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**Abstracts: Original Articles**



## Balloon Aortic Valvuloplasty in Pediatric Patients with Low Left Ventricular Ejection Fraction: Is It Safe?

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**Background and aims:** Congenital aortic valve stenosis (AVS) is a rare disease and may develop congestive heart failure. Balloon aortic valvuloplasty (BAV) is a valid established procedure for surgical management of congenital AVS. It has been proven that BAV is effective and safe in patients with preserved left ventricular ejection fraction (PLVEF). However, its efficacy and safety in pediatric patients with low left ventricular ejection fraction (LLVEF) remains uncertain. The study aimed to evaluate the safety and efficacy of BAV in pediatric patients with congenital AVS and LLVEF.

**Materials and Methods:** We analyzed retrospectively the BAV procedures in 10 patients with congenital AVS at the National Cardiovascular Center Harapan Kita between 2014 and 2019. We compared the early results of BAV in PLVEF and LLVEF.

**Results:** Fifteen pediatric patients with congenital AVS were included. There are 4 (27%) patients with LLVEF (EF of 28 (+/- 4)%) and 11 (73%) patients with PLVEF (EF of 79 (+/- 2)%). The age in LLVEF group was 4859 (+/- 1653) days, and 746 (144 – 6006) days in PLVEF group. There is no mortality after procedure in both group. Transient cardiac arrest during the procedure was 5 (45%) patients in PLVEF group compared to 2 (50%) patients in LLVEF group ( $p=0.33$ ). Acute limb ischemia complication only happened in 1 patient with PLVEF, while intracardiac thrombus and neurological disorder found only 1 patient each in LLVEF. Eventhough the length of stay in LLVEF group was longer than PLVEF group (16 vs 3 days,  $p = 0.02$ ), there was significance improvement of EF in the LLVEF compared to PLVEF group (24 (+/- 9)% vs 5 (+/- 3)%;  $p=0,03$ ).

**Conclusions:** BAV is save and beneficial to improve the LVEF in pediatric patients with congenital AVS and LLVEF.

**Keywords:** Balloon Aortic Valvuloplasty, Left Ventricular Ejection Fraction



**CHARACTERISTICS OF PATIENTS UNDERWENT  
PERCUTANEOUS CORONARY INTERVENTION AND CORONARY  
ANGIOGRAPHY at dr. M. SALAMUN AIR FORCE HOSPITAL**

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**Background and aims:** To describe the characteristics of patients undergoing Percutaneous Coronary Intervention (PCI) and coronary angiography at dr. M. Salamun Air Force Hospital

**Material and Methods:** This study is a descriptive retrospective which use secondary data from medical record from June 2019 through June 2020. The data is managed then divided into demographic characteristics, diagnosis, and findings of the PCI or coronary angiography

**Results:** Of the 447 patients, 295 (65,9%) were male and the age range between 45 – 65 years old. The type of intervention carried out was dominated by PCI with 317 cases (70,9%). PCI procedure was performed mostly in Acute Coronary Syndrome (ACS) as many as 211 cases (66.6%). Both 1 Vessel Disease (VD) and 3 VD have the same percentage, 29.3%. Most of the patient who underwent coronary angiography showed normal coronary angiography or non-significant stenosis.

**Conclusions:** Male gender and age classification are the same as the study conducted by Joshua, et al and Remita Hutagalung, et al. Most of the patients underwent PCI, and two-third of the patient underwent PCI was due to ACS, this data was consistent with study conducted by Alkhouli, et al.

**Keywords:** PCI, Coronary Angiography, ACS



## Immediate Outcome of Percutaneous Balloon Mitral Valvuloplasty in Patient with Mitral Stenosis at Dr. M Djamil Hospital Padang: A Single-Center Experience

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**Background:** Percutaneous Balloon Mitral Valvuloplasty (BMV) is an alternative to surgery in patients with mitral stenosis who remain symptomatic despite adequate medical therapy. This procedure has been recommended as a treatment of choice for severe pliable rheumatic mitral stenosis. This study aimed to evaluate the immediate outcome of percutaneous balloon mitral valvuloplasty procedure in patients with mitral stenosis in Dr. M Djamil Hospital Padang.

