

A Study on the Effectiveness of Cardiac Rehabilitation Nursing for Patients with Coronary Atherosclerotic Heart Disease Following Interventional Therapy

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Abstract: *Objective:* To investigate the efficacy of cardiac rehabilitation nursing in patients with coronary atherosclerotic heart disease (CAD) following interventional therapy, providing evidence for optimizing clinical nursing protocols. *Methods:* Eighty CAD patients undergoing interventional therapy between January 2025 and June 2025 were enrolled. Using random number tables, they were divided into a study group and a control group (n=40 each). The control group received routine clinical care, while the study group received comprehensive cardiac rehabilitation care in addition to routine care. The following parameters were compared between groups: cardiac function indicators (LVEDD, LVESD, LVEF), 6-minute walk test distance, quality of life (SF-36 score), and incidence of adverse cardiovascular events. *Results:* After intervention, the study group demonstrated significantly lower LVEDD and LVESD and higher LVEF compared to the control group ($P < 0.05$). The study group achieved longer 6-minute walk distances and higher SF-36 scores across all domains than the control group, with statistically significant differences ($P < 0.05$). The incidence of adverse cardiovascular events was lower in the study group than in the control group, with statistically significant differences ($P < 0.05$). *Conclusion:* Implementing cardiac rehabilitation nursing after interventional therapy in patients with coronary heart disease significantly improves cardiac function, enhances cardiopulmonary endurance and quality of life, and reduces the risk of adverse cardiovascular events, warranting clinical promotion and application.

Keywords: Coronary atherosclerotic heart disease; Interventional therapy; Cardiac rehabilitation nursing; Cardiac function; Quality of life

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1. Introduction

Coronary atherosclerotic heart disease is a common clinical cardiovascular condition. Its core pathological mechanism involves coronary atherosclerosis, causing vascular stenosis or occlusion, leading to myocardial ischemia and hypoxia. Interventional therapies (e.g., stent implantation) remain a primary treatment for coronary artery disease, rapidly restoring blood flow to the myocardium. However, postoperative risks such as restenosis and declining cardiac function significantly impact patient prognosis. Conventional clinical care often focuses on basic postoperative nursing and simplified rehabilitation guidance, lacking systematic and personalized approaches that adequately address patients' long-term rehabilitation needs. Cardiac rehabilitation nursing centers on "comprehensive management and precise intervention." Through phased, personalized rehabilitation training and nursing guidance, it improves cardiac function and reduces the incidence of postoperative adverse events. This randomized controlled trial investigates the efficacy of cardiac rehabilitation nursing in patients following interventional treatment for coronary heart disease, aiming to provide evidence-based support for optimizing clinical nursing models. The findings are reported below ^[1].

2. Materials and methods

2.1. General data

Eighty patients with coronary heart disease undergoing interventional therapy at our hospital between January 2025 and June 2025 were enrolled. Inclusion criteria: (1) Diagnosis meeting the criteria in the "Guidelines for Diagnosis of Coronary Heart Disease", confirmed by coronary angiography or other imaging studies; (2) Undergoing percutaneous coronary intervention (PCI); (3) Informed consent obtained from patients and their families after understanding the study details. (4) Approval from the hospital ethics committee. Exclusion criteria: (1) Patients with concurrent infectious diseases; (2) Patients with autoimmune diseases; (3) Patients with impaired consciousness or psychiatric disorders; (4) Patients with malignant tumors; (5) Patients with severe hepatic or renal insufficiency.

Patients were randomly assigned to the study group and control group using a random number table, with 40 patients in each group. The study group comprised 22 males and 18 females, aged 45–78 years (mean 62.3 ± 7.5 years); disease duration ranged from 2 to 10 years (mean 5.6 ± 2.1 years). The control group comprised 23 males and 17 females; ages ranged from 46 to 79 years, with a mean of (63.1 ± 7.2) years; disease duration ranged from 2 to 11 years, with a mean of (5.8 ± 2.3) years. Comparison of general characteristics between groups showed no statistically significant differences ($P > 0.05$), indicating comparability ^[2].

2.2. Nursing methods

2.2.1. Control group: Routine clinical care

Patients were instructed to remain bedridden for 24 hours postoperatively and avoid strenuous activities. They were advised to drink ample water and adhere to scientific dietary principles (low-salt, low-fat, high-protein). Close monitoring was conducted for wound bleeding or exudate, along with vital signs, including heart rate and blood pressure. Once vital signs were fully stabilized, patients were guided through rehabilitation exercises following a progressive approach. A foundational rehabilitation plan was developed based on individual tolerance.

