ORIGINAL RESEARCH

Impact of Early Rehabilitation Nursing on Postoperative Cardiac Function and Quality of Life in Patients with Atrial Fibrillation

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ABSTRACT

Background • Radiofrequency ablation, a widely utilized minimally invasive surgery for atrial fibrillation treatment, has certain latent risks, including a high postoperative recurrence rate and various complications. Therefore, nursing intervention plays a pivotal role in the rehabilitation process after radiofrequency ablation.

Objective • This study aims to investigate the impact of rehabilitation nursing on postoperative cardiac function and quality of life in patients with atrial fibrillation.

Methods • A total of 156 atrial fibrillation patients who underwent radiofrequency ablation and were admitted to our hospital from June 2018 to June 2023 were randomly assigned to either the control group or the research group. The control group received routine nursing, while the research group received early rehabilitation nursing in addition to routine care. A comparative analysis was conducted on cardiac function, hospital stay, incidence of complications, emotional well-being, sleep quality, overall quality of life, and nursing satisfaction between the two groups.

Results • In comparison to the control group, the research group exhibited an elevation in left ventricular ejection fraction, along with a reduction in left ventricular end-systolic diameter and left ventricular end-diastolic dimension ($P < .05$). Moreover, the research group demonstrated a shorter hospital stay and a lower incidence of complications compared to the control group ($P < .05$). Following nursing intervention, anxiety and depression scores, as well as sleep quality scores, were lower in the research group than in the control group ($P < .05$). Additionally, quality of life scores and nursing satisfaction were higher in the research group than in the control group ($P < .05$).

Conclusions • Early rehabilitation nursing emerges as a valuable intervention, expediting the recovery of postoperative cardiac function and enhancing the overall quality of life in atrial fibrillation patients. These findings emphasize its clinical significance. (*Altern Ther Health Med.* [E-pub ahead of print.])

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INTRODUCTION

Atrial fibrillation (AF) stands as a prevalent arrhythmia marked by the disruption of regular atrial electrical activity, replaced by chaotic AF waves, consequently inducing ectopic arrhythmia.[1] Following the onset of AF, patients experience diastolic and contraction disorders in the atria, leading to a diminished pumping function of the heart. This reduction in cardiac efficiency can lead to cardiac insufficiency and thromboembolism, posing a serious threat to the lives of patients and necessitating prompt intervention.[1,2]

The primary focus in treating patients with AF is the critical need to facilitate the restoration and long-term maintenance of sinus rhythm. The inherent limitations of conventional antiarrhythmic drugs, displaying limited efficacy in this context, underscore the urgency for more effective treatment approaches.[3,4] Radiofrequency ablation emerges as an effective intervention, alleviating AF symptoms by impeding the pathway of disordered electrical impulses in the left atrium.[5]

However, the use of radiofrequency ablation in AF treatment may induce pain, posing an elevated risk of adverse events and subsequently impacting the patient's quality of life.[6] Therefore, implementing nursing measures post-operation and initiating early rehabilitation exercises prove pivotal for a positive prognosis. Early rehabilitation

nursing represents a contemporary model in the realm of rehabilitation nursing, becoming more recognized and utilized in clinical practices for disease rehabilitation in recent years.[7] The focus of early rehabilitation nursing is on brain plasticity and functional reorganization.

In the implementation of diverse training and nursing methods, early rehabilitation nursing stands out for its significant application value in reducing treatment duration and enhancing overall prognosis, guided by the principle of people-oriented care.[8] Concurrently, early rehabilitation nursing aims to expedite the restoration of various bodily functions, boost patients' heart function, and lower the occurrence of complications.[9]

Therefore, our study was designed to investigate the impact of early rehabilitation nursing on the postoperative cardiac function and quality of life of patients with atrial fibrillation to enhance patient care.

DATA AND METHODS
Study Design
An observational comparative study was conducted, and a total of 156 AF patients who underwent radiofrequency ablation at our hospital from June 2018 to June 2023 were selected. Patients were randomly divided into a control group (CG) and a study group (SG), each comprising 78 cases.

Inclusion And Exclusion Criteria
Inclusion criteria were as follows: (1) All patients meeting the diagnostic criteria for AF; (2) Patients meeting the indications for radiofrequency ablation; (3) Patients in a conscious state whose postoperative vital signs were stable; (4) All patients gave informed consent to this study and signed informed consent. Exclusion criteria were as follows: (1) Patients with mental illness; (2) Complicated with other heart, brain, lung, liver, kidney, and other important organ function lesions; (3) Complicated with congestive heart failure and fatal arrhythmia, were excluded from this study.

