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Case Report

Double Balloon Technique for Percutaneous Transluminal Septal Myocardial Ablation (PTSMA) of Hypertrophic Cardiomyopathy

Haryadi Adi, Yoga Yuniadi, Dicky A Hanafy

Departement of Cardiology and Vascular Medicine, Faculty of Medicine University of Indonesia, and National Cardiovascular Center Harapan Kita, Jakarta

Percutaneous transluminalseptal myocardial ablation (PTSMA), has been a standard treatment of hypertrophic cardiomyopathy (HCM). Rarely, special technique of PTSMA needed for complicated HCM case with collateral of target artery (septal perforator) into distal left anterior descending. To overcome such problem, a case of double balloon technique during PTSMA will be elaborated.

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Keywords: percutaneous transluminalseptalmyocardial ablation, double balloon

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Laporan Kasus

Teknik Balon Ganda Untuk Ablasi Septum Miokardium Transluminal Perkutan Pada Kardiomiopati Hipertrofik

Haryadi Adi, Yoga Yuniadi, Dicky A Hanafy

Percutaneous transluminalseptal myocardial ablation (PTSMA), telah menjadi terapi standar terapi kardio miopati hipertropi (KMH). Kadang-kadang didapatkan kasus KHM dengan target arteri (septal perforator) yang mempunyai kolateralke distal *left anterior descendens* (LAD), sehingga diperlukan teknik khusus dalam melakukan PTSMA. Akan dilaporkan suatu kasus KHM yang memerlukan teknik balon ganda pada saat PTSMA.

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Kata kunci: percutaneous transluminalseptal myocardial ablation, double balloon

First reported in 1995, Percutaneous alcohol septal ablation treatment involves the introduction of absolute alcohol into a target septal perforator branchof the left anterior descending coronary artery for the purpose of producing a myocardial infarction within the proximal ventricular septum. Septal ablation mimics the hemodynamics consequences of mycetomy by reducing the basal septal thickness and excursion (producing akinetic or hypokinetic septal motion), enlarging the LV outflow tract and, thereby, lessening the systolic anterior motion of the mitral valve and mitral regurgitation.[1-3] Initial experience of PTSMA in Indonesia has been currently reported with good results.[4]

Corresponding Address:
Dr. dr. Yoga Yuniadi, SpJP. Departemen Kardiologi dan Kedoteran Vaskular FKUI, dan Pusat Jantung Nasional Harapan Kita, Jakarta.
Email: *yogayun@yahoo.com*

This technique utilizes methods and technology available for atherosclerotic coronary artery disease. Injection of myocardial contrast with pressure-angiographic and fluoroscopy guided technique is important selecting the appropriate septal perforator branch. The targeted septal perforator and area for infarction are identified by and immediate fall in outflow gradient following ballon occlusion and/or contrast injection.

In generalcurrently, HCM patients are treated pharmacologically with beta adrenergic blocker or non-dihydropiridinecalcium channel blocker only. Treatment results were not sophisticated as the patients remain symptomatic and functionally limited. Hence, the needs for PTSMA in those patients are as of importance.

Case

A 47 years old male with chief symptom of dyspnoe and syncope was refered to NCVCHK for further

work up. He was in functional NYHA class III. The physical examnination was unremarkable. ECG recording showed sinus rhythm with evidence of left ventricle hypertrophy. Echocardiography examination revealed hypertrophic obstructive cardiomyopathy with interventricular thickness of 18 mm, posterior wall thickness of 21 mm, dynamic LVOT gradient of 158 mmHg, and evidence of septal anterior motion (SAM). Left ventricle ejection fraction was 80%. (Figure 1) The invasive resting maximal LVOT pressure gradient were 160 which then immediatelydecrease to 80 mmHg after PTSMA. (Figure 2)

PTSMA

PTSMA technique has been written elsewhere.[4]In brief, after local anesthesia of both groin three vascular sheaths were inserted into femoral artery (6 French in left and 7 French in right) and left femoral vein (6 French). A 6F bipolar temporary pacing electrode (Cordis™, Johnson & Johnson) was inserted through left femoral vein and placed at right ventricle apex. Coronary angiogram was performed to ensure normal coronary flow and anatomy. A multipurpose (MP) catheter (Cordis™, Johnson & Johnson) was inserted into left ventricle through right femoral artery in order

