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The Effect of Right Lateral Positioning Compared to Semi-Fowler on Oxygenation and Comfort in Patients with Dyspnea Due to Cardiomegaly: An Experimental Study

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Abstract

Aims and Objectives:
This study aimed to investigate the effect of right lateral positioning compared to the semi-Fowler position on oxygenation (PO_2), respiratory rate, and perceived comfort in patients with dyspnea due to cardiomegaly.

Background:
Dyspnea is a common clinical manifestation in patients with cardiomegaly, often resulting from pulmonary congestion and mechanical compression of the lungs caused by an enlarged heart. While semi-Fowler positioning is frequently used to alleviate breathing difficulties, alternative positions, such as the right lateral position, may offer distinct physiological advantages by improving ventilation-perfusion matching and reducing intrathoracic pressure.

Design:
A single-group, pre-post experimental design was conducted to explore the impact of right lateral positioning on key respiratory parameters.

Methods:
A total of 150 hospitalized patients diagnosed with cardiomegaly and experiencing episodes of dyspnea participated in this study. During episodes of mild to moderate dyspnea, patients were instructed to lie in a right lateral position using a pillow for support and comfort. This intervention was performed 3 to 4 times daily, depending on patient need, over a 7-day observation period. Data were collected before and after the intervention, including arterial oxygen partial pressure (PO_2), respiratory rate, breathing pattern (via direct observation), and subjective comfort (using a 5-point Likert scale). Paired t-tests were used to compare the outcomes pre- and post-intervention.

Results:
After one week of intervention, a statistically significant improvement was observed in PO_2 levels (mean increase of 10.7 mmHg) and a decrease in respiratory rate (mean reduction of 5.7 breaths/min). Breathing patterns became more regular and deeper, and 85% of patients reported higher comfort scores while in the right lateral position. These findings suggest that this positioning may facilitate better lung expansion and enhance gas exchange, possibly due to decreased pulmonary compression and improved perfusion.

Conclusions:

Right lateral positioning appears to be an effective non-pharmacological intervention for improving oxygenation, respiratory function, and comfort in patients with dyspnea secondary to cardiomegaly. This simple and low-cost technique can be easily incorporated into daily nursing care.

Key words: oxygenation; cardiomegaly; respiratory

Introduction:

Cardiomegaly, or an enlarged heart, is a common pathological condition resulting from a variety of cardiovascular disorders, including hypertension, heart valve disease, and cardiomyopathy. It is often associated with compromised cardiac function and reduced pulmonary compliance, leading to symptoms such as dyspnea, fatigue, and orthopnea (McDonagh et al., 2021). Dyspnea in particular is a distressing and frequent symptom experienced by patients hospitalized with cardiomegaly and is often exacerbated by pulmonary congestion and impaired oxygen exchange (Yancy et al., 2017).

In clinical practice, the semi-Fowler position has long been used as a non-pharmacological intervention to relieve dyspnea by reducing diaphragmatic pressure and facilitating lung expansion (Stillwell & Powers, 2019). However, alternative positioning strategies, such as the right lateral decubitus position, may offer additional physiological benefits. This position is believed to optimize ventilation-perfusion (V/Q) matching by promoting more even distribution of airflow and blood flow, especially in patients with asymmetric cardiac or pulmonary pathology (West, 2012).

The right lateral position may also reduce the compressive effect of an enlarged heart on the left lung, thereby improving gas exchange efficiency and increasing oxygen saturation. Additionally, lateral positioning has been associated with increased functional residual capacity and better diaphragmatic excursion in patients with compromised respiratory function (Smetana & Shmerling, 2002).

Despite its potential advantages, the right lateral position is underutilized in daily clinical care, possibly due to limited empirical evidence supporting its efficacy in patients with cardiomegaly. Therefore, it is important to explore non-invasive, simple interventions that can be easily implemented by nurses at the bedside to improve patient comfort and physiological outcomes. This study was designed to evaluate the effect of right lateral positioning compared to the commonly used semi-Fowler position in patients experiencing dyspnea secondary to cardiomegaly. The primary outcomes measured were oxygenation (PO_2), respiratory rate, and subjective comfort level. Findings from this study may provide an evidence base for incorporating right lateral positioning as a routine nursing intervention in cardiology units.

Methods:

Design

This study employed a quantitative experimental design using a one-group pre-post intervention approach to evaluate the effect of right lateral positioning on oxygenation (PO_2), respiratory rate, and comfort in patients with dyspnea due to cardiomegaly. This design is appropriate for evaluating interventions where randomization may be ethically or practically challenging in a clinical care setting (Polit & Beck, 2021).

Setting and Participants

The study was conducted in a medical ward of a tertiary hospital in North Sulawesi, Indonesia, over a three-month period. A total of 150 patients diagnosed with cardiomegaly and experiencing dyspnea were recruited using a purposive sampling technique. Inclusion criteria were: (1) age ≥ 18 years, (2) clinical and radiological diagnosis of cardiomegaly, (3) ability to lie laterally without assistance, and (4) experiencing mild to moderate dyspnea based on a visual analog scale (VAS 3–7). Patients with unstable hemodynamics, spinal deformities, or other contraindications to lateral positioning were excluded.

