



A COMPARATIVE STUDY ON PLEURODESIS EITHER WITH DOXYCYCLINE OR POVIDONE-IODINE IN PATIENTS OF RECURRENT PLEURAL EFFUSION.

Respiratory Medicine

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ABSTRACT

Background: Recurrent pleural effusion (PE), often secondary to malignancy, poses a significant clinical burden due to its impact on respiratory function and quality of life. Pleurodesis remains a definitive palliative intervention aimed at preventing fluid reaccumulation through pleural symphysis. While doxycycline is a commonly used sclerosing agent, it is associated with variable success rates and notable adverse effects. Povidone-iodine has emerged as a cost-effective alternative with promising efficacy and a more favorable safety profile. This study aims to compare the efficacy, recurrence rates, and tolerability of doxycycline and povidone-iodine in chemical pleurodesis for recurrent pleural effusion. **Objectives:** To compare the efficacy and safety of doxycycline and povidone-iodine for pleurodesis in patients with recurrent pleural effusion. **Methods:** This prospective observational study was conducted at a tertiary care center in Rajasthan over one year. A total of 110 patients were randomly assigned to receive pleurodesis with either doxycycline (n=55) or povidone-iodine (n=55). Post-procedure recurrence, complications, and success rates were analyzed over a 90-day follow-up. **Results:** The success rate was higher in the povidone-iodine group (75%) compared to doxycycline (52.7%). Recurrence within 90 days was significantly lower with povidone-iodine (25%) than with doxycycline (47.6%). Pain and fever were more frequent in the doxycycline group. No cases of empyema or pneumothorax were observed in either group. **Conclusion:** Povidone-iodine is a safe, effective, and more tolerable alternative to doxycycline for pleurodesis, especially in low-resource settings.

KEYWORDS

Pleurodesis, Doxycycline, Povidone-iodine, Recurrent Pleural Effusion, Chemical Pleurodesis

INTRODUCTION

Recurrent pleural effusion (PE), the pathological accumulation of fluid in the pleural space, is a common and debilitating complication associated with various underlying conditions such as heart failure, infections, and, most frequently, malignancies like lung cancer, breast cancer, and lymphoma⁽¹⁾. Pleural effusion significantly impairs a patient's quality of life by causing symptoms such as dyspnea, chest pain, and chronic fatigue, which can severely limit daily activities and lead to emotional distress⁽²⁾.

For patients suffering from persistent or recurrent PE, **pleurodesis** is a critical therapeutic intervention designed to obliterate the pleural space and prevent further fluid accumulation⁽³⁾. This procedure involves the instillation of a chemical irritant, or sclerosing agent, into the pleural cavity to induce inflammation and subsequent fibrous adhesion between the visceral and parietal pleura⁽⁴⁾. While various agents have been explored for pleurodesis, the selection of the optimal sclerosing agent remains a subject of ongoing research due to differences in efficacy, recurrence rates, and patient tolerance.

Doxycycline, a tetracycline derivative, has historically been a commonly used agent for chemical pleurodesis due to its efficacy and broad availability⁽⁵⁾. However, studies have reported recurrence rates as high as 47.6% within 90 days and frequently associated side effects such as chest pain and fever, which can impact patient comfort and adherence to treatment⁽⁶⁾. In recent years, **povidone-iodine**, a cost-effective and widely accessible antiseptic, has garnered increasing attention as an alternative sclerosing agent. Preliminary evidence suggests that povidone-iodine may offer comparable efficacy with potentially lower recurrence rates (around 25%) and a more favorable side-effect profile, including reduced pain and fever, making it a compelling option, particularly in resource-limited settings⁽⁷⁾.

Despite the growing interest in povidone-iodine, a direct comparative analysis between doxycycline and povidone-iodine regarding their efficacy, recurrence rates, and safety in the management of recurrent PE is crucial to inform clinical decision-making. This study aims to bridge this knowledge gap by directly comparing these two commonly

used agents, with the hypothesis that povidone-iodine will demonstrate superior overall success and a more favorable side-effect profile.

MATERIALS AND METHODS:

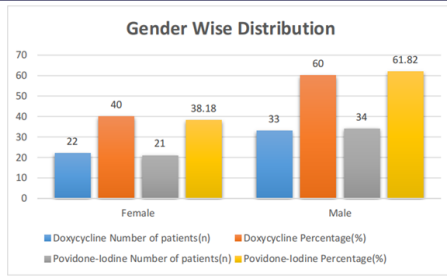
This prospective observational case study, conducted at the Department of Respiratory Medicine, Government Medical College, Kota, Rajasthan, from October 2023 to September 2024, investigated recurrent pleural effusion. The study included 110 inpatients with recurrent pleural effusion, excluding those unwilling to consent to procedures, hemodynamically unstable, pregnant, or with bleeding disorders. Patients were randomized to receive pleurodesis with either 20 mL of 10% povidone-iodine or 7 mg/kg of doxycycline, both diluted in 50 mL normal saline with 10 mL of 2% lidocaine.