Standard Nursing Care in the Control Group (CG)
The CG received standard nursing care, which encompassed effective breathing guidance, health education, disease monitoring, dietary guidance, pre-and post-surgery psychological counseling, and other routine daily nursing interventions.

Early Rehabilitation Nursing in the Study Group (SG)
The SG received early rehabilitation nursing in alignment with the CG. Patients were directed to engage in tailored rehabilitation training corresponding to distinct postoperative recovery phases, namely the postoperative decumbent period, postoperative sitting period, and postoperative standing period.

Rehabilitation Activities During the Initial Postoperative Period. In the postoperative decubitus period (1-2 days after surgery), patients were instructed in abdominal breathing and deep breathing exercises. Additionally, they were guided and assisted in performing flexion, extension, inversion, and rotation of the wrist, elbow, ankle, and knee joints, along with grasp exercises for the hands. Each movement was repeated 10-15 times, 2-3 times a day, with individual adjustments made based on the patient's subjective fatigue level.

Rehabilitation Activities During Postoperative Sitting Period. The intermediate postoperative period started from 3-4 days after surgery. Based on the exercises from the lying period, patients were instructed to intensify lower limb exercises, with a particular emphasis on quadriceps exercises. It involved contracting the muscles above the thigh while extending the knee joint as far as possible. Patients performed a push-off action, holding for 5 seconds each time before relaxing. Each repetition of this action was done 10-15 times, 2-3 times a day. Individual adjustments were made based on the patient's subjective fatigue level.

Rehabilitation Activities During the Advanced Postoperative Period. (1) Postoperative standing stage I (5~7 days after surgery): Building on previous exercises, this stage included increased upper limb activities such as wall climbing and combing actions. Patients progressed from bedside activities to standing beside the bed and gradually engaged in walking, with the walking distance controlled between 35 and 100 meters. Individual adjustments were made based on the patient's subjective fatigue level. If uncomfortable symptoms like chest tightness or shortness of breath arose, the activity was immediately halted.

(2) Postoperative standing stage II (7 days after surgery to discharge): Continuing limb exercises, the activity distance increased to 160~200 meters. Patients incorporated appropriate stair climbing exercises with the height limited to one floor.

Observation Indicators
Cardiac Function Assessment. Observation included the evaluation of left ventricular ejection fraction (LVEF), left ventricular end-systolic diameter (LVESD), and left ventricular end-diastolic dimension (LVEDD).

Patient Outcomes Analysis. We examined the length of hospital stay and the incidence of complications in both groups. The analysis encompassed various complications, including infection, pressure sores, and deep vein thrombosis.

Depression and Anxiety Assessment. The Self-rating Depression Scale (SDS) and Self-rating Anxiety Scale (SAS) were employed to evaluate the degree of depression and anxiety,[10] with both scales having a total score of 100 points. The score was proportionate to the severity of depression and anxiety.

Sleep Quality Measurement. The Pittsburgh Sleep Quality Index (PSQI)[11] scale was utilized to measure sleep quality, with scores ranging from 0 to 21. The score was inversely correlated with the quality of sleep.

Quality of Life Assessment. Quality of life was primarily assessed using the 36-item short-form (SF-36) questionnaire.[12] The questionnaire covered various aspects, including social function, physiological function, vitality, physical activities,

emotional function, physical pain, general health, and mental health. The total score was capped at 100 points, with higher scores indicating an enhanced quality of life.

Patient Satisfaction Assessment. To gauge the satisfaction levels of both groups with the provided service, we employed the self-designed Nursing Satisfaction Questionnaire. The scoring system ranged from 0 to 100, where a score of 90 to 100 indicated satisfaction, 80 to <90 denoted basic satisfaction, and <80 reflected dissatisfaction. The overall satisfaction rate was calculated using the formula: Total Satisfaction Rate = (Number of Satisfied Cases + Number of Basically Satisfied Cases)/Total Number of Cases ×100%

Statistical Analysis

The data were processed using SPSS 23.0 statistical software (IBM, Armonk, New York, USA). Measurement data were presented as mean ± standard deviation ($\bar{x} \pm s$) and compared using the t test. Categorical data were represented by the number of cases (n) and percentages, with group differences assessed by the χ^2 test. A significance level of $P < .05$ was considered statistically significant.