**Materials and Methods:** This descriptive study was performed in the Department of Cardiology, M. Djamil Hospital Padang, to evaluate the immediate outcome of BMV in patients with mitral stenosis. A total of nine patients who underwent BMV from 2019 to 2020 were included. Before the procedure, the patients underwent Transesophageal echocardiography to measure the mitral valve area (MVA), mean mitral valve gradient (MVG), left atrial pressure. After that, the measurement results before and after the procedure were compared, and all complications were noted. The procedure was defined as a success if final MVA  $>1,5 \text{ cm}^2$  or there was  $>50\%$  increase in the area without mitral regurgitation more than moderate.

**Results:** In this study, nine patients were included (4 males, 5 females). The MVA (Mean $\pm$ SD) showed an increase from  $0.66\pm 0.21 \text{ cm}^2$  to  $1.19\pm 0.21 \text{ cm}^2$  with procedure success rate of 8/9. The MVG and left atrial pressure (Mean $\pm$ SD) decreased from  $11.78\pm 7.48 \text{ mmHg}$  to  $5.33\pm 2.60 \text{ mmHg}$ , and from  $27.56\pm 4.61 \text{ mmHg}$  to  $18.67\pm 5.67 \text{ mmHg}$ , respectively. The complications occurred at approximately the following rates: mortality (0/9), cardiac tamponade (0/9), mitral regurgitation more than mild (2/9), atrial septal defect detected by color Doppler (2/9), and thrombus formation (1/9).

**Conclusions:** This study demonstrated that percutaneous mitral balloon valvuloplasty as a treatment of mitral stenosis in M. Djamil Hospital Padang is a safe and effective procedure with a high success rate, yet several minor complications were noted.

**Keywords:** Mitral Stenosis, Balloon Mitral Valvuloplasty



## Intermediate-Term Follow-Up of Transcatheter Closure of Patent Ductus Arteriosus: Single Center Experience

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**Background and aims:** Patent ductus arteriosus (PDA) is a common form of congenital heart disease and forms about 5-10% of congenital heart diseases. Transcatheter closure of patent ductus arteriosus (PDA) has become an alternative treatment to surgery. We evaluated the short-term results of the transcatheter closure of PDA.

**Material and Methods:** In this descriptive study, we collected patients who underwent transcatheter closure of patent ductus arteriosus between May 2019 and February 2020. A total of 12 patients with PDA closure by devices. Clinical hemodynamic data, echocardiographic were assessed pre and postprocedurally and at follow-up at 1 weeks, 1 months, 3 month, and 6 month.

**Results:** The range age of the patients at procedure was 6 to 20 years, most of patient were female (66%) with range of aortic isthmus diameter from 3 mm to 20 mm, range of device occluder from 8 mm to 9.80 mm. During the procedure, right heart catheterization was performed with result 7 patient (58.3%) had high flow and low resistance. The devices were successfully deployed to all patients. One patient had largest aortic isthmus diameter 9.8 mm and and deployed device with size 20 mm. There were no cases of residual shunt, late embolization, aortic obstruction, or infective endocarditis after intermediate-term followup (up to 6 month).

**Conclusion:** Transcatheter PDA closure was safe and effective, with a high success rate at intermediate-term follow-up.

**Keywords:** Patent Ductus Arteriosus, transcatheter closure, Treatment Outcome



## Interventions in Pulmonary Hypertensive Acyanotic Congenital Heart Disease at Sanglah General Hospital: Single Center Experiences

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**Background:** Pulmonary hypertension (PH) is a common complication in patients with congenital heart disease (CHD). It could lead to right ventricular failure and early death. Various acyanotic CHDs differ in characteristics, functionality, and clinical outcomes, and the need for interventions. The purpose of this study was to describe the characteristic and outcomes of intervention in various acyanotic CHDs with PH in our institution.

**Materials and Methods:** This descriptive study was based on pediatric intervention registry at Sanglah General Hospital from July 2009 until October 2020. Patients with acyanotic CHD and PH underwent intervention procedure percutaneously were included. Gender, age at procedure, underlying diagnosis, pulmonary arterial resistance index (PARI), flow ratio, mean pulmonary arterial pressure (mPAP) were recorded. PARI of more than 4 WU x m<sup>2</sup> defined as pulmonary hypertension. We grouped patients age into infant (0 days old to 11 months 29 days old), children (1 years old to 12 years old 11 months), adolescents (13 years old To 18 years old 11 months), and adult (Over 19 years old).

