

Dimensions change and left ventricular function carvedilol post therapy due to heart failure cases in children with congenital heart disease left-to-right

by Mahrus Abdur Rahman

Submission date: 20-Mar-2021 10:39AM (UTC+0800)

Submission ID: 1537520821

File name: ases_in_children_with_congenital_heart_disease_left-to-right.pdf (275.71K)

Word count: 3919

Character count: 20059



Dimensions change and left ventricular function carvedilol post therapy due to heart failure cases in children with congenital heart disease left-to-right

Mahrus A. Rahman ^{1*}, Dewi Astasari ¹, I Ketut Alit Utamayasa ¹

¹ Department of Child Health, Faculty of Medicine, Universitas Airlangga, INDONESIA

*Corresponding author: mahrus_rahman@yahoo.com

10

Abstract

Background: Congenital Heart Disease (CHD) is the most common congenital disorder in newborns with a prevalence of 9.1 per 1000 live births. In left-to-right PJB shunts occur excessive volume burden on the ventricles, resulting in heart failure.

Purpose: Knowing the difference in changes in the dimensions and function of the left ventricle on echocardiography after standard therapy plus placebo with the standard therapy group plus carvedilol in children with heart failure due to left-to-right CHD.

Method: Using a Randomized Controlled Trial (RCT) research design by giving a Double Blind Study treatment. Research data including comparison of initial data and final data of the two groups were analyzed by independent sample t test.

Result: The results of measurement of left ventricular mass showed a significant decrease to $40.56 \pm 23.63 \text{ g/m}^2$ ($p < 0.001$). There was a significant decrease in left ventricular volume to $42.23 \pm 20.36 \text{ m}^3$ ($p = 0.05$). There was a significant increase in the mean left ventricular ejection fraction to $74.16 \pm 4.10\%$ ($p = 0.03$). There was an increase in the left ventricular shortening fraction to $42.18 \pm 3.66\%$ ($p = 0.04$).

Conclusion: There are differences in the dimensions of the left ventricular at the end of systolic (DVKI-AS), the left ventricle at the end of diastolic (VKI-AD), the thickness of the back wall of the left ventricle at the end of diastolic (DBVKI-AD), and the thickness of the interventricular septum at the end of diastolic (SIV-AD).

Keywords: congenital heart disease, heart failure, pomegranate, carvedilol, left ventricle

Rahman MA, Astasari D, Utamayasa IKA (2020) Dimensions change and left ventricular function carvedilol post therapy due to heart failure cases in children with congenital heart disease left-to-right. *Eurasia J Biosci* 14: 3697-3701.

© 2020 Rahman et al.

This is an open-access article distributed under the terms of the Creative Commons Attribution License.

INTRODUCTION

One of the most high urgency-level diseases is Heart disease (Widiyanti, et al. 2016). Congenital heart disease (PJB) is the most frequent congenital disorder in newborns with a prevalence in the last 15 years is 9.1 per 1000 live (van der Linde, et al. 2011). The most frequent complication in patients with left-to-right PJB is heart failure

On the left PJB shunts to the right there is excessive volume load on the ventricle resulting in heart failure (Pavo, & Michel-Behnke, 2017). The reduction of blood pump in heart failure leads to a compensatory mechanism of sympathetic system activity and a renin-angiotension-aldosterone (RAA) system. If long lasts can cause changes in the shape and function of the heart muscle (Wahab, 2009). The standard therapy of heart failure in children with left to right PJB shunts is digitalis, diuretic, and ACE inhibitors. However, The use of these medications is temporary, namely to prepare optimal conditions prior to the operative action (Kay,

Colan, & Graham, 2001). In addition, there is still no data that expresses the effectiveness of the use of these drugs in children (Hsu, & Pearson, 2009).

Long-term use of inotropic can give a destructive effect. Vasodilator therapy is then introduced with the aim of fixing hemodynamics and lowering the heart burden. ACE inhibitors are the first and antagonists to work through the obstacles on the RAA system. The concept of the and blockade was later expanded on the sympathetic nervous system, with the use of β (Lechat, 2006) inhibitors.