RESULTS
Comparison of Baseline Characteristics

In the CG, there were 46 men and 32 women, ranging in age from 47 to 68 years, with a mean age of 57.50±7.66 years. The SG consisted of 44 men and 34 women, aged from 46 to 67 years, with a mean age of 57.56±7.71 years. No significant differences were observed in the general patient data between both groups ($P > .05$).

Cardiac Function Comparison in Both Groups

As illustrated in Figure 1, the LVEF, LVESD, and LVEDD in the RG were (50.31±5.03)%, (43.12±4.32) mm, and (58.24±5.84) mm, respectively. In the CG, these values were (41.08±4.12)%, (57.25±5.73) mm, and (67.26±6.73) mm, respectively. Comparatively, the LVEF in the RG was higher, while LVESD and LVEDD were lower than those in the CG ($P < .05$).

Hospital Stay and Incidence of Complications in Both Groups

As depicted in Figure 2 and detailed in Table 1, the hospital stay and the incidence of complications in the RG were (4.13±0.14) days and 2.56%, respectively, while those in the CG were (6.52±0.66) days and 10.26%, respectively. In comparison with the CG, the RG exhibited a shorter hospital stay and a reduced incidence of complications ($P < .05$).

### Comparison of Emotional Well-being in Both Groups

As illustrated in Figure 3, no significant differences in SAS and SDS scores were observed between the two groups prior to nursing ($P > .05$). After the nursing intervention, the SAS and SDS scores in the RG were (36.23±3.64) points and (30.47±3.05) points, respectively, while those in the CG were (45.12±4.52) points and (43.85±4.39) points, respectively. Both groups experienced a reduction in SAS and SDS scores

Figure 1. Comparison of Cardiac Function in Both Groups.
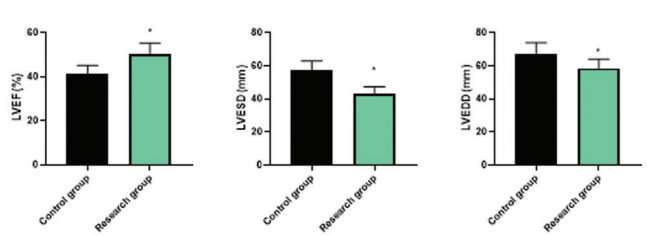
Note: The figure illustrates the comparison of cardiac function between the control group (CG) and the research group (RG). The parameters measured include left ventricular ejection fraction (LVEF), left ventricular end-systolic diameter (LVESD), and left ventricular end-diastolic dimension (LVEDD). The asterisk (*) denotes a statistically significant difference with a $P < .05$.

**Figure 2.** Comparison of Hospital Stay in Both Groups.
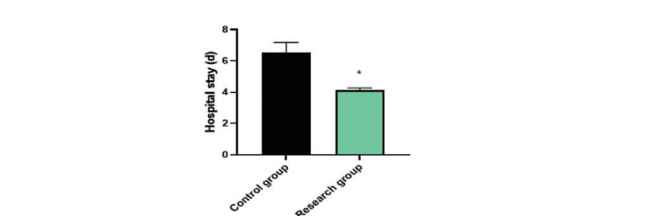
Note: The figure presents a comparison of hospital stay between the control group (CG) and the research group (RG). The asterisk (*) denotes a statistically significant difference with a $P < .05$.

Table 1. Incidence of Complications in Both Groups [n (%)]

Groups	n	Infection	Pressure Sore	Deep Vein Thrombosis	Incidence Rate
Control Group	78	3 (3.85%)	2 (2.56)	3 (3.85%)	8 (10.26%)
Research Group	78	1 (1.28%)	0 (0.00%)	1 (1.28%)	2 (2.56%)
χ^2					3.85
P value					< .05

Note: The incidence rates are presented as percentages within parentheses. The statistical analysis was performed using the χ^2 test, with a significance level set at $P < .05$.

Figure 3. Comparison of Emotional Well-Bieng in Both Groups.
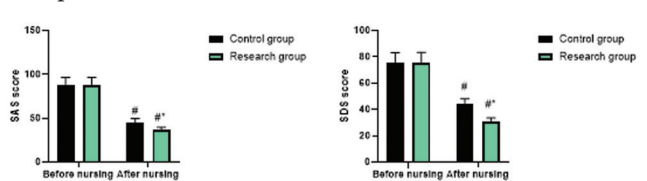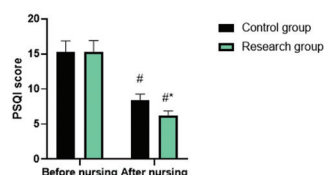

Note: The figure displays the assessment of bad emotions using the Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) in both the control group (CG) and the research group (RG). The symbol "#" indicates a significant difference compared with the pre-nursing period (before nursing), and "*" denotes a significant difference compared with the CG. The statistical significance threshold is set at $P < .05$.