Intervention:

Patients were instructed to assume a right lateral decubitus position during episodes of dyspnea. Each session lasted approximately 20–30 minutes, performed 3–4 times per day for seven consecutive days. A pillow was provided for abdominal support to enhance comfort and relaxation. The intervention was nurse-facilitated, and patients were encouraged to adopt the position voluntarily when experiencing shortness of breath. No pharmacological agents were modified during the observation period to isolate the effect of the positioning intervention.

Measurements:

Primary outcome measures included:

- Oxygenation (PO_2): Measured using a portable arterial blood gas analyzer before and after the intervention (morning and evening).
- Respiratory Rate (RR): Manually counted over one minute by trained nurses at baseline and post-intervention.
- Comfort Level: Assessed using a validated 5-point Likert scale adapted from patient comfort tools used in clinical practice (Williams et al., 2019).
- Breathing pattern (e.g., shallow, rapid, labored vs. regular) was also documented through observational checklist notes

by two independent assessors to minimize bias. All nurses received training on standardized data collection procedures.

Data Analysis:

Descriptive statistics were used to summarize demographic and baseline clinical data. Paired t-tests were used to analyze the differences in PO_2 and RR pre- and post-intervention. Wilcoxon signed-rank tests were applied for ordinal variables such as comfort level scores. A p-value of <0.05 was considered statistically significant. Data were analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY).

Ethical Considerations:

The study received ethical approval from the hospital's research ethics committee (Approval No: 245/2024). Informed consent was obtained from all participants prior to data collection. Patient confidentiality and the right to withdraw from the study at any point were fully respected.

Results:

A total of 150 patients completed the 7-day intervention protocol. The mean age of participants was 56.4 years (SD ± 10.7), with 52% being male. All patients had a confirmed diagnosis of cardiomegaly and reported at least moderate dyspnea (VAS score ≥ 4) prior to intervention. No adverse events related to the right lateral positioning were recorded.

Effect on Oxygenation (PO_2):

There was a statistically significant increase in arterial oxygen partial pressure (PO_2) following the right lateral positioning intervention. Mean PO_2 increased from 68.2 mmHg (SD ± 6.4) at baseline to 78.9 mmHg (SD ± 7.1) on day seven ($p < 0.001$). This improvement suggests enhanced pulmonary gas exchange.

Effect on Respiratory Rate:

Participants demonstrated a reduction in respiratory rate, decreasing from a mean of 26.3 breaths/minute (SD ± 3.1) at baseline to 20.6 breaths/minute (SD ± 2.8) at the end of the observation period ($p < 0.001$). The observed change corresponds with more efficient breathing and decreased work of breathing.

Comfort Level:

Patient-reported comfort levels significantly improved. Before the intervention, only 18% rated their comfort as “comfortable” or “very comfortable,” whereas this increased to 85% by the end of the study ($p < 0.001$, Wilcoxon signed-rank test). Most patients attributed their increased comfort to the support provided by the right lateral posture and the use of a pillow.

Breathing Pattern:

Clinical observation revealed a shift from shallow, rapid breathing in 70% of patients at baseline to regular and deeper breathing in 76% of patient’s post-intervention. This change was subjectively associated with decreased chest tightness and fatigue. These findings align with previous nursing studies highlighting the physiological benefits of body positioning to enhance respiratory function in hospitalized patients (Coyer et al., 2013; Yu et al., 2016).

Outcome Variable	Baseline (Mean ± SD)	Day 7 (Mean ± SD)	*p*-value
Arterial PO_2 (mmHg)	68.2 ± 6.4	78.9 ± 7.1	< 0.001
Respiratory Rate (bpm)	26.3 ± 3.1	20.6 ± 2.8	< 0.001
Comfort Score (1–5 scale)	2.1 ± 0.6	4.3 ± 0.5	< 0.001

Table 1: *Clinical Outcomes Before and After Right Lateral Positioning (N = 150)*

Note: Paired *t*-test was used for continuous variables; Wilcoxon signed-rank test was applied for ordinal comfort scores.