Carvedilol is an adrenoreceptor antagonist β_1 and β_2 nonselective with vasodilatory ability through the α_1 adrenoreceptor antagonist. Carvedilol also has antiproliferative effects and antioxidant activity. The use of carvedilol has been approved by the Food and Drug

Received: September 2019

Accepted: March 2020

Printed: September 2020

Administration (FDA) since 1997 as a therapeutic heart failure, and can be administered concurrently with digoxin, diuretics, and ACE inhibitors to reduce disease travel and lower the number of treatments and deaths associated with cardiovascular conditions (Spicer, 2001. Remme, & Swedberg, 2001). With the dose of the titration carvedilol can improve the dimensions and function of the left ventricle (Conrad, et al. 2019). Although the current carvedilol is indicated as a therapy for heart failure in adults, but only 7 studies can report the safety, effectiveness, or pharmacokinetics of the use of carvedilol in the repair of heart failure in children (Foerster, & Canter, 2008; Nishiyama, et al. 2009; Clausen, 2018).

Based on the discussion above, it is necessary to do research of randomized controlled studies to prove whether the use of carvedilol is effective in repairing the left ventricular dimensions and functions in children with left-to-right PJB of heart failure. Echocardiography is a tool used to measure the output of cardiac work by non-invasive (Kusumastuti, & Osaki, 2015). Echocardiography will specify the movement of the heart wall in the 2-dimensional (2d) echocardiographic image of (Aziz, et al. 2018). In this study, echocardiography was used to see any changes in the dimensions of the left ventricle at the end of the systolic and diastolic, the rear wall thickness of the left ventricle at the end of diastolic, thickness of ventricular septum at the end of diastolic, the left ventricular volume, left ventricular mass, Left ventricular ejection fraction, left ventricular shortening fraction, and E/A wave ratio.

METHOD

This Research used the Randomized Controlled Trial (RCT) research with the Double Blind Study treatment. There are two treatment groups that are groups with standard therapeutic plus placebo and a group with Standard therapeutic with carvedilol

Population and Sample

Samples were taken from the patient with a left to right PJB shunts that experienced heart failure which meet the criteria of inclusion and willing to follow the research, then randomly selected with the number of samples according to calculation

Data Analysis

Data on research results include comparisons of preliminary data and end data of both groups analyzed with Independent sample t test. Data before and after the treatment is analyzed by paired t test statistical test. Statistical analysis of computer programs assisted.

RESULT

A total of 30 child patients as research subjects divided into two groups, consisting of 19 (63.3%) Male and 11 (36.7%) Women, with an average age of 57.6 ±

Table 1. Comparison of dimensional change and left ventricular function of echocardiography test before and after treatment in treatment group (standard therapy + carvedilol)

Parameter	Before Mean (SD)	After Mean (SD)	Mean Change (SD)	Price P
DVKI-AS (cm)	2,08 (0,37)	1,89 (0,48)	0,18 (0,37)	0,08 *
DVKI-AD (cm)	3,56 (0,48)	3,31 (0,57)	0,25 (0,43)	0,03 *
DBVKI-AD (cm)	0,56 (0,20)	0,52 (0,15)	0,04 (0,10)	0,14 *
SIV-AD (cm)	0,59 (0,16)	0,48 (0,14)	0,11 (0,14)	0,80 *
Left ventricular mass (g/m ²)	56,44 (34,11)	40,56 (23,63)	1,58 (13,38)	0,00 *
Left ventricular volume (m ³)	50,08 (18,96)	42,23 (20,36)	7,85 (14,74)	0,05 *
Ejection Fraction (%)	70,66 (3,87)	74,16 (4,10)	-3,50 (5,96)	0,03 *
Short Fraction (%)	39,01 (3,35)	42,18 (3,66)	-3,17 (5,43)	0,04 *
Ratio E/A	1,67 (0,29)	1,75 (0,26)	-0,07 (0,32)	0,36

