Cardiovascular Reviews, 2024, Volume 2, Issue 1
http://ojs.bbwpublisher.com/index.php/CR

Clinical Effects of Sildenafil in the Treatment of Congenital Heart Disease with Pulmonary Hypertension

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Abstract: *Objective:* To analyze the improvement of mean pulmonary arterial pressure and oxygenation index as well as the therapeutic effect of sildenafil treatment in patients with congenital heart disease and pulmonary arterial hypertension. *Methods:* A total of 104 patients with congenital heart disease and pulmonary arterial hypertension were recruited from February 2023 to January 2024 and grouped into study and control groups using a randomized numerical table, with 52 patients in each group. The study group received sildenafil treatment, while the control group received conventional treatment. The therapeutic effects of both groups were analyzed and compared. *Results:* The study group had an average pulmonary arterial pressure of 26.23 ± 2.16 mmHg, an oxygenation index of 241.63 ± 4.86, and a total effective treatment rate of 98.08%, which was significantly better than the control group ($P < 0.05$). *Conclusion:* By implementing sildenafil treatment for patients with congenital heart disease and pulmonary hypertension, the mean pulmonary artery pressure and oxygenation index of the patients improved significantly, and the effective rate of treatment increased significantly.

Keywords: Congenital heart disease; Pulmonary hypertension; Sildenafil therapy

Online publication: May 8, 2024

1. Introduction

Pulmonary hypertension is A common complication of congenital heart disease which not only adversely affects the patient's recovery but also increases the mortality rate. At this stage, the main treatment for this complication is the use of appropriate medication, and patients can use sildenafil under the guidance of the doctor, which is safer and can significantly improve the patient's condition. This study was conducted on 104 patients with congenital heart disease and pulmonary hypertension treated between February 2023 and January 2024.

2. Materials and methods

2.1. General information

A total of 104 patients with congenital heart disease and pulmonary hypertension treated between February 2023 and January 2024 were recruited for this study, and their basic data are shown in **Table 1**.

Table 1. Basic data of patients with congenital heart disease and pulmonary hypertension

Group	Male patients	Female patients	Age	Average age
Study group (52 cases)	25 cases	27 cases	43–78years	57.9 ± 8.2 years
Control group (52 cases)	27 cases	25 cases	46–80 years	60.3 ± 7.6 years

There was no statistically significant difference between the general information of the above two groups ($P > 0.05$). Consent was obtained from the patients and their families for this study.

2.2. Methods

Conventional treatment was implemented for the patients in the study group, and calcium channel blockers, vasodilators, diuretics, anticoagulants, and cardiotonic agents were used for the patients at regular intervals [1,2]. The treatment lasted for 8 weeks, and the patients were closely observed for any adverse reactions during the treatment period.

In addition to the implementation of conventional treatment for patients in the experimental group, sildenafil treatment is implemented at the same time. Sildenafil was given thrice daily, with 20 mg each time, and the treatment lasted for 8 weeks. During the treatment period, patients were closely monitored for any adverse reactions.

2.3. Observation indexes

The average pulmonary artery pressure and oxygenation index of patients with congenital heart disease and pulmonary hypertension before and after treatment were compared between the two groups. The treatment effect of the patients was observed, where “very effective” is indicated by significantly improved heart function, “effective” is indicated by improved heart function, and “ineffective” is indicated by no improvement in heart function or further deterioration. The total effective rate is the sum of “very effective” and “effective” among all cases × 100%.

2.4. Statistical analysis

SPSS 22.0 statistical software was applied, a *t*-test was used for the measurement data and expressed as mean ± standard deviation (SD), while χ^2 test was used for the count data and expressed as [*n* (%)]. A *P* value of less than 0.05 indicated a statistically significant difference.

3. Results

3.1. Comparison of the average pulmonary artery pressure and oxygenation index of the two groups before and after treatment

Before treatment, there were no significant differences in the mean pulmonary artery pressure and oxygenation index of both groups. However, the study group showed significantly better mean pulmonary artery pressure and oxygenation index as compared to the control group ($P = 0.00$), as shown in **Table 2**.

Table 2. Comparison of mean pulmonary artery pressure and oxygenation index before and after treatment (mean ± SD)

Group	Before treatment		After treatment	
	Mean pulmonary artery pressure (mmHg)	Oxygenation index	Mean pulmonary artery pressure (mmHg)	Oxygenation index
Study group (52 cases)	59.13 ± 11.12	192.12 ± 5.04	26.23 ± 2.16	241.63 ± 4.86
Control group (52 cases)	58.24 ± 11.47	191.68 ± 5.43	39.42 ± 2.57	198.14 ± 5.27
t	0.402	0.428	28.332	43.746
P	0.689	0.669	0.000	0.000

3.2. Comparison of the therapeutic effect of the two groups

Table 3 shows that the total effective treatment rate of the study group was 98.08%, which was significantly higher than the control group of 86.54% ($P = 0.027$).

Table 3. Comparison of the therapeutic effect [*n* (%)]

Group	Very effective	Effective	Ineffective	Overall effective rate
Study group (52 cases)	30 (57.69)	21 (40.38)	1 (1.92)	51 (98.08)
Control group (52 cases)	15 (28.85)	30 (57.69)	7 (13.46)	45 (86.54)
χ^2				4.875
P				0.027

4. Discussion

In recent years, the phenomenon of late marriage and childbearing has become increasingly serious, coupled with the implementation of the two-child policy in China, the number of women of advanced maternal age has increased, which has led to a higher rate of children with congenital heart disease [3-5]. In children with congenital heart disease, due to the body being in a long-term left-to-right shunt state and increased pulmonary vascular resistance, it is easy to induce pulmonary hypertension as a complication. The emergence of this complication will pose a further threat to the physical health of the child [4,6].

Sildenafil has been increasingly used in the treatment of congenital heart disease and pulmonary arterial hypertension in recent years. This drug was mainly used to treat male erectile dysfunction previously, but lately, it was found to have a better therapeutic effect on pulmonary arterial hypertension with fast effect, simple usage, can effectively dilate the blood vessels, reduce the pulmonary vascular resistance, increase the concentration of oxygen in the blood, thereby achieving the therapeutic effect of improving pulmonary hypertension [7-9].

In this study, 52 patients in the study group were treated with sildenafil, and the average pulmonary artery pressure was 26.23 ± 2.16 mmHg, the oxygenation index was 241.63 ± 4.86, which was significantly better than the control group's average pulmonary artery pressure (39.42 ± 2.57 mmHg) and oxygenation index (198.14 ± 5.27). Moreover, the total effective treatment rate of the study group reached 98.08%, which was significantly higher than that of the control group (86.54%). This shows that with the implementation of sildenafil treatment for patients with congenital heart disease and pulmonary hypertension, the average pulmonary artery pressure and oxygenation index of patients significantly improved, and the treatment efficiency was high.

In conclusion, patients with congenital heart disease, after the complication of pulmonary hypertension, can follow the doctor's instructions, through the treatment of sildenafil to relieve the disease, the drug has a

better therapeutic effect on congenital heart disease and pulmonary arterial hypertension and has a high degree of safety.

Disclosure statement

The authors declare no conflict of interest.

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