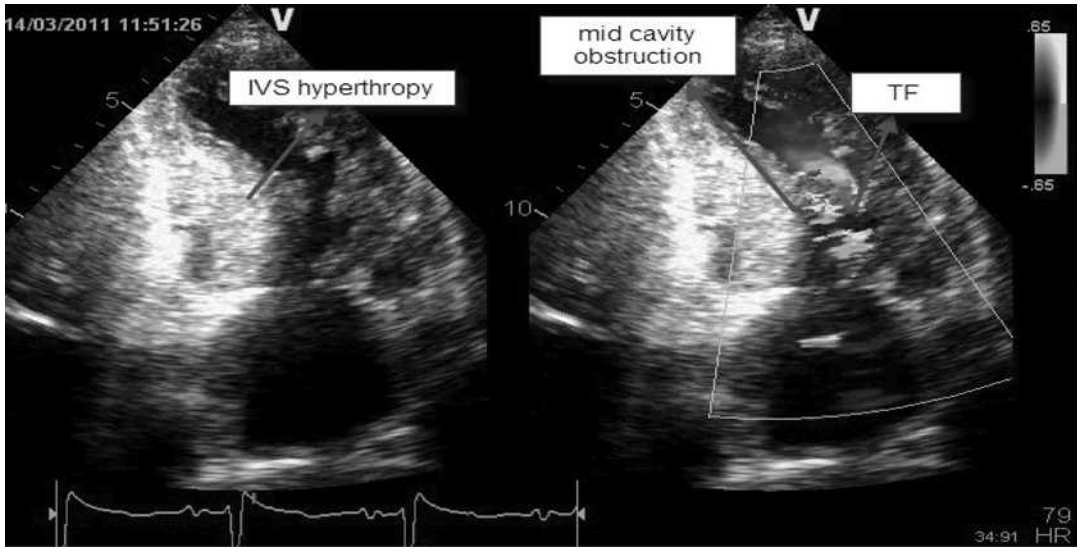

Figure 1. Five chamber view of echocardiography demonstrates IVS *hypertrophy and obstruction at mid left ventricle cavity*. IVS = *interventricular septum*, TF = *turbulence flow resulted from obstruction at mid left ventricle cavity*.

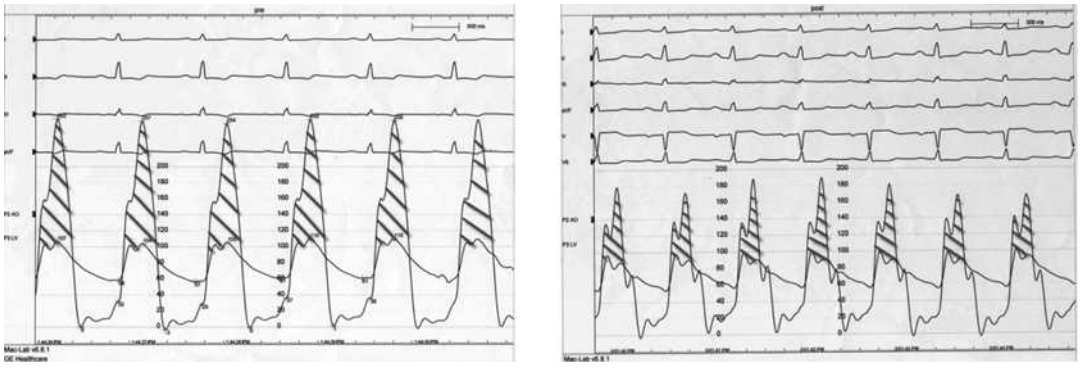

Figure 2. Invasive pressure recording of patient during sinus beat. Left panel showed mid LV pressure gradient before PTSMA which were reduce significantly after PTSMA (right panel).