**Results:** There were 291 patients (33.1%) with PH among 880 patients. The majority were female (n=193, 66.3%) and from children group (n=128, 44.0%). The majority of defects were patent ductus arteriosus (PDA) (n=102, 35.1%) followed by ventricular septal defect (VSD) (n=88, 30.2%) and atrial septal defect (ASD) (n=45, 15.5%) respectively. The median mPAP was 38.0 mmHg, PARI was 6.69 WU x m<sup>2</sup> and flow ratio was 1.20. Most cases of PDA (n=100, 98%) was closed transcatheterly, followed by VSD (n=46, 52.3%) and ASD (n=21, 46.7%) respectively. Most PDA (n=60, 60%) and VSD (n=17, 37%) were completely closed with smoky residual. Major complications occurred within PDA group (n=4, 0.03%), and none reported within ASD group.

**Conclusions:** Female, children group, and PDA were the most frequent characteristic in patient with acyanotic CHD and PH. Transcatheter closure were effective with minimal complications.

**Keywords:** Pulmonary hypertensive, acyanotic congenital heart disease



## Left Atrial Strain As A Novel Imaging Biomarker in Prediction of Atrial Fibrillation in Patients with Suspected Cardioembolic Stroke

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**Background and aims:** Up to one-third of ischemic stroke attributed to atrial fibrillation (AF). To date, the assessment of left atrial (LA) function has been proven with the existence of paroxysmal AF, but still it just confined to field of research and observational study. One of the important issue regarding detection of silent AF is finding a simple clue from LA remodelling that the AF exists even though not yet recorded. The aim of this study was to explore whether LA strain can be used as biomarkers in to predict the occurrence of paroxysmal AF in patients with suspected cardioembolic stroke.

**Materials and Methods:** This study evaluated all patients who had transthoracic echocardiogram following presentation with embolic stroke of undetermined source (ESUS). Evaluation of LA global longitudinal strain (GLS) and reservoir strain (RST) using velocity vector imaging (VVI) in 52 ischemic stroke patients [21 Pre-Holter Monitoring (Pre-HM), 17 paroxysmal AF proven by 72-hour Holter Monitoring (PAF), and 14 chronic AF during echo examination (Persi-AF) as control subjects] were compared. The group were compared by one-way of variance (ANOVA) for multiple comparisons. Differences were considered statistically significant at  $p < 0.05$ .

**Results:** LA function was significantly lower in Pre-HM and PAF patients, (GLS:  $22.5 \pm 5.8\%$ ; RST:  $25.0 \pm 8.0\%$ ) and (GLS:  $19.9 \pm 6.9\%$ ; RST:  $20.9 \pm 8.3\%$ ), respectively; and much lower in Persi-AF patients (GLS:  $12.4 \pm 6\%$ ; RST:  $12.4 \pm 6.7\%$ ;  $p < 0.001$ ). Both GLS and RST values in Pre-HM vs those in PAF are not significant ( $p = 0.24$  and  $p = 0.12$ , respectively). In multivariate logistic regression analysis, GLS and RST were independent feature of future AF.

**Conclusion:** LA strain is a novel biomarker to predict the occurrence and recurrence of AF in patients with cardioembolic stroke. In particularly, decreased LA-GLS and LA reservoir strain value obtained from echocardiographic could be used to encourage a long-term monitoring ECG albeit in the normal sinus rhythm.

**Keywords:** Left Atrial Strain, Imaging Biomarker, Atrial Fibrillation, Cardioembolic Stroke.



## Single Center Registry Update of Ductal Stenting in Congenital Heart Disease with Ductal Dependent Pulmonary Blood Flow

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**Background and aims:** Lesion with ductal-dependent pulmonary circulation, which pulmonary blood flow for oxygenation is supplied by the systemic circulation through PDA. Patient usually presents with severe cyanosis. The risk of mortality and morbidity is highest during neonatal period and increase when diagnosis and proper management are delayed. Early stabilization through maintaining pulmonary blood flow is crucial to improve the outcome in neonates. Ductal stenting now becoming an emerging procedure, but still challenging for catheterization center as it's not widely done in Indonesia. This retrospective analysis aimed to report early experience in National Cardiovascular Center Harapan Kita in short term and complication of ductal stenting in cyanotic ductal dependent CHD.

**Material and Methods:** We collect data from 2013 to September 2020. Thirty-nine neonates with cyanotic ductal dependent congenital heart disease underwent ductal stenting as palliative care. Data were collected from medical records of all patients.