Abbreviations: SAS, Self-rating Anxiety Scale; SDS, Self-rating Depression Scale.

after nursing, with the RG showing lower scores compared to the CG ($P < .05$).

Comparison of Sleep Quality Between Both Groups

No significant difference in the PSQI score was observed between the two groups prior to nursing ($P > .05$), see Figure

Figure 4. Comparison of Sleep Quality in Both Groups.

Note: The figure illustrates the assessment of sleep quality in both the control group (CG) and the research group (RG) using the Pittsburgh Sleep Quality Index (PSQI). The symbol "#" indicates a significant difference compared with the pre-nursing period (before nursing), and "*" denotes a significant difference compared with the CG. The statistical significance threshold is set at $P < .05$.

Abbreviation: PSQI, Pittsburgh Sleep Quality Index.

Figure 5. Comparison of Quality of Life in Both Groups.
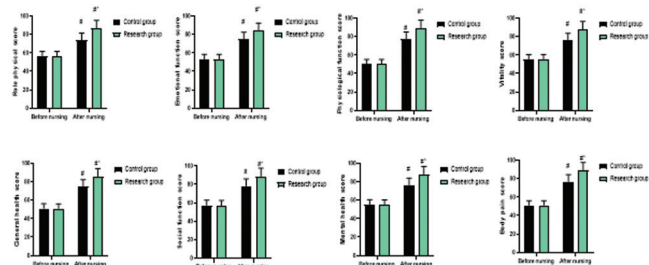
Note: This figure depicts the evaluation of quality of life in both the control group (CG) and the research group (RG). The symbols "#" and "*" signify significant differences compared with the pre-nursing period (before nursing) and the CG, respectively. The statistical significance threshold is set at $P < .05$.

Table 2. Nursing Satisfaction in Both Groups [n (%)]

Groups	n	Satisfied	Basically Satisfied	Dissatisfied	Total Satisfaction Rate
Control Group	78	32 (41.03%)	34 (43.59%)	12 (15.38%)	66 (84.62%)
Research Group	78	40 (51.28%)	35 (44.87%)	3 (3.85%)	75 (96.15%)
χ^2					5.97
P value					<0.05

Note: The satisfaction rates are presented as percentages within parentheses. The statistical analysis was performed using the χ^2 test, with a significance level set at $P < .05$.

4. After the nursing intervention, the PSQI score in both groups decreased. Specifically, the PSQI score in the RG was (6.24±0.63) points, significantly lower than that of (8.42±0.85) points in the CG ($P < .05$).

Comparison of Quality of Life in Both Groups

As shown in Figure 5, there was no significant difference in SF-36 scores between the two groups prior to nursing ($P > .05$). After the nursing intervention, the SF-36 scores for role physical, emotional function, physiological function, vitality, general health, social function, mental health, and physical pain in the RG were (86.74±8.58), (84.16±8.42), (88.97±8.92), (87.58±8.82), (85.69±8.57), (88.69±8.92), (87.69±8.79), and (88.69±8.74), respectively. In comparison, the scores in the CG were (74.05±7.41), (75.14±7.51), (77.18±7.74), (75.87±7.59), (74.78±7.51), (78.25±7.82), (76.36±7.65), and (76.68±7.72), respectively. All SF-36 scores in both groups increased after nursing, with the RG demonstrating higher scores than the CG ($P < .05$).

Nursing Satisfaction in Both Groups

As depicted in Table 2, the nursing satisfaction in the RG was significantly higher than in CG, indicating better satisfaction in the RG relative to the CG ($P < .05$).