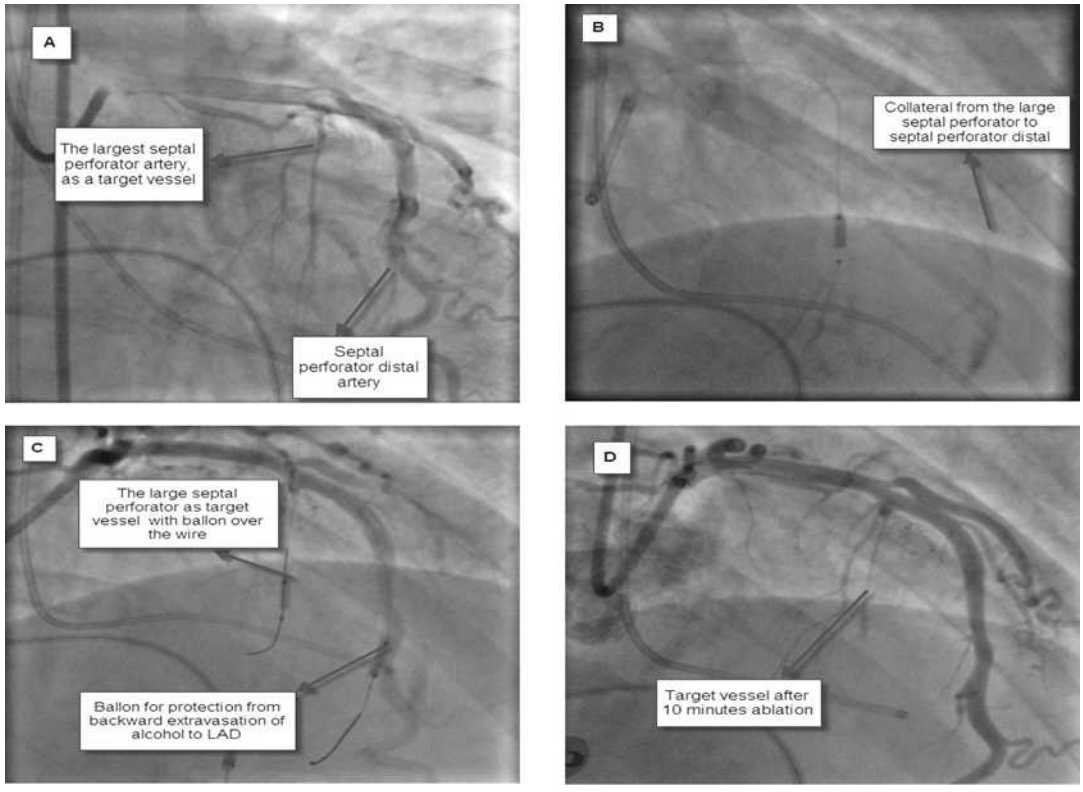

Figure 3. (A) Angiography of left coronary artery demonstrates septal perforator artery (arrow). (B) Septal perforator artery was blocked by over the wire (OTW) balloon. BMW guide wire was retrieved followed by contrast media injection into the OTW balloon lumen shows collateral of septal branch which is contrast flow into left anterior ascending artery. (C) It is followed by 2 ml absolute alcohol injection after balloon inflated at proximal part of septal perforator distal artery. (D) LCA-graphy shows blockage of septal perforator artery 10 minutes after alcohol injection.

to continuously measure left ventricle cavity pressure. Recanulation of left coronary artery by means of extra backup (XB) guiding catheter (Cordis™, Johnson & Johnson) followed by wiring of septal perforator branch of left anterior descending (LAD) artery using BMW guiding wire (Boston Scientific™, USA) after 100 units per kilogram body weight unfractionated heparin injection. Over the wire (OTW) balloon was placed at proximal septal perforator branch and inflated up to 6 atmospheres. Selective contrast media injection was done to visualized septal artery vasculature in order to avoid spill off alcohol injection to LAD unintentionally. Contrastmedia injection showed collateral of target vessel toother distal septal branch which then goes to mid LAD. Then, it was decided to put second guiding wire using Pilot 50 (Boston Scientific™, USA)from mid LAD into distal septal branch. Yangtze balloon was placed at proximalpart of distal septalbranch and inflated up to 6 atmospheres to protectalcohol extravasation to LAD artery. (Figure 3) Three milliliter (ml) of Levovist™ injected into target artery followed by echocardiography confirmation. Intravenous injection of 2-3 milligram of morphine sulfate was given followed by slow injection of 2 ml absolute alcohol into target artery. The first and second balloons remain inflated for ten minutes before pull them off coronary artery. Repeat measure pressure gradient between left ventricle cavity and aorta.

Discussion

This case demonstrates efficacy and safety of PTSMA for HCM patientin which target vessel has collateral to more distal LAD part. Double balloon technique has been effectively prevented alcohol leakage to distal LAD.

Left ventricle outflow tract pressure gradient immediately reduced after alcohol septal ablation without significant side effect.Lessons learned from this case is that selective contrast media injection into target vessel and observation of any collateral drainage is mandatory.

Recently, Agarwal et al[5] and Parham et al[6] reported cases of apical myocardial infarction due to collateralization of septal arteryand could possibly also produce a inferior infarction because of communication between the septal and the descending posterior artery.[7] The study by Chowdhary et al[7] describes a non-complicated inferior infarction related to this procedure, which could have been related with collaterals of this type. If collateral recruitment is detected, it is important to avoid a second alcohol injection, or use a second balloon to occlude the branch into which the collaterals lead to avoid alcohol reaching the LAD.[8]

Collateral recruitment in the septal branch is aphenomenon that can arise during PTSMA. We muststress that in the event of using