*there is different mean if price p<0,05

43.57 months. By age group there were 9 (30%) Patients aged ≤ 24 months or ≤ 2 years, 14 (46.7%) Patients aged 25-83 months, 3 (10%) Patients aged 84-131 months, 4 (13.3%) Patients aged ≥ 132 months. The weight of the child in this study was 13.68 ± 6.19 kg, where there were 18 (60%) Patients with good nutrition, 9 (30%) Patients with less nutrition, and 3 (10%) Patients with poor nutrition. Based on the type of defect, 21 (70%) Patients with ventricular septal defect (DSV) and 9 (30%) Patients with a Duktus Arteriosus persistent (DAP), where as much as 3 (10%) Patients in the form of small defects, 20 (66.7%) Patients in the form of moderate defects, and 7 (23.3%) Patients in the form of large defects.

Observations on the left ventricular dimension value at end of systolic (Dvki-as) Tcan decrease Dvki-AS after administration of carvedilol in treatment group to 1.89 ± 0.48 cm, but the decline by using the test paired T test is not statistically meaningful with the price P = 0.08. While in the control group, DVKI-AS increased to 2, 20 ± 0.47 cm (P = 0.63). There is a meaningful difference in the Carvedilol Pascaterapi in both research groups with the test results of independent t test with a price of P = 0.04, and the average difference between the two groups is-0.27.

There is a decrease in left ventricular dimensions when late diastolic (dvki-AD) means through test paired T test after administration of Carvedilol in the treatment group to 3.31 ± 0.57 cm with a price of P = 0.03. While in the control group, DVKI-AD increased to 3.82 ± 0,84 cm (Price P = 0.20). There is a meaningful difference in the carvedilol in both research groups through the results of independent T test tests with a price of P = 0.04, with the average difference of the two groups being-0.39.

There is a decline in left ventricular rear wall at the end of diastolic (DBVKI-AD) after administration of carvedilol in treatment group to 0.52 ± 0.15 cm, but the decline is not statistically meaningful with test paired T test (price $P = 0.14$). While in the control group, there was increased DBVKI-AD to 0.57 ± 0.18 cm (price $P = 0.15$). There is a meaningful difference in the carvedilol in both research groups with the test results independent t Test (price $P = 0.03$), and the average difference between the two groups is-0.15.

Observation results of interventricular septum at the end diastolic (SIV-AD) indicates the presence of a statistically significant decline of SIV-AD through test paired T test to 0.48 ± 0.14 cm (price $P = 0,008$) in the treatment group after receiving therapy carvedilol. While in the control group, there was increased SIV-AD to 0.56 ± 0.15 cm (price $p = 0.80$). There is a meaningful difference in carvedilol in both research groups with test results independent t, Test (price $P = 0.04$), and the average difference between the two groups is-0.14

The result of the measurement of the left ventricular mass value indicates a statistically significant decrease in the left ventricular mass in the treatment group after receiving therapy carvedilol with test paired t test to 40.56 ± 23.63 g/M² (price $p < 0.001$). While in the control group, there was an increase in the left ventricle mass to 76.14 ± 72.86 G/m² (price $P = 0.16$). There is a meaningful difference in the carvedilol in both research groups with independent test (price $P = 0.01$), and the average difference between the two groups is-35.36.

A statistically significant decrease in left ventricular volume with test paired T test to 42.23 ± 20.36 m³ ($P = 0.05$) in the treatment group after receiving carvedilol therapy. While in the control group, there was an increase in the left ventricle volume to 650.05 ± 47.28 m³ (price $p = 0.20$). There is a meaningful difference in the carvedilol in both research groups of independent t test results (price $P = 0.03$), and the average difference between the two groups is-15.66.

