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The Effect of Percutaneous Coronary Intervention in Elderly Patients with Coronary Heart Disease and Its Impact on Cardiac Function Indicators

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Abstract: *Objective:* To analyze the role of percutaneous coronary intervention and its value in elderly patients with coronary heart disease. *Methods:* A total of 88 elderly patients diagnosed with coronary heart disease between June 2022 and June 2023 were recruited and divided into two groups using the random number table method, with 44 cases in each group. The control group received conventional drug therapy, while the observation group received percutaneous arterial interventional treatment in addition to conventional drug therapy. Clinical efficacy, adverse cardiovascular events, cardiac function indicators, and quality of life were observed in both groups. *Results:* The observation group demonstrated a significantly higher total effective rate and significantly lower adverse cardiovascular events ($P < 0.05$). Furthermore, after treatment, the observation group showed a higher left ventricular ejection fraction, as well as lower left ventricular end-systolic diameter, left ventricular end-systolic volume, left ventricular end-diastolic diameter, and left ventricular end-diastolic volume ($P < 0.05$). Additionally, the observation group had higher scores in all eight dimensions of the SF-36 scale ($P < 0.05$). *Conclusion:* For elderly patients diagnosed with coronary heart disease, percutaneous coronary intervention can achieve superior clinical efficacy and high safety and can help improve cardiac function indicators and quality of life.

Keywords: Advanced age; Coronary heart disease; Percutaneous coronary intervention; Cardiac function indicators

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1. Introduction

Coronary heart disease is a cardiovascular disease resulting from the narrowing or blockage of blood vessels due to atherosclerotic lesions in the coronary arteries. The elderly constitute the primary demographic affected by this disease, with common contributing factors including dietary habits and high blood lipid levels [1]. Chest pain, often accompanied by dyspnea, represents the predominant symptom among patients with coronary heart disease, significantly impacting their quality of life [2]. Percutaneous coronary intervention stands as a standard

procedure aimed at ameliorating the condition of individuals with coronary heart disease. This interventional utilizes transradial catheter technology to alleviate stenosis or occlusion in coronary arteries, thereby facilitating the improvement of ischemic and hypoxic myocardial tissue [3]. In this study, percutaneous coronary intervention was carried out to evaluate its role and value in elderly patients with coronary heart disease.

2. Materials and methods

2.1. General information

A total of 88 elderly patients confirmed to have coronary heart disease following examination between June 2022 and June 2023 were recruited and divided into two groups using the random number table method, with 44 patients in each group. A comparison of clinical data among all patients revealed no significant difference ($P > 0.05$). The control group comprised 24 males and 20 females, aged 76 to 83 years old, with an average age of 79.40 ± 1.16 years. Cardiac function classification in this group included 15 cases of grade II, 14 cases of grade III, and 15 cases of grade IV. The observation group consisted of 25 males and 19 females, with ages ranging from 76 to 83 years old and a mean age of 79.24 ± 1.26 years. Cardiac function classification in this group included 13 cases of grade II, 15 cases of grade III, and 16 cases of grade IV.

Inclusion criteria: (1) Patients diagnosed with coronary heart disease via cardiac ultrasound and conventional surface electrocardiogram, aged over 75 years; (2) Patients' family members are informed of the study and voluntarily consent to participation.

Exclusion criteria: (1) Individuals with fatal arrhythmias; (2) Individuals with severe liver and kidney dysfunction; (3) Individuals with allergic reactions to the drugs used in this study; (4) Individuals with aortic dissection or cerebral hemorrhage; (5) Individuals with immune diseases and myocardial infarction; (6) Individuals with malignant tumors; (7) Individuals with contraindications to percutaneous coronary intervention.

2.2. Methods

The control group received conventional drug treatment, consisting of 100 mg aspirin (National Drug Approval No. J20130078, Bayer Healthcare Co., Ltd.) once daily and 75 mg clopidogrel [Sanofi (Hangzhou) Pharmaceutical Co., Ltd., national drug approval number J20130083] once daily or 90 mg ticagrelor (AstraZeneca) twice daily, continued for 30 days.