2.2.2. Study group: Implementation of cardiac rehabilitation nursing

Building upon the basic clinical care provided in the control group, implement comprehensive, personalized cardiac rehabilitation interventions as follows: (1) On the day of surgery: Instruct patients to maintain a supine position for 6–8 hours postoperatively. Once wound bleeding has completely ceased, assist patients with sitting-up and turning exercises. If discomfort occurs during training, switch to slow walking at the bedside. If pain is intolerable, reduce training intensity and guide the patient through simple bed activities while ensuring steady breathing. (2) Day after surgery: Guide patients in bed exercises such as independent turning and sitting up, combined with simple resistance activities like squeezing a ball or stretching rubber bands. Gradually increase activity volume and intensity. Simultaneously instruct patients on deep breathing techniques (inhaling fully and exhaling slowly) to prevent breathing difficulties during training. (3) Days 3–4 post-op: Initiate standing, squatting, and walking exercises with full nursing assistance to ensure gentle movements. Guide patients to walk approximately 100 meters within the ward, strictly controlling exertion to avoid overexertion. (4) Days 5–7 post-op: Increase training difficulty based on recovery progress by extending walking distance and speed. Continuously monitor heart rate during training to ensure stability. Expand training locations from indoors to outdoors, incorporate stair climbing, and dynamically adjust the rehabilitation plan. (5) Pre-discharge guidance: Teach patients to independently adjust training based on heart rate changes. If discomfort occurs during training, reduce exercise volume and gradually increase frequency after adaptation. If training heart rate exceeds baseline by 15 beats/min, maintain current volume to avoid blindly increasing intensity^[3–6].

2.3. Evaluation criteria

(1) Cardiac function indicators: Measure LVEDD, LVESD, and LVEF in both groups post-intervention using transthoracic echocardiography. (2) Cardiorespiratory endurance: Assessed via 6-minute walk test. Distance > 425 m indicates mild cardiorespiratory impairment, 150–425 m indicates moderate impairment, and < 150 m indicates severe impairment. (3) Quality of Life: Assessed using the SF-36 questionnaire, which comprises eight dimensions: physical functioning, role physical, bodily pain, general health perception, vitality, social functioning, role emotional, and mental health. The total score ranges from 0 to 100, with higher scores indicating a better quality of life. (4) Adverse cardiovascular events: Adverse events such as angina pectoris, myocardial infarction, and arrhythmia were observed and recorded during the intervention period, with incidence rates calculated^[7–9].

2.4. Statistical methods

Data were processed using SPSS 26.0 statistical software. Count data are expressed as (n, %) and analyzed using the chi-square test; measurement data are expressed as (Mean ± SD) and analyzed using the t-test. A *P* value < 0.05 was considered statistically significant.

3. Results

3.1. Comparison of cardiac function indicators between groups

After intervention, the study group exhibited significantly lower LVEDD and LVESD and significantly higher LVEF compared to the control group (*P* < 0.05). See **Table 1** for details.

Table 1. Comparison of cardiac function indicators between groups after intervention

Group	Cases	LVEDD (mm)	LVESD (mm)	LVEF (%)
Study Group	40	52.1±3.2	34.5±2.8	58.3±4.1
Control group	40	56.8±3.5	38.7±3.1	52.6±4.3
<i>t</i> -value	-	6.215	6.432	6.018
<i>P</i> -value	-	< 0.001	< 0.001	< 0.001

3.2. Comparison of 6-minute walk test distance between groups

After intervention, the study group achieved a 6-minute walk distance of 452.3 ± 41.5 m, while the control group achieved 386.7 ± 43.2 m. The study group demonstrated a significantly longer walking distance than the control group ($t=7.123$, $P < 0.001$).

3.3. Comparison of SF-36 scores between groups

After intervention, the study group scored higher than the control group on all dimensions of the SF-36 questionnaire, with statistically significant differences ($P < 0.05$). See **Table 2** for details.