There is a statistically significant left ventricular ejection fraction value increase with test paired T test to $74.16 \pm 4.10\%$ (price $P = 0.03$) in the treatment group after receiving carvedilol therapy. While in the control group, there was a decrease in the left ventricular ejection fraction to $70.75 \pm 4.45\%$ (price $P = 0.34$). There is a significant difference in the carvedilol supply in both research groups of independent t test results (price $P = 0.03$), and the average difference between the two groups is-5.05.

There is a statistically significant increase in the left ventricular shortening fraction of the test paired T test to $42.18 \pm 3.66\%$ ($P = 0.04$ price) in the treatment group after receiving carvedilol therapy. While in the control group, there was a decrease in the left ventricular shortening fraction to $39.41 \pm 3, 84\%$ (price $P = 0.46$). There is a meaningful difference in the carvedilol in both research groups with test results independent t Test

(price $P = 0.04$), and the average difference between the two groups is-4.00.

At the observation of the E/A ratio, the administration of Carvedilol in the treatment group contained as much as 13 (86,70%) Research subject with an E/A ratio between 1-2, and as much as 2 (13,30%) The E/A ratio > 2. As for the control group, there are 13 (86,70%) The E/A ratio between 1-2, and a total of 2 (13,30%) The subject with the E/A ratio > 2. There is an increase in the ratio of E/A after the administration of Carvedilol to the treatment group to 1.75 ± 0.26 , but the increase is not statistically meaningful with test paired T test (price $P = 0.36$). Similarly, in the control group, there was an increase of E/A ratio to 1.74 ± 0.46 (price $P = 0.67$). There is No statistical difference in the Carvedilol Pascaterapi in both research groups with the test results independent t Test (price $P = 1.00$), and the average difference between the two groups is-0.04.

DISCUSSION

In this study, there was a decrease in the average value of DVKI-AD in the treatment group (price $P = 0,039$). While the control group occurs an average increase in the value of DVKI-AD (Price $P = 0,203$). There is a significant difference between the control group and the Carvedilol final treatment at the average value of DVKI-AD with the price $P = 0,043$. Accordingly in SIV-AD, there is a significant difference between the treatment group and the control group with the price $P = 0,044$, where a significant decrease in the treatment group (price $P = 0,008$), while the control group occurred Increase the average of the SIV-AD value (price $p = 0,803$).

Significant differences between treatment groups and the Carvedilol Jet control group are also present in DVKI-AS (Price $P = 0.04$) and DBVKI-AD (Price $P = 0,038$). In both research groups there was an average decline in the value of DVKI-AS, but the decrease of DVKI-AS occurred Pascaterapi carvedilol in both groups is not significant compared to before given carvedilol therapy, priced at $p = 0.08$ on Treatment groups; and price $P = 0,635$ in the control group. Likewise, with the average DBVKI-AD value, the decline that occurs after carvedilol in both groups is not significant compared to before given carvedilol therapy with the price $P = 0,146$ on the treatment group; and price $P = 0,155$ on the control group

This suggests that administering carvedilol can provide benefits to the remodeling process that occurs. There is a research conducted by Khattar et al. (2001) indicates there is a decline in the final volume of systolic through cross sectional echocardiography examination, but there is no change in the final volume of diastolic in patients with a single-jet heart failure with Carvedilol. When ACE inhibitors are added to the Carvedilol group, there is no change in the final systolic volume. However,

there was a significant decrease in the final systolic volume when carvedilol was administered to the Group YanG had been given an ACE inhibitor for 6 months (Khattar, et al. 2001).

In this study there were significant differences between treatment groups with control groups at mass average (price $P = 0,016$) and left ventricular volume (price $p = 0,034$). A decrease in mass and left ventricular volume of carvedilol in the treatment group although the decline occurred not significantly different when compared to before administered carvedilol therapy. While in the control group acquired increase in mass and left ventricular volume carvedilol in comparison with before given the carvedilol.

The important result gained in this study is that carvedilol can restore partial eccentric remodeling that is seen in the left ventricle mass and left ventricular volume in child patients with heart failure due to PJB shunts left to right. This change occurs in research subjects with a stable clinical condition.

Diastolic function of the left ventricle can be assessed by calculating (i) the peak speed and ratio of the E wave and A wave; (ii) The deceleration time, which is the interval of the peak of wave E to the zero cut point from the decrease of the wave slope E; (iii) Atrial filling fraction, the velocity of wave A is integrally divided by the total speed of entry of blood flow through the mitral valve; and (iv) the time of isovolemic relaxation, which is the interval between the end speed of the final blood flow from the left ventricle with the onset of blood flow through the mitral valve taken from the echocardiography pulsed test (ekokardiografi pulsed-wave Doppler) (Nolan, et al. 2008).

In this research there were significant differences in ejection fraction (price $P = 0,031$) and shortening fraction (price $P = 0,041$) between the treatment group and the control group. There was a significant increase in ejection fraction (price $P = 0,039$) and shortening fraction (price $P = 0,040$) on the treatment group compared to

the control group. The increase in ejection fraction and the shortening fraction does not found in the control group.

In this research, there was an increase in E/A ratio after administration of carvedilol in both research groups but the increase was not statistically meaningful (price $P = 0,365$ on the treatment group; and price $P = 0,676$ in the control group). There is no significant difference in the Carvedilol Pascaterapi in both research groups (price $P = 1.00$)

In the research conducted by Bergström et al. (2004), the administration of carvedilol in adults with heart failure diastolic and normal systolic function, can give a significant difference in the ratio of E/A and heart frequency. The decrease in heart frequency will provide a long heart diastolic filling effect so that the diastolic phase occurs longer than the systolic phase for the occurrence of diastolic filling. Carvedilol can fix the early diastolic filling phase through complex interactions between relaxation and heart space. The administration of Carvedilol is not related to the speed improvement of myocardial relaxation, but more on slowing the fast filling phase so that A normal filling pattern occurs (Bergström, et al. 2004).

CONCLUSION

There is a difference in the left ventricular dimension changes during systolic end (DVKI-AS), left ventricular dimensions at the end of diastolic (DVKI-AD), thick left ventricular rear wall at the end of diastolic (DBVKI-AD), thick interventricular septum at the end of diastolic (SIV-AD), left ventricular volume, left ventricular mass, left ventricular ejection fraction, and shortening fraction Left ventricle, but there is no difference in the E/A ratio change between standard therapy groups and carvedilol compared to standard therapy groups in children with heart failure due to the left-to-right PJB shunts.

REFERENCES

- Aziz, A. S., Sigit, R., Basuki, A., & Hidayat, T. (2018). Cardiac motions classification on sequential PSAX echocardiogram. *Indones. J. Electr. Eng. Comput. Sci.*, 12(3), 1289-1296.
- Bergström, A., Andersson, B., Edner, M., Nylander, E., Persson, H., & Dahlström, U. (2004). Effect of carvedilol on diastolic function in patients with diastolic heart failure and preserved systolic function. Results of the Swedish Doppler-echocardiographic study (SWEDIC). *European journal of heart failure*, 6(4), 453-461.
- Clausen, E. (2018). Probable Deep Erosion by Continental Ice Sheet Melt Water Floods: Chalk Buttes Area of Carter County, Montana, USA. *International Journal of Geography and Geology*, 7(1), 14-26.
- Conrad, N., Judge, A., Canoy, D., Tran, J., O'Donnell, J., Nazarzadeh, M., ... & Rahimi, K. (2019). Diagnostic tests, drug prescriptions, and follow-up patterns after incident heart failure: A cohort study of 93,000 UK patients. *PLoS medicine*, 16(5), e1002805.
- Foerster, S. R., & Canter, C. E. (2008). Pediatric heart failure therapy with β -adrenoceptor antagonists. *Pediatric Drugs*, 10(2), 125-134.
- Hsu, D. T., & Pearson, G. D. (2009). Heart failure in children: part II: diagnosis, treatment, and future directions. *Circulation: Heart Failure*, 2(5), 490-498.

- Kantor, P. F., & Mertens, L. L. (2010). Clinical practice: heart failure in children. Part II: current maintenance therapy and new therapeutic approaches. *European journal of pediatrics*, 169(4).
- Kay, J. D., Colan, S. D., & Graham, T. P. (2001). Congestive heart failure in pediatric patients. *The American heart journal*, 142(5), 923-928.
- Khattar, R. S., Senior, R., Soman, P., van der Does, R., & Lahiri, A. (2001). Regression of left ventricular remodeling in chronic heart failure: comparative and combined effects of captopril and carvedilol. *American heart journal*, 142(4), 704-713.
- Kusumastuti, N. P., & Osaki, M. (2015). Electric velocimetry and transthoracic echocardiography for non-invasive cardiac output monitoring in children after cardiac surgery. *Crit Care*, 18(2), 37.
- Lechat, P. (2006). The evolution of heart failure management over recent decades: from CONSENSUS to CIBIS. *European Heart Journal Supplements*, 8(suppl_C), C5-C12.
- Nishiyama, M., Park, I. S., Yoshikawa, T., Hatai, Y., Ando, M., Takahashi, Y., ... & Murakami, Y. (2009). Efficacy and safety of carvedilol for heart failure in children and patients with congenital heart disease. *Heart and vessels*, 24(3), 187-192.
- Nolan, J. P., Neumar, R. W., Adrie, C., Aibiki, M., Berg, R. A., Böttiger, B. W., ... & Kern, K. B. (2008). Post-cardiac arrest syndrome: epidemiology, pathophysiology, treatment, and prognostication: a scientific statement from the International liaison Committee on Resuscitation; the American Heart Association Emergency cardiovascular Care Committee; the Council on Cardiovascular Surgery and Anesthesia; the Council on cardiopulmonary, Perioperative, and Critical Care; the Council on clinical cardiology; the Council on Stroke. *Resuscitation*, 79(3), 350-379.
- Pavo, I. J., & Michel-Behnke, I. (2017). Clinical cardiac regenerative studies in children. *World Journal of Cardiology*, 9(2), 147.
- Remme, W., & Swedberg, K. (2001). Guidelines for the diagnosis and treatment of chronic heart failure. *European heart journal*, 22(17), 1527-1560.
- Spicer, R. L. (2001). Carvedilol—a new dimension in pediatric heart failure therapy. *The Journal of pediatrics*, 138(4), 457-458.
- van der Linde, D., Konings, E. E., Slager, M. A., Witsenburg, M., Helbing, W. A., Takkenberg, J. J., & Roos-Hesselink, J. W. (2011). Birth prevalence of congenital heart disease worldwide: a systematic review and meta-analysis. *Journal of the American College of Cardiology*, 58(21), 2241-2247.
- Wahab, A.S. K.D. (2009). Congestive heart failure. In: Susanto D, editor. *Child cardiology: congenital heart disease that is not cyanotic*. 1st ed. Jakarta: EGC; 271–94 p.
- Widiyanti, P., Paramadini, A. W., Jabbar, H., Fatimah, I., Nisak, F. N., & Puspitasari, R. A. (2016, March). Morphology characterization and biocompatibility study of PLLA (Poly-L-Lactid-Acid) coating chitosan as stent for coronary heart disease. In *AIP Conference Proceedings* (Vol. 1718, No. 1, p. 060008). AIP Publishing LLC.

Dimensions change and left ventricular function carvedilol post therapy due to heart failure cases in children with congenital heart disease left-to-right

ORIGINALITY REPORT

12%

SIMILARITY INDEX

10%

INTERNET SOURCES

7%

PUBLICATIONS

2%

STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Universitas Airlangga Student Paper	2%
2	watermark.silverchair.com Internet Source	1%
3	worldwidescience.org Internet Source	1%
4	link.springer.com Internet Source	1%
5	content.nejm.org Internet Source	1%
6	lirias.kuleuven.be Internet Source	1%
7	www.ncbi.nlm.nih.gov Internet Source	1%
8	heartfailureeducation.blogspot.com Internet Source	1%

9

P. Lechat. "The evolution of heart failure management over recent decades: from CONSENSUS to CIBIS", European Heart Journal Supplements, 06/01/2006

Publication

<1%

10

bpabd.org

Internet Source

<1%

11

Koen Luyckx, Eva Goossens, Jessica Rassart, Silke Apers, Janne Vanhalst, Philip Moons. "Parental support, internalizing symptoms, perceived health status, and quality of life in adolescents with congenital heart disease: influences and reciprocal effects", Journal of Behavioral Medicine, 2012

Publication

<1%

12

www.vastragotaland.net

Internet Source

<1%

13

Gavin I.W. Galasko, Avijit Lahiri. "The non-invasive assessment of hibernating myocardium in ischaemic cardiomyopathy-a myriad of techniques", European Journal of Heart Failure, 2003

Publication

<1%

14

jaha.ahajournals.org

Internet Source

<1%

15

www.heart-scan.co.uk

Internet Source

<1%

16

www.journals.ac.za

Internet Source

<1%

17

www.science.gov

Internet Source

<1%

18

A. Bergström, B. Andersson, M. Edner, E. Nylander, H. Persson, U. Dahlström. "Effect of carvedilol on diastolic function in patients with diastolic heart failure and preserved systolic function. Results of the Swedish Doppler-echocardiographic study (SWEDIC)", European Journal of Heart Failure, 2004

Publication

<1%

19

Jun Gao, Xiaoyuan Feng, Li Zhou, Jing Kang, Zhengliang Meng, Chengwen Guo. "Evaluation of biventricular volume and systolic function of medium to large ventricular septal defect with pulmonary hypertension in infants aged within 1 year old by real-time three-dimensional echocardiography", Research Square, 2020

Publication

<1%

20

academic.oup.com

Internet Source

<1%

21

effectivehealthcare.ahrq.gov

Internet Source

<1%

22

repository.unair.ac.id

Internet Source

<1%

23

umu.diva-portal.org

Internet Source

<1%

24

www.lib.kobe-u.ac.jp

Internet Source

<1%

25

www.nejm.org

Internet Source

<1%

26

Anwar Anwar, Riyanto Sigit, Achmad Basuki, I Putu Adi Surya Gunawan. "Implementation of optical flow: good feature definition for tracking of heart cavity", Indonesian Journal of Electrical Engineering and Computer Science, 2020

Publication

<1%

27

Kathleen E. Simpson. "Can adult heart failure regimens be applied to children : what works and what does not?", Current Opinion in Cardiology, 03/2012

Publication

<1%

28

Otto Kamp. "Effect of the long-term administration of nebivolol on clinical symptoms, exercise capacity and left ventricular function in patients with heart failure and preserved left

<1%

ventricular ejection fraction: background, aims and design of the ELANDD study", Clinical Research in Cardiology, 12/29/2009

Publication

29

Zeinab Alsadat Ahmadi, Manijhe Mokhtari-Dizaji, Anita Sadeghpour, Hamideh Khesali, Ata Firouzi. "Echocardiographic Assessment of the Left Ventricular Physical Parameters: A Comparison Study in Patients With Significant and Non-Significant Coronary Artery Disease", Research Square, 2020

Publication

<1%

30

M G Tektonidou. "Right ventricular diastolic dysfunction in patients with anticardiolipin antibodies and antiphospholipid syndrome", Annals of the Rheumatic Diseases, 2001

Publication

<1%

Exclude quotes On

Exclude matches Off

Exclude bibliography On

Dimensions change and left ventricular function carvedilol post therapy due to heart failure cases in children with congenital heart disease left-to-right

GRADEMARK REPORT

FINAL GRADE

/100

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5
