteria. Nonetheless, the study is not without limitations. The single-center design restricts generalizability, and the sample size, while adequate for descriptive analysis,

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limits the statistical power to detect associations between certain covariates and treatment outcomes. The lack of data on histological subtypes of malignancy, pleural fluid cytology, and performance status further narrows the interpretability of results. Adverse effects and complications of pleurodesis were not recorded, which is a critical omission given the potential for talc-induced acute respiratory failure and other complications reported in prior studies (10,11). Additionally, survival outcomes beyond the 30-day post-procedure period were not assessed, precluding insights into long-term effectiveness or recurrence rates. Future studies should incorporate a multicenter design with larger, more diverse patient populations and extended follow-up durations. Comparative trials between talc slurry and poudrage in local settings, with stratification by malignancy type and pleural fluid profile, would also be valuable in optimizing treatment protocols. Furthermore, incorporating health-related quality of life measures and adverse event monitoring would provide a more comprehensive evaluation of pleurodesis efficacy. In summary, this study supports the effectiveness of talc slurry pleurodesis as a palliative intervention for MPE, with a 71% success rate observed in a local tertiary care setting. The findings contribute to the growing body of evidence favoring talc as a first-line sclerosing agent, particularly where access to thoracoscopy is limited. However, the importance of continued research to refine patient selection and procedural technique remains critical to improving outcomes in this vulnerable patient population.

CONCLUSION

This study concludes that talc pleurodesis is an effective palliative intervention for managing malignant pleural effusion, demonstrating its clinical value in relieving symptoms and controlling fluid accumulation. Among the variables assessed, hypertension emerged as the only significant factor influencing treatment success, suggesting a possible role in predicting outcomes. Other demographic, clinical, and procedural factors did not show a meaningful association. These findings underscore the importance of individualized patient assessment and contribute valuable insight for refining treatment strategies in routine oncology practice.

AUTHOR CONTRIBUTION

Author	Contribution
Iraj Shehzad*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Salma Muhammad Abbas	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Muhammad Usman Shabbir	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published

REFERENCES

1. Han C, Lee J, Cho JS, Ahn HY. Which is the More Effective Option for Pleurodesis to Prevent the Recurrence of Malignant Pleural Effusion? Large-Particle Talc or Mistletoe Extract (ABNOVA Viscum Injection). J Chest Surg. 2023;56(5):353-8.
2. Rodrigues A, Souza MEC, Moraes FCA, Lima DP, Carvalho RLC. Talc slurry versus thoracoscopic talc insufflation for malignant pleural effusion: a systematic review and meta-analysis. J Bras Pneumol. 2024;50(3):e20240115.
3. Wang L, Deng H, Chen X, Li C, Yi F, Wei Y, et al. Talc pleurodesis versus indwelling pleural catheter among patients with malignant pleural effusion: a meta-analysis of randomized controlled trials. World J Surg Oncol. 2020;18(1):184.
4. Ershadi R, Vahedi M, Zadeh HK, Fathi F, Ebrahimpour H, Zadeh JS, et al. Subcutaneous octreotide therapy for malignant pleural effusion after pleurodesis with talc powder: a placebo-controlled, triple-blind, randomized trial. Support Care Cancer. 2022;30(12):9833-40.

5. Markowiak T, Ried M, Großer C, Hofmann HS, Hillejan L, Hecker E, et al. Postoperative outcome after palliative treatment of malignant pleural effusion. Thorac Cancer. 2022;13(15):2158-63.
6. Mohs Z, DeVillers M, Ziegler S, Basson MD, Newman W. Management of Malignant Pleural Effusions in U.S. Veterans: A Retrospective Review. Ann Thorac Cardiovasc Surg. 2022;28(6):420-8.
7. Muthu V, Dhooria S, Sehgal IS, Prasad KT, Aggarwal AN, Agarwal R. Iodopovidone pleurodesis for malignant pleural effusions: an updated systematic review and meta-analysis. Support Care Cancer. 2021;29(8):4733-42.
8. Yeung M, Loh EW, Tiong TY, Tam KW. Indwelling pleural catheter versus talc pleurodesis for malignant pleural effusion: a meta-analysis. Clin Exp Metastasis. 2020;37(4):541-9.
9. Sivakumar P, Fitzgerald DB, Ip H, Rao D, West A, Noorzad F, et al. The impact of outpatient versus inpatient management on health-related quality of life outcomes for patients with malignant pleural effusion: the OPTIMUM randomised clinical trial. Eur Respir J. 2024;63(2).
10. Lovato JB, Laroumagne S, Tronchetti J, Nguyen NAT, Dutau H, Astoul P. Fast pleurodesis combining talc poudrage and indwelling pleural catheter for the management of recurrent malignant pleural effusions. Respir Med Res. 2024;86:101124.
11. Mercer RM, Macready J, Jeffries H, Speck N, Kanellakis NI, Maskell NA, et al. Clinically important associations of pleurodesis success in malignant pleural effusion: Analysis of the TIME1 data set. Respirology. 2020;25(7):750-5.
12. Lau EPM, Ing M, Vekaria S, Tan AL, Charlesworth C, Fysh E, et al. Australasian Malignant PLeural Effusion (AMPLE)-4 trial: study protocol for a multi-centre randomised trial of topical antibiotics prophylaxis for infections of indwelling pleural catheters. Trials. 2024;25(1):249.
13. Fitzgerald DB, Sidhu C, Budgeon C, Tan AL, Read CA, Kwan BCH, et al. Australasian Malignant PLeural Effusion (AMPLE)-3 trial: study protocol for a multi-centre randomised study comparing indwelling pleural catheter (±talc pleurodesis) versus video-assisted thoracoscopic surgery for management of malignant pleural effusion. Trials. 2022;23(1):530.
14. Gould Rothberg BE, Quest TE, Yeung SCJ, Pelosof LC, Gerber DE, Seltzer JA, et al. Oncologic emergencies and urgencies: A comprehensive review. CA: Canc J Clin. 2022;72(6):570-93.
15. Janes SM, Alrifai D, Fennell DA. Perspectives on the treatment of malignant pleural mesothelioma. N Engl J Med. 2021;385(13):1207-18.
16. Bashour SI, Mankidy BJ, Lazarus DR. Update on the diagnosis and management of malignant pleural effusions. Resp Med. 2022; 196:106802.
17. Dipper A, Jones HE, Bhatnagar R, Preston NJ, Maskell N, Clive AO. Interventions for the management of malignant pleural effusions: a network meta-analysis. Cochrane Database Syst Rev. 2020(4): CD010529.
18. Johnson KE, Popratiloff A, Fan Y, McDonald S, Godleski JJ. Analytic comparison of talc in commercially available baby powder and in pelvic tissues resected from ovarian carcinoma patients. Gynecol Oncol. 2020;159(2):527-33.
19. Chang Y, Cho D, Cho K, Cho M. Viscum pleurodesis is as effective as talc pleurodesis and tends to have less adverse effect. Support Care Canc. 2020; 28:5463-7.
20. Hassan M, Harriss E, Mercer RM, Rahman NM. Survival and pleurodesis outcome in patients with malignant pleural effusion–a systematic review. Pleura Peritoneum. 2021;6(1):20200147.
21. Guerra S, Ferro R, Conceição M, Cunha Â, António C, Torres AS. Outcomes of talc pleurodesis in malignant pleural effusion. Chest. 2020;157(6): A350.
22. Garcia YA, Palkar A, Koenig SJ, Narasimhan M, Mayo PH. Assessment of diaphragm function and pleural pressures during thoracentesis. Chest. 2020;157(1):205-11.