The results presented in Table 1 demonstrate clinically and statistically significant improvements in all measured outcomes

following the implementation of the right lateral positioning intervention in patients with dyspnea due to cardiomegaly.
Firstly, the increase in arterial oxygen pressure (PO_2) from 68.2 mmHg to 78.9 mmHg indicates enhanced pulmonary oxygenation. This change may be attributed to improved ventilation-perfusion matching and reduced cardiac compression on the pulmonary structures when patients are in the right lateral position. The findings suggest that this position allows better alveolar recruitment, especially in the left lung, which is often compromised due to the mechanical shift caused by an enlarged heart.
Secondly, the reduction in respiratory rate from 26.3 to 20.6 breaths per minute reflects a decrease in respiratory distress and work of breathing. Slower respiratory rates generally indicate improved gas exchange and respiratory efficiency, supporting the notion that right lateral positioning can reduce dyspnea severity.
Thirdly, the comfort score increased significantly, from a mean of 2.1 to 4.3 on a 5-point scale. This suggests that the right lateral position was not only physiologically beneficial but also well-tolerated and preferred by patients. The use of a supporting pillow for comfort may have further contributed to this positive perception, aligning with nursing practices that promote patient-centered care and non-pharmacological symptom management.
Taken together, these findings support the right lateral position as a simple, low-cost, and effective nursing intervention for patients with cardiomegaly experiencing dyspnea. The physiological benefits observed are consistent with the literature, which underscores the role of strategic patient positioning in optimizing oxygenation and comfort (Coyer et al., 2013; Yu et al., 2016).

Discussion

This study demonstrates that right lateral positioning is a simple and effective intervention to improve oxygenation, reduce respiratory rate, and enhance comfort in patients experiencing dyspnea due to cardiomegaly. These findings are consistent with previous literature emphasizing the importance of body positioning as a non-pharmacological approach in the management of respiratory distress.
The significant improvement in PO_2 levels suggests that the right lateral decubitus position may optimize pulmonary ventilation by reducing cardiac compression on the lungs, particularly the left lung. In patients with cardiomegaly, the enlarged heart can shift mediastinal structures and limit lung expansion. Right lateral positioning may reduce this effect and facilitate better alveolar ventilation, especially in gravity-dependent lung regions (Yu et al., 2016). This aligns with prior studies in respiratory and intensive care units where lateral positioning was associated with improved gas exchange and oxygen saturation (Coyer et al., 2013).
The reduction in respiratory rate indicates a decreased work of breathing, which can be particularly meaningful in cardiomegaly patients who often experience fatigue and exertional dyspnea. A lower respiratory rate not only reflects improved pulmonary function but also points to an enhanced feeling of respiratory control and reduced anxiety during dyspneic episodes (Williams et al., 2019). This supports earlier findings that individualized nursing care, including frequent repositioning and comfort measures, plays a crucial role in enhancing patient outcomes in cardiopulmonary care (Richardson et al., 2021).
The subjective improvement in comfort reported by patients reinforces the value of nurse-led interventions in managing symptoms beyond pharmacologic treatments. The use of a pillow to support the body in the right lateral position likely contributed to this outcome by increasing postural stability and decreasing musculoskeletal strain, which is particularly important for elderly or frail patients (Duffy et al., 2018).
Notably, this intervention is low-cost, easy to implement, and can be incorporated into routine nursing care without requiring specialized equipment or additional personnel. The flexibility of allowing patients to assume the position at their own discretion further increases adherence and feasibility in real-world settings.
While the findings are promising, this study also has limitations. The lack of a control group using semi-Fowler or supine positions prevents a direct comparative analysis. Moreover, the reliance on subjective measures of comfort may introduce bias despite the use of validated scales. Future studies using randomized controlled designs and objective respiratory function tests, such as spirometry or imaging, are recommended to further validate these results.
Nonetheless, this study contributes valuable evidence to the growing body of literature supporting non-pharmacological nursing interventions in cardiopulmonary care. Incorporating patient positioning strategies such as the right lateral decubitus position could be considered a best practice in nursing protocols for managing dyspnea in cardiomegaly patients.

Conclusion:

This study demonstrates that right lateral positioning is a beneficial non-pharmacological nursing intervention for patients with dyspnea due to cardiomegaly. The intervention significantly improved arterial oxygenation, reduced respiratory rate, and enhanced patient comfort without adverse effects. These findings suggest that simple body positioning can play a critical role in optimizing respiratory function and improving the quality of care for patients with cardiac enlargement.
Given its ease of application, low cost, and high patient acceptability, the right lateral position should be considered as part of routine nursing practice in managing respiratory symptoms associated with cardiomegaly. Further research using randomized controlled trials is recommended to strengthen the evidence base and explore the long-term effects of this intervention on clinical outcomes.

Relevance to Clinical Practice:

The findings from this study provide strong support for the integration of right lateral positioning as a routine nursing

intervention in the care of patients with dyspnea related to cardiomegaly. As a low-cost, non-invasive, and nurse-led strategy, this positioning technique offers a practical solution to enhance oxygenation and relieve respiratory discomfort without the need for pharmacologic interventions or advanced equipment.

Nurses play a central role in the continuous assessment and management of patient comfort and respiratory status. By adopting evidence-based repositioning techniques such as the right lateral position, nurses can actively contribute to improved clinical outcomes, patient satisfaction, and overall quality of care. This intervention is especially valuable in settings with limited resources, where simple yet effective strategies are essential.

The results emphasize the importance of empowering nursing staff through education and clinical protocols that support individualized and responsive care for cardiopulmonary patients.

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