After chest tube insertion and complete lung expansion, the mixture was injected, and the tube clamped for one hour. Patients were monitored for minor complications for three days and long-term complications (including recurrence) on days 30, 60, and 90. Detailed demographic, historical, and clinical data were collected from June 2023 to September 2024, and statistical analysis was performed using SPSS software, with significance set at $P < 0.05$.

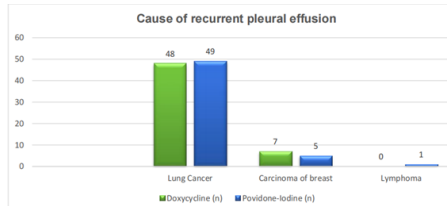
RESULTS:

Table 1. Age Distribution

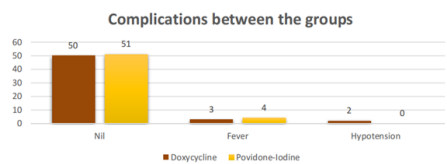
S.No	Age (in years)	Doxycycline		Povidone-iodine	
		Number of patients(n)	Percentage (%)	Number of patients(n)	Percentage (%)
1	31-40	0	0	3	5.45
2	41-50	3	5.45	19	34.54
3	51-60	23	41.81	20	36.36
4	61-70	28	50.93	11	20.02
5	71-80	1	1.81	2	3.63
Total		55	100	55	100



Graph 1: Bar graph representation of gender wise distribution



Graph 2: A pie chart representation of cause of pleural effusion and agents used for pleurodesis.



Graph3: Bar diagram showing complications of pleurodesis .

DISCUSSION:

This study investigated the comparative efficacy and safety of doxycycline and povidone-iodine for pleurodesis in recurrent pleural effusion (PE), a common complication in conditions like malignant pleural effusion (MPE) and pneumothorax (3). While both agents effectively induce pleural adhesion, the choice of sclerosing agent significantly impacts patient outcomes, including recurrence rates, side effects, and overall experience (1,8). Recent evidence suggests povidone-iodine might offer comparable efficacy with fewer side effects, especially in resource-limited settings (1,5,7).

Our findings on patient demographics align with established literature, showing no statistically significant differences in age or gender distribution between the doxycycline and povidone-iodine groups. Most patients were over 50 years old, consistent with the higher prevalence of age-associated malignancies (e.g., lung and breast cancers) that frequently cause recurrent PE (1,6,9,10). Lung cancer was the predominant cause of PE in both groups, followed by breast cancer, reflecting global trends and the significant burden of metastatic lung cancer requiring palliative pleurodesis (9,10).

Regarding efficacy, povidone-iodine demonstrated superior performance. Patients in the povidone-iodine group achieved pleurodesis significantly faster (mean 4.23 days vs. 5.8 days for doxycycline; p<0.001) and reported significantly lower chest pain scores (VAS mean 2.98 vs. 3.63 for doxycycline; p=0.015). These results are consistent with multiple comparative studies highlighting povidone-iodine's rapid action and favorable pain profile (7,9,10). The Mann-Whitney U test further reinforced these findings, showing significantly shorter time to pleurodesis (p<0.001) and lower VAS scores (p=0.031) with povidone-iodine, attributed to its balanced inflammatory response (1,11).

Both agents exhibited high overall success rates, with complete pleurodesis achieved in 96.36% of doxycycline patients and 98.2% of povidone-iodine patients, indicating comparable overall effectiveness (6,9). Furthermore, both treatments demonstrated similar safety profiles, with the vast majority of patients experiencing no complications (doxycycline 90.9%, povidone-iodine 92.72%). Minor complications like fever and hypotension were rare and not statistically different between groups (1,5).

CONCLUSION:

Both doxycycline and povidone-iodine are highly effective and safe for pleurodesis, povidone-iodine offers distinct advantages in

facilitating faster pleurodesis and reducing patient discomfort. These benefits, coupled with its comparable success rates and safety profile, suggest that povidone-iodine may be a preferable option for recurrent PE, particularly when prioritizing rapid recovery, patient comfort, and cost-effectiveness in diverse clinical settings.

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