DISCUSSION

Atrial fibrillation is a prevalent and persistent arrhythmia. In the occurrence of atrial fibrillation, the atria lose their contractile function.[13] Without timely intervention through medication or surgery, blood stasis can result in the formation of blood clots within the atrium.[14] The detachment of these thrombi may lead to severe complications such as thromboembolism, cerebral embolism, pulmonary embolism, and other life-threatening conditions.[15]

Radiofrequency ablation is a minimally invasive surgery widely employed in treating AF, recognized for its effectiveness, safety, and reliability.[16] However, the surgical procedure for radiofrequency ablation is intricate, necessitating more detailed and complex postoperative nursing requirements for patients.[17] Relevant studies have indicated a significant correlation between postoperative nursing for AF patients undergoing radiofrequency ablation and both the prognosis of patients' quality of life and the incidence of complications.[18] Additionally, timely and comprehensive rehabilitation guidance plays a crucial role in AF control and the physical rehabilitation of patients.[19]

Past studies suggest that early rehabilitation nursing can effectively reduce recovery time, prevent complications, and play a crucial role in promoting the recovery of cardiac function.[20] In line with these findings, our study revealed that, in comparison to the CG, the RG showed an elevation in LVEF, along with a decline in LVESD and LVEDD. Additionally, the RG exhibited a shorter hospital stay and a reduced incidence of complications compared to the CG.

Similarly, a randomized controlled trial conducted by Kato et al.[21] outside of China reveals that early exercise rehabilitation following AF can significantly improve heart function recovery and lower the risk of AF recurrence. Furthermore, Shan et al.[22] suggest that early exercise rehabilitation can effectively enhance cardiopulmonary function exercise tolerance and improve the quality of life for patients after coronary artery bypass grafting.

Early rehabilitation nursing plays a crucial role in enhancing patients' cognitive understanding and psychological acceptance of the disease, thereby fostering improved rehabilitation outcomes in the later stages.[23] Engaging in early rehabilitation exercises has been shown to enhance the quality of life for patients significantly. In the realm of rehabilitation nursing, the mental state and physical recovery of the patient are connected, with improvements in one often positively influencing the other.[24]

Our results clearly demonstrate a significant improvement in the bad emotions, sleep quality, and overall quality of life for patients who underwent early rehabilitation nursing. This finding aligns with previous research findings as Arving et al.[25] highlighted that early rehabilitation contributes to an enhanced quality of life and psychological well-being. Additionally, the work of Marupuru et al.[26] suggests that physical activity can

improve sleep quality in older stroke survivors, further substantiating our observed improvements.

Furthermore, our study revealed that in comparison with the CG, the nursing satisfaction in the RG was notably higher. This finding indicates that early rehabilitation nursing has the potential to enhance the satisfaction of patients with AF. Similarly, there is evidence supporting increased satisfaction among patients with acute cerebrovascular accidents following early rehabilitation therapy.[27] Additionally, research by Jiang et al.[28] suggests that early rehabilitation nursing contributes to the satisfaction of stroke patients with hemiplegia.

The study's outcomes highlighted the beneficial impact of early rehabilitation nursing on patients with AF. Notably, the RG exhibited significant improvements in bad emotions, sleep quality, and overall quality of life compared to the CG. Moreover, the nursing satisfaction in the RG surpassed that of the CG, emphasizing the positive influence of early rehabilitation nursing on patient satisfaction. These findings support the impact of rehabilitation nursing on postoperative cardiac function and quality of life in AF patients. The observed enhancements in psychological well-being, sleep quality, and overall satisfaction underscore the potential of early rehabilitation strategies to contribute substantially to the holistic recovery and contentment of individuals undergoing radiofrequency ablation for AF.

Study Limitations

Several limitations warrant consideration in the interpretation of our study results. Primarily, the sample size employed in this research is relatively small, and the study design is restricted to a single center. It introduces inherent biases and may limit the generalizability of our findings to a broader population. Future investigations should prioritize multi-center, large-sample prospective studies to validate and extend the current outcomes. Expanding the scope of research across multiple centers would enhance the robustness and applicability of the findings, providing a more comprehensive understanding of the impacts of early rehabilitation nursing on postoperative cardiac function and quality of life in atrial fibrillation patients.

CONCLUSION

In conclusion, the findings of this study highlight the significant benefits of early rehabilitation nursing in the postoperative care of atrial fibrillation patients. The observed improvement in the recovery of postoperative cardiac function, combined with the enhancement of the patient's overall quality of life, highlights the clinical value of early rehabilitation nursing interventions. The positive impact on cardiac function and quality of life suggests that integrating early rehabilitation strategies into the standard care protocols for AF patients undergoing radiofrequency ablation can yield meaningful clinical outcomes. These conclusions support that early rehabilitation nursing stands as a valuable and effective component of comprehensive care strategies for individuals with atrial fibrillation, emphasizing its potential to contribute to improved patient outcomes and well-being in clinical practice.

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