

The Effects of the Pleural Interventions on Patients' Performance Status, Dyspnea, and Pain Scores in Patients Receiving Palliative Care

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ABSTRACT

Instruction : Palliative care units aim to improve the quality of life and alleviate symptoms in patients with serious illnesses. Dyspnea, a distressing symptom, can significantly impact patients' quality of life. While various methods are used to manage dyspnea in palliative patients, surgical interventions may be overlooked or underutilized due to patient-specific considerations. This study investigates the effects of pleural interventions on quality of life, dyspnea, and pain scores in palliative care patients.

Materials and Methods : This retrospective case series analyzed data from 213 patients treated in a palliative care service between May 2022 and May 2023. Patients who underwent pleural interventions for dyspnea control were included. Data on patient characteristics, pleural pathologies, type of intervention (thoracentesis, indwelling pleural catheter or tube thoracostomy), complications, modified Borg dyspnea scale, Karnofsky Performance Scale (KPS), and visual analog scale (VAS) scores were collected.

Results : A total of 21 patients met the inclusion criteria. Thoracentesis was the most commonly performed intervention. After pleural intervention, Borg dyspnea scale scores significantly decreased (5.9-3.2, $p<0.001$), while KPS scores significantly increased (32.4-40.9, $p<0.001$). No significant difference was observed in VAS scores (3.1-3.4, $p:0.25$). Complications were minimal, with a small number of patients experiencing iatrogenic pneumothorax or catheter infection.

Conclusions : This study highlights the importance of pleural interventions in managing dyspnea and improving symptom control-related performance in palliative care patients. Therapeutic thoracentesis, pleural catheter insertion, and chest tube placement have demonstrated effectiveness in alleviating dyspnea. Therefore, pleural interventions should not be avoided if indicated in palliative care patients accompanied by dyspnea. However, potential complications and limitations must be considered, and patient-specific factors should guide decision-making.

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Introduction

Palliative care plays a crucial role in providing comfort and support to individuals with serious illnesses in the advanced stages

of their lives (1, 2). These units adhere to the fundamental principles of palliative care, aiming to enhance patients' quality of life and alleviate symptoms such as pain, dyspnea, discomfort, and emotional distress (3, 4).

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Among the distressing symptoms experienced by these patients, dyspnea stands out due to its complex nature, difficulty in control, and potential to significantly impair quality of life. Dyspnea in this population is multifactorial, arising from complex interactions between physiological, psychological, and environmental factors. Pathophysiological mechanisms such as airway obstruction, lung parenchymal disease, pleural effusions, and cardiopulmonary comorbidities contribute to the development and exacerbation of dyspnea. Additionally, psychosocial factors, including anxiety, depression, and fear, further intensify the symptom burden experienced by patients.

While various treatment approaches, including oxygen therapy and pharmacological interventions, are commonly used to manage dyspnea in palliative care, the importance of considering surgical interventions like thoracentesis, pleural catheter or chest tube insertion for specific cases should not be overlooked (5). However, in palliative care patients with a limited life expectancy, the decision regarding surgical interventions requires careful consideration of the potential benefits and risks. Pleural interventions that play an important role in the management of various pleural diseases are typically aimed at relieving specific symptoms or addressing complications that significantly impact the patient's quality of life. However, due to the patient's overall health status, comorbidities, and the potential for intervention-related complications, a more conservative approach is often favored for palliative care patients. The primary goal is to optimize comfort and quality of life while minimizing unnecessary invasive procedures and their associated burdens. In these cases, a multidisciplinary team approach is crucial, involving the patient, their family, and healthcare professionals, to assess the potential benefits and risks of pleural interventions. Shared decision-making and clear communication are essential to ensure that the patient's preferences, values, and goals of care are thoroughly considered.

In our study, we aimed to reveal the effects of pleural intervention on patients' quality of life, dyspnea and pain scores by examining

the data of patients who were treated in the palliative care service and required pleural intervention for the control of dyspnea.

Materials and Methods

Study design and patient selection

This study was approved by the Institutional Review Board and informed consent was obtained from all patients or their legal guardians (Ethics Number: 80576354-050-99/324). This study was designed as a retrospective case series and analyzes were performed with routinely collected data.