The observation group received percutaneous coronary intervention treatment in addition to conventional drug treatment 3 days before surgery. The percutaneous coronary intervention was performed on the radial artery. Patients were in the supine position, with the right upper limb extended outward 30°, the proximal and superior end of the radial styloid process was selected, and the pulsating radial artery was chosen as the puncture site. Local anesthesia was administered, followed by the insertion of a 5F arterial sheath for coronary angiography. 100 U/kg heparin sodium [Sanofi (Beijing) Pharmaceutical Co., Ltd.] was administered. The sheath was removed, and hemostasis was performed using a radial artery compressor. Post-surgery, 5,000 U of low-molecular-weight heparin sodium was subcutaneously injected daily for seven days.

2.3. Observation indicators

(1) Clinical efficacy: The number of angina attacks is reduced by more than 90% after treatment, nitroglycerin is no longer needed, and the tolerance of daily activities significantly increased are considered "markedly effective"; The number of angina attacks is reduced by 50% after treatment, the dosage of nitroglycerin can be reduced by more than 50% for 90% of the angina attacks, and increasing

daily activity tolerance are considered "effective"; The first two standards not met are considered "ineffective". Total efficacy is the sum of markedly effective and effective cases.

(2) Adverse cardiovascular events: Arrhythmia, myocardial infarction, and deterioration of cardiac function of both groups were recorded.

(3) Cardiac function indicators: Cardiac function is detected through cardiac color Doppler ultrasound examination, including the following indicators: left ventricular ejection fraction (LVEF), left ventricular end-systolic diameter (LVESD), left ventricular end-systolic volume (LVESV), left ventricular end-diastolic diameter (LVEDD), and left ventricular end-diastolic volume (LVEDV).

(4) Quality of life scores: Patient quality of life is evaluated using the SF-36 score, which contains 8 scales: physiological function (PF), bodily pain (BP), role limitations due to physical health problems (RP), role limitations due to personal or emotional problems (RE), general mental health (MH), social functioning (SF), energy/fatigue or vitality (VIT), and general health perceptions (GH). The total score of each dimension is 100 points. A higher SF-36 score indicated a better quality of life.

2.4. Statistical analysis

Statistical analysis was performed using SPSS 28.0 software. Measurement data were expressed as mean ± standard deviation (SD) and compared using the *t*-test, whereas count data were presented as [*n* (%)] and compared using the χ^2 test. A statistically significant difference was defined as $P < 0.05$.

3. Results

3.1. Clinical efficacy and adverse cardiovascular events

Table 1 shows that the observation group had a significantly higher total effective rate and significantly lower adverse cardiovascular event rate ($P < 0.05$).

Table 1. Analysis of the total effective rate and incidence of adverse cardiovascular events in the two groups [*n* (%)]

		Control group (*n* = 44)	Observation group (*n* = 44)	χ^2	P
Clinical efficacy	Markedly effective	17 (38.64)	25 (56.82)		
	Effective	13 (29.55)	19 (43.18)		
	Ineffective	14 (31.82)	3 (6.82)		
	Total efficacy	30 (68.18)	41 (93.18)	8.822	0.003
Adverse cardiovascular events	Arrhythmia	4 (9.09)	1 (2.27)		
	Myocardial infarction	4 (9.09)	1 (2.27)		
	Deterioration of heart function	4 (9.09)	2 (4.55)		
	Total incidence rate	12 (27.27)	4 (9.09)	4.889	0.027

3.2. Cardiac function indicators

As shown in **Table 2**, there were no significant differences in cardiac function indicators between both groups before intervention ($P > 0.05$). However, after intervention, the observation group exhibited a significantly higher LVEF, and significantly lower LVESD, LVESV, LVEDD, and LVEDV, as compared to the control group ($P < 0.05$).