Table 2. Comparison of SF-36 scores between groups after intervention

Group	Number of Cases	Physical Function	Physical Function	Body Pain	General Health Status	Energy	Social Function	Emotional Function	Mental Health
Research Group	40	82.3±6.5	79.5±7.1	85.2±5.8	81.6±6.2	83.1±5.9	84.5±6.3	82.7±6.1	83.9±5.7
Control group	40	72.1±7.3	68.3 ± 7.5	76.4±6.4	73.2±6.8	74.5±6.5	75.3±6.7	73.6±7.2	75.2±6.4
<i>t</i> -value	-	6.542	6.871	6.235	5.987	6.124	5.873	5.642	5.761
<i>P</i> -value	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

3.4. Comparison of adverse cardiovascular event rates between groups

During the intervention period, the study group experienced 2 cases of angina pectoris, with an adverse cardiovascular event rate of 5.0%. The control group experienced 5 cases of angina pectoris and 2 cases of arrhythmia, with an adverse cardiovascular event rate of 17.5%. The adverse cardiovascular event rate in the study group was lower than that in the control group, with a statistically significant difference ($\chi^2=4.114$, $P=0.043$).

4. Discussion

Although interventional therapy for coronary heart disease can rapidly improve myocardial blood supply,

postoperative vascular endothelial injury and inflammatory responses may still lead to issues such as reduced cardiac function and restenosis. Therefore, postoperative rehabilitation nursing is particularly important. Conventional clinical nursing models are relatively monotonous, lacking comprehensive management of the patient's rehabilitation process, making it difficult to achieve effective improvement in cardiac function. The cardiac rehabilitation nursing model adopted in this study established a personalized, stepwise rehabilitation intervention system based on the physiological characteristics of patients at different postoperative recovery stages, embodying the innovative concept of "comprehensive holistic management and precision intervention"^[10].

Regarding cardiac function improvement, the study group exhibited significantly lower LVEDD and LVESD and significantly higher LVEF compared to the control group post-intervention, indicating that cardiac rehabilitation nursing effectively enhances myocardial systolic and diastolic function. This outcome is closely linked to the stepwise training design of the rehabilitation program: mild exercise in the early postoperative period promotes blood circulation and prevents bedrest-induced thrombosis; training intensity is gradually increased in the intermediate phase to enhance myocardial endurance; and in the late phase, dynamically adjusts the program based on individual patient conditions to achieve steady improvement in cardiac function. The 6-minute walk test results showed that the study group walked significantly longer distances than the control group, indicating that cardiac rehabilitation nursing can effectively enhance patients' cardiopulmonary endurance, providing a physiological foundation for patients to return to normal life after surgery. Regarding quality of life, the study group scored higher than the control group across all dimensions of the SF-36 questionnaire, suggesting that cardiac rehabilitation nursing not only improves physiological function but also enhances psychological well-being and social adaptation. Analysis indicates that, on one hand, the physical functional improvements from rehabilitation training reduce anxiety and depression stemming from the disease. On the other hand, close communication between nursing staff and patients during the care process provides psychological support, bolstering patients' confidence in recovery. Regarding the incidence of adverse cardiovascular events, the study group showed a significantly lower rate than the control group. This confirms that cardiac rehabilitation nursing can reduce the risk of postoperative complications and ensure patient safety through scientific training guidance and risk monitoring. The innovations of this study are primarily reflected in three aspects: (1) Conceptual Innovation: Breaking away from the traditional "single intervention" model, it establishes a nursing-led, comprehensive cardiac rehabilitation management system that achieves seamless continuity from postoperative care to discharge. (2) Content innovation: Replacing generalized protocols with personalized rehabilitation plans tailored to patients' recovery characteristics at different postoperative stages, enhancing intervention precision; (3) Technical innovation: Shifting from subjective experience-driven to objective data-driven approaches, dynamically adjusting care plans based on objective metrics like cardiac function indicators and walking distance to ensure intervention efficacy. This study has limitations, including a small sample size and a short follow-up period. Future research should expand the sample size and extend follow-up duration to further validate the long-term efficacy of cardiac rehabilitation nursing. In summary, cardiac rehabilitation nursing significantly improves cardiac function, cardiopulmonary endurance, and quality of life while reducing adverse cardiovascular events in patients undergoing interventional therapy for coronary heart disease, demonstrating substantial clinical value for widespread adoption.

5. Conclusion

The implementation of cardiac rehabilitation nursing following interventional therapy in patients with coronary heart disease demonstrates significant benefits, including improved cardiac function, enhanced cardiopulmonary endurance and quality of life, and a reduced risk of adverse cardiovascular events. These outcomes support its clinical promotion and wider application in practice.

Disclosure statement

The authors declare no conflict of interest.

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