The data of 213 patients who were treated in the palliative service clinic in Kars Harakani State Hospital between May 2022 and May 2023 were analyzed retrospectively. The hospitalization criteria for the palliative care service of our center are standard for all patients and are summarized in Table 1.

Effusions occupying more than 50% of a hemithorax on posterior-anterior chest radiography were classified as "large pleural effusion". Patients who had undergone pleural intervention such as thoracentesis, pleural catheter, chest tube, pleurodesis for pleural complications were included in the study. Pleural interventions not aimed at symptomatic recovery (e.g., diagnostic procedures) were excluded from the study.

The characteristics of the patients, pleural pathologies, type of pleural intervention, pleural intervention-related complications, dyspnea scores, QoL, VAS were recorded.

Pleural interventions

Therapeutic thoracentesis

In the presence of symptomatic large pleural effusion, thoracentesis was preferred as the first option. Therapeutic thoracentesis was not preferred in hepatic hydrothorax, in case of unexpandable lung and transudative pleural effusions, except for those resistant to medical treatment. Thoracentesis was performed under ultrasound guidance in cases with intrathoracic heterogeneous densities, pleural irregularity, or elevated diaphragm on thorax tomography. The posterior chest wall was preferred as the thoracentesis site in free-flowing pleural

effusions. In localized pleural effusions, the application site was determined under ultrasound guidance. It was aimed to drain 1000-1500 cc of pleural fluid at one time, but thoracentesis was terminated early in case of chest discomfort.

Pleural catheter

Indwelling pleural catheters are preferred in patients with refractory pleural effusions, recurrent malign pleural effusions and non-expandable lungs. It was preferred as the initial method, especially in palliative care patients with short survival expectations and short hospitalization demand.

Chest tube +/- pleurodesis

The chest tube was preferred in pneumothorax, empyema, malignant effusions planned for pleurodesis, and in the presence of massive pleural effusion caused a mediastinal shift. It was usually placed in a mid-axillary line between 4-5 intercostal spaces. Pleurodesis with sterile Talc powder was also performed in patients with malignant pleural effusion with a medium-long life expectancy.

Although the basic criteria as mentioned above were considered in the choice of

pleural intervention method, the expectations and demands of the patients and their relatives and the expected life expectancy of the patients were effective in the decision-making process.

Evaluation criteria

In our study, the effects of pleural interventions on the patient were evaluated in terms of pain, dyspnea and quality of life. The analgesic ladder strategy recommended by the World Health Organization was used in the pain management of the patients and the visual analog scale (VAS) which pain can be measured on a scale of 0 to 10, with 0 representing no pain and 10 representing the worst imaginable pain was preferred to measure pain intensity (6). The modified Borg dyspnea scale was used to measure dyspnea. The scale ranges from 0 to 10, with 0 representing no breathlessness or exertion and 10 indicating extreme breathlessness or maximal exertion (7). Karnofsky Performance Scale (KPS) was used to evaluate overall quality of life and functional status of the patient (8). The data of these three scales were recorded retrospectively and the values before and after pleural intervention were compared.

Table 1. Hospitalization criteria for the palliative care unit.

Criteria*	Description
Terminal or Life-Limiting Illness	Patients with advanced or progressive illnesses, such as cancer, heart failure, chronic obstructive pulmonary disease (COPD), advanced dementia, or end-stage renal disease.
Complex Symptom Management	Patients experiencing difficult-to-control symptoms, such as severe pain, uncontrolled nausea or vomiting, breathlessness, anxiety, or depression.
Functional Decline	Patients who have experienced a significant decline in their functional abilities, such as difficulty with activities of daily living or mobility.
Complex Social or Family Situations	Individuals with complex social circumstances, such as limited social support, strained family dynamics, or challenging living conditions.
Prognosis	While palliative care can be provided alongside curative treatments, admission to a palliative care unit often occurs when the patient has a limited life expectancy, typically within the range of weeks to months.

* It should be noted that the criteria for the need for palliative care, unlike other fields of medicine, do not consist of quantitative solid medical parameters. In the palliative care unit where this study was carried out, although the basic criteria in this table were taken into account for patient admission, there were also cases that were decided on a patient-specific basis.