Table 2. Analysis of cardiac function indicators in the two groups (mean ± SD)

Cardiac function indicators	Before intervention (n = 60)		t	P	After intervention (n = 60)		t	P
	Control group	Observation group			Control group	Observation group		
LVEF (%)	40.54 ± 5.39	41.37 ± 5.19	0.447	0.118	45.25 ± 4.62	55.41 ± 5.39	13.167	0.001
LVESD (mm)	42.35 ± 4.50	42.45 ± 4.32	0.649	0.402	38.62 ± 6.23	30.14 ± 5.47	12.127	0.001
LVESV (mL)	61.54 ± 7.35	60.15 ± 8.22	0.910	0.343	55.67 ± 8.15	48.32 ± 6.40	8.961	0.001
LVEDD (mm)	61.37 ± 8.06	61.70 ± 8.26	0.099	0.782	54.19 ± 5.75	44.35 ± 5.15	11.049	0.001
LVEDV (mL)	163.44 ± 17.50	164.30 ± 17.52	0.018	0.763	101.64 ± 11.49	95.75 ± 10.31	9.392	0.001

3.3. Two groups of statistical analysis of life indicators

Both groups had similar quality of life scores during pre-treatment ($P > 0.05$). However, after treatment, the observation group had higher scores in 8 dimensions of SF-36 ($P < 0.05$), as presented in **Table 3**.

Table 3. Analysis of SF-36 scores of two groups (points, mean ± SD)

	Before intervention (n = 60)		t	P	After intervention (n = 60)		t	P
	Control group	Observation group			Control group	Observation group		
PF	56.24 ± 5.60	56.72 ± 5.39	0.265	0.647	66.42 ± 5.39	78.41 ± 5.20	7.943	0.001
BP	56.71 ± 5.30	56.45 ± 5.19	0.333	0.294	66.32 ± 5.10	75.49 ± 4.20	7.981	0.001
RP	56.80 ± 5.27	56.21 ± 5.58	0.216	0.725	65.92 ± 5.05	78.46 ± 4.29	8,686	0.001
GH	49.72 ± 5.60	49.60 ± 5.34	0.441	0.363	67.32 ± 5.11	79.14 ± 4.25	8,086	0.001
VIT	51.24 ± 5.26	51.46 ± 5.19	0.225	0.353	62.67 ± 5.09	77.13 ± 4.08	8.410	0.001
SF	50.39 ± 5.45	50.37 ± 5.29	0.176	0.853	65.37 ± 5.10	78.41 ± 4.32	9.390	0.001
RE	50.19 ± 5.27	50.26 ± 5.40	0.098	0.892	65.39 ± 5.42	77.31 ± 4.15	9.990	0.001
MH	51.64 ± 5.47	51.37 ± 5.48	0.461	0.853	64.33 ± 5.19	77.41 ± 4.28	6.305	0.001

4. Discussion

The incidence of coronary heart disease has been on the rise in recent years, attributed to various factors. Common symptoms such as angina and palpitations are indicative of coronary heart disease, with severe cases posing a risk of fatality. Consequently, prompt intervention is crucial to treat elderly patients and halt disease progression [4].

Currently, both conservative drug therapy and surgical intervention are widely employed for coronary heart disease treatment. However, drug treatment's drawback lies in its slow onset of action [5]. In contrast, percutaneous coronary intervention offers a rapid and favorable outcome in clearing coronary lumens. This method utilizes transradial catheter technology to enhance myocardial blood perfusion, thereby alleviating myocardial ischemia and oxygen deficiency symptoms [6]. This study, focusing on clinical efficacy, cardiac function, and quality of life, indicates that percutaneous coronary intervention yields promising results. By relieving coronary artery stenosis or obstruction, this intervention facilitates coronary blood flow reconstruction and effectively alleviates clinical symptoms [7].

Moreover, percutaneous coronary intervention is minimally invasive, employing transradial catheter technology to deploy balloon catheters or other devices for expanding stenotic coronary arteries and implanting stents. This approach aids in ameliorating coronary artery stenosis and restoring normal coronary and

myocardial blood supply, thereby enhancing patient prognosis [8]. Previous research has demonstrated the benefits of percutaneous coronary intervention in improving cardiac function post-relief of myocardial ischemia and hypoxia [9]. Another study revealed that the insertion of a special balloon catheter into the coronary artery lesion dilates the stenotic blood vessel, thereby reconstructing the anatomical structure of the blood vessel, improving the necrotic myocardium, reducing the impact and symptoms of the condition, inhibiting disease progression to a certain extent, and reducing the risk of adverse cardiovascular events [10].

In summary, percutaneous coronary intervention emerges as an effective, safe, and life-saving intervention for elderly patients with coronary heart disease, significantly enhancing cardiac function indicators.

Disclosure statement

The author declares no conflict of interest.

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