**Results:** We performed ductal stenting in 39 patients. The procedures were successful in 29 patients (74,35%). Among all of the procedure, only 11 patients (28,2%) underwent carotid artery cutdown for procedural access, and the rest using femoral access. 13 patients used bare metal stenting (33,3%), while 26 patients used drug-eluting stent. Dual antiplatelet, aspirin and clopidogrel, were given to 22 patients (56,4%) following the procedure. Complication following procedure were observed in 16 patients, with proportion of acute limb ischemia 7,69%, sepsis 7,69%, bleeding event 12,8%, dislodged stent 7,69%, and in-stent thrombosis 7,69%. Among all of the procedure, 26 patient had drug-eluting stent (66,67%), while 13 patients had bare metal stent (33,33%). Mortality rate among patients underwent the procedure were observed in 10 patients (25,64%).

**Conclusions:** Ductal stenting in congenital heart disease with ductal dependent pulmonary blood flow remained one of the most promising alternative procedure for palliative care before definitive operation performed. Ductal stenting also showed good outcome with 41% complication events following the procedure.

**Keywords:** Patent ductus arteriosus stenting, duct dependent pulmonary blood flow



## The Association Between Coronary Lesion Severity based on Gensini Score with Ankle-Brachial Index in Stable Coronary Artery Disease Patients

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**Background and aims:** To investigate the association between coronary lesion severity based on Gensini score with Ankle-Brachial Index (ABI) in stable Coronary Artery Disease (CAD) patients  
**Materials and Methods:** This cross-sectional study enrolled 62 stable CAD patients with significant coronary lesions who underwent coronary angiography from September 2019 - January 2020 at Sanglah General Hospital. The severity of coronary lesions was measured using Gensini score, then an ABI examination was performed. ABI less than 0.9 was classified as low and 0.9 – 1.4 as normal.

**Results:** Among 62 study subjects, 51 subjects (82.2%) were male, age  $58.34 \pm 8.6$  years, and 18 subjects (29%) had low ABI. There was a significant mean difference of Gensini score between low and normal ABI groups ( $89.44 \pm 32.2$  and  $55.41 \pm 28.9$ ; mean difference 34.03; 95% CI 16.1-51.9;  $p = 0.001$ ). Based on the Receiver Operating Characteristic (ROC) curve analysis, the cut off point of Gensini score to determine low ABI was 67 with sensitivity 66.7% and specificity 68.2% (AUC 0.789;  $p < 0.0001$ ). Using multivariate analysis, it was found that the variables that independently associated with low ABI were smoking (PR 4.533; 95% CI 1.106 - 22.140;  $p = 0.036$ ), diabetes mellitus (PR 7.186; 95% CI 1.854 - 38.245;  $p = 0.006$ ), and Gensini score  $\geq 67$  (PR 4.606; 95% CI 1.169 – 21.716;  $p = 0.030$ ).

**Conclusion:** Severe coronary lesions with Gensini score  $\geq 67$ , smoking, and diabetes mellitus were associated with low ABI in stable CAD patients.

**Keywords:** *Gensini score, Ankle-Brachial Index, Stable CAD*



## Short Term Outcome on Carotid Artery Approach for Patent Ductus Arteriosus Stenting in Infants with Ductal Dependent Pulmonary Circulation: a Single Center Study

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**Background and aims:** Patency of ductus arteriosus in infants with ductal dependent pulmonary circulation is very important and can be achieved by implanting a stent through cardiac catheterization. However, cannulation of the patent ductus arteriosus (PDA) using femoral artery approach is often difficult to achieve due to the vertical position of the PDA in infants. Carotid artery approach, using a surgical cutdown, may cannulate the PDA easily due to the natural position of the carotid artery toward the PDA. However, data is scarce regarding short term outcome on safety and efficacy of the procedure using carotid artery approach. This study aimed to describe the short term outcome on safety and efficacy of carotid artery approach for PDA stenting in infants with ductal dependent pulmonary circulation.

**Material and Methods:** We collected and analyzed data from infants with ductal dependent pulmonary circulation who underwent PDA stenting from 2013 to September 2020.

**Results:** There were 39 infants with ductal dependent pulmonary circulation who underwent PDA stenting from 2013 to September 2020. With 11 cases (28%) using carotid artery approach and 28 cases (72%) using femoral artery approach. The carotid artery approach group consisted of 3 cases of pulmonary atresia with intact ventricular septum (PA-IVS) and 8 cases of pulmonary atresia with ventricular septal defect (PA-VSD). Meanwhile the femoral artery approach group consisted of 15 cases of PA-IVS, 9 cases of PA-VSD, 1 case of severe pulmonary stenosis, 1 case of transposition of the great arteries with intact ventricular septum (TGA-IVS), 1 case of transposition of the great arteries with ventricular septal defect (TGA-VSD), and 1 case of hypoplastic left heart syndrome (HLHS). The success rate of stent implantation was 100% for carotid artery approach group and 93% for femoral artery approach group. The two cases of failed implantation in the femoral artery group was due to difficulty in cannulating the PDA and has contributed to inhospital mortality. There was 1 case (9%) of inhospital mortality in the carotid artery approach group due to ischaemic stroke after surgical closure of the carotid artery. Meanwhile, in the femoral artery approach group, there were 9 cases (32%) of inhospital mortality. Two cases caused by stent implantation failure resulting prolonged acidosis and sepsis, another 7 cases were caused by bleeding and sepsis after a prolonged ICU care.

**Conclusion:** Carotid artery approach for PDA stenting in infants with ductal dependent pulmonary circulation is safe with acceptable success rate and inhospital mortality.

**Keywords:** Patent ductus arteriosus stenting, ductal dependent pulmonary circulation.



## Transcatheter Closure Of Atrial Septal Defect: A Single Center Experience With One Year Serial Follow-Up

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**Background and aims:** The therapeutic strategy for secundum atrial septal defect (ASD) has changed a lot in the past decade due to the evolution of technological devices and currently the use of septal occluder is the main choice in various service centres because it shows a high success rate and excellent safety. This study aims to assess feasibility, safety, and efficacy of the use of septal occluder for the closure of ASD at developing country single centre that has relatively new experience with percutaneous cardiac catheterization procedure.

**Material and methods:** The descriptive study was conducted at Dr. M. Djamil Hospital, Padang, West Sumatra, Indonesia. Patients included in this study were all patients who underwent ASD device closure from September 2018 until October 2019. All patients had clinical, transthoracic, and transesophageal echocardiographic (TEE) evaluation prior to device closure. Postclosure follow-up was done at 1 weeks, 1 months, 3 month, 6 month, 12 month and annually thereafter.

**Results:** Eight patients underwent ASD closure using device during the study period. Mean age and weight of the group was  $33.7 \pm 14.7$  years and  $41.2 \pm 6.2$  kg respectively. Mean ASD diameter on TEE was  $24.7 \pm 3.0$  mm. The procedure was successful in 7/8 patients. One patient suffered from device dislodgment and successfully pulled out by snaring technique. Follow-up was available in 7 patients over a period of  $12.8 \pm 3.3$  months. No patients had residual shunt, embolization, arrhythmia, cardiac erosion or perforation. The severity of tricuspid regurgitation decreased in 7/8 patients. The mean pulmonary artery pressure decreased from  $25.6 \pm 10.7$  to  $13.1 \pm 10.9$  mm Hg.

**Conclusion:** Device closure of ASD is currently accepted as the treatment of choice in most patients with secundum ASD, showing excellent efficacy as well as lower complication rate.

**Keywords:** Atrial septal defect, transcatheter closure



## Antegrade Versus Retrograde Approach in Zero Fluoroscopy Transcatheter Patent Ductus Arteriosus Closure, Which One is more Promising?

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**Background and aims:** Transcatheter closure of patent ductus arteriosus (PDA) with zero fluoroscopy has now become a treatment of choice replacing fluoroscopy. Device closure in PDA is usually done by an antegrade technique where PDA is crossed from the PA side. In some patients, this universal procedure may not be successful due to anatomical differences. There are still limited study that reviewed the use of retrograde approach in this setting. Here we reviewed the efficacy, feasibility, and safety of retrograde approach in zero fluoroscopy transcatheter PDA closure.

**Method and aims:** We reviewed clinical and catheterization reports of 38 patients who underwent successful zero fluoroscopy transcatheter PDA closure between March 2019 and October 2020 in the National Cardiovascular Center Harapan Kita.

**Results:** All subjects had successfully undergone zero fluoroscopy transcatheter PDA closure. of all 38 subjects, 15 subjects underwent antegrade approach, and 23 subjects underwent retrograde approach. The procedural time was different between both groups (mean procedural time was 36.43 minutes in retrograde approach, and 61.6 minutes in antegrade approach). Retrograde approach was faster in procedural time, with the similar low rate of complications compared to antegrade approach.

**Conclusions:** Retrograde approach in zero fluoroscopy transcatheter PDA closure was faster in procedural time, feasible to do, and has the similar low complication compared to antegrade approach.

**Keywords:** retrograde approach, zero fluoroscopy, transcatheter PDA closure