Statistical analyses

Statistical analysis was performed using SPSS 28.0 (SPSS Inc., Chicago, IL, USA). Continuous variables expressed as mean value \pm standard deviation (SD) while categorical variables were presented as counts and percentages. The Shapiro-Wilk test was used to test of normality. Except for age, since the continuous variables in our study were normally distributed, the Student's T test was used to compare these variables. Statistical significance was set at P-value < 0.05 (All P values presented were 2-sided).

Results

A total of 21 patients who met the criteria were included in the study. There were 15 males and 6 females. The mean age was 75.3 ± 11.9 , the median age was 77 years (range: 45-92). Characteristics of the patients were summarized in Table 2. Malignant conditions constituted the majority of the

etiologies (n=8, 38.1%). The most common main complaint as the cause for hospital admission was dyspnea (n=7, 33.3%). In addition, other common complaints were pain, nutritional issues, and pressure ulcers. The most common pathology requiring pleural intervention was large pleural effusion and the most preferred pleural intervention was thoracentesis (n=10, 47.6%). When the VAS, Borg dyspnea scale and KPS and scores of the patients at hospitalization and on the 1st day after pleural intervention were compared, there was no significant difference between pain scores, but it was found that the mean dyspnea score was lower, and the mean performance score was higher after pleural intervention (p values are 0.25, <0.001 and <0.001 respectively) (Figure 1).

Among the 10 patients who underwent thoracentesis, 2 patients developed iatrogenic pneumothorax. In these patients, the pneumothorax was small and regressed with oxygen therapy without the need for chest tube placement.

Table 2. Baseline patient characteristics.

Variables	N
Age (mean \pm SD)	75.3 \pm 11.9
Sex (male, %)	15 (71.4)
Main diagnosis (n, %)	
Malignancy	8 (38.1)
Dementia	5 (23.8)
Cerebrovascular accident	6 (28.6)
COPD	2 (9.5)
Main complaint (n, %)	
Dyspnea	7 (33.3)
Nutritional issues \pm pressure ulcer	6 (28.6)
Pain	4 (19.0)
Changes in behavior or general condition	4 (19.0)
Pleural complication (n, %)	
Large pleural effusion	14 (66.7)
Malign pleural effusion	3 (14.3)
Empyema	2 (9.5)
Pneumothorax	2 (9.5)
Pleural intervention (n, %)	
Thoracentesis	10 (47.6)
Indwelling pleural catheter	5 (23.8)
Tube thoracostomy	6 (26.6)

The indwelling pleural catheter was placed in 5 patients. The mean drainage time was found to be 10.2 ± 8.9 days and no catheter-related complications were observed, except for the catheter infection, which was observed in one of the patients and regressed with antibiotherapy.

The mean drainage time was 6.3 ± 3.1 in 6 patients who underwent chest tube placement. Among these patients, talc pleurodesis was performed in 2 patients with a diagnosis of malignant pleural effusion. No chest tube or pleurodesis related complications were encountered.

Discussion

Dyspnea, or shortness of breath, is a distressing symptom frequently encountered in palliative care patients. This study aimed to examine the utilization and effectiveness of pleural interventions, including thoracentesis, pleural catheter insertion, and chest tube placement, in the management of dyspnea in palliative care patients.

Our findings highlight the significance of pleural interventions in alleviating dyspnea and improving symptom control-related performance status in palliative care patients. Therapeutic thoracentesis, the removal of pleural fluid, has been extensively utilized as an effective intervention to relieve dyspnea

associated with pleural effusions. This procedure offers rapid relief by reducing the volume of pleural fluid and restoring lung expansion (9). The results of our study align with previous research, demonstrating the positive impact of thoracentesis on dyspnea scores and overall quality of life in palliative care settings (10,11).

Pleural catheter insertion, also known as indwelling pleural catheter (IPC) placement, provides an alternative approach for managing dyspnea in patients with recurrent pleural effusions. By allowing ongoing drainage of pleural fluid, IPCs offer symptomatic relief and enhance patient comfort (12). Our study supports the effectiveness of pleural catheters in dyspnea management, with patients reporting improved dyspnea scores and a reduction in hospital admissions for thoracentesis (13).

In cases where pleural fluid drainage is required for a more extended period or in patients with trapped lung, the placement of a chest tube may be considered. Chest tubes facilitate the drainage of large or loculated pleural effusions and provide sustained relief from dyspnea (14). Although chest tube placement is typically associated with more invasive measures, it can offer effective palliation for selected patients, particularly those with significant symptom burden and limited prognosis.

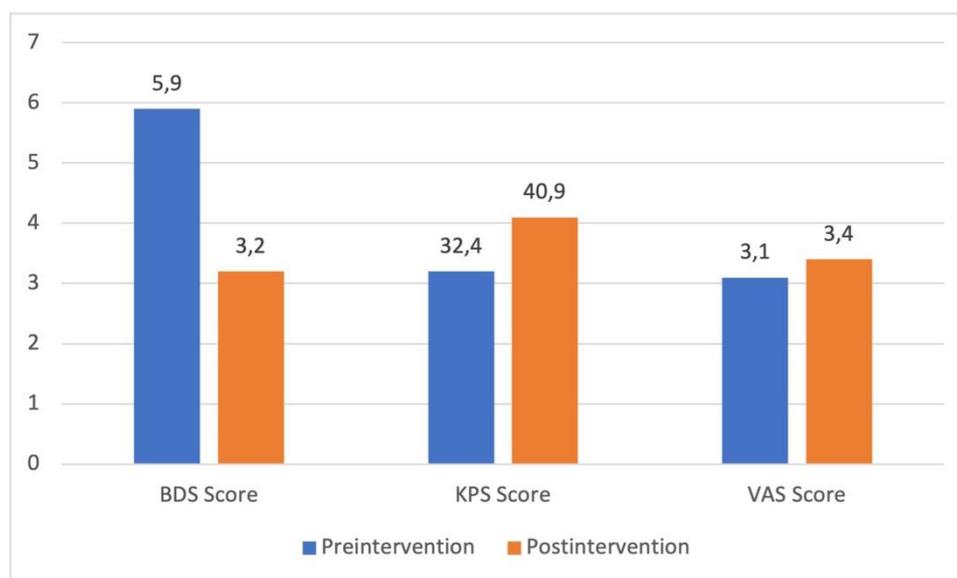


Figure 1. Comparison of mean BDS, KPS, and VAS scores between pre- and post-pleural intervention.

BDS: Borg Dyspnea Scale, **KPS:** Karnofsky Performance Scale, **VAS:** Visual Analogue Scale.

*(p values are <0.001, <0.001 and 0.25 respectively)

While pleural interventions demonstrate efficacy in dyspnea management, it is important to recognize potential complications and limitations associated with these procedures. Thoracentesis carries the risk of pneumothorax, infection, and bleeding, although the overall complication rate is relatively low (15). Pleural catheters and chest tubes, on the other hand, may be associated with complications such as infection, occlusion, and discomfort at the insertion site (12, 16). Patient selection, careful procedural planning, and appropriate monitoring are essential to minimize these risks.

The decision to pursue pleural interventions should be made through collaborative discussions involving the patient, their family, and the multidisciplinary palliative care team. It is vital to consider the patient's overall goals of care, prognosis, and individual preferences when deciding on the appropriate intervention. In palliative care, the primary focus is on optimizing comfort and quality of life rather than curative measures. Therefore, pleural interventions should be tailored to the specific needs and values of each patient.

Limitations

The main limitation of this study is its retrospective design, which relies on the availability and accuracy of existing medical records belongs palliative care patients. Despite efforts to ensure data quality and accuracy, the retrospective nature of the study introduces inherent limitations. In addition, the relatively short study period is another important limitation as it affects the sample size. Finally, our study includes data from a heterogeneous patient group. The etiologies of pleural complications and the methods of pleural interventions vary among patients. The results obtained in this study should be validated by studying homogeneous subgroups within larger patient populations.

Conclusion

In conclusion, pleural interventions, including thoracentesis, pleural catheter

insertion, and chest tube placement, offer valuable options for managing dyspnea in palliative care patients with pleural pathologies. These interventions have demonstrated effectiveness in providing rapid and sustained relief, improving dyspnea scores, and enhancing overall quality of life. However, the potential risks and limitations associated with these procedures should be carefully considered, and individualized decision-making should be employed in collaboration with the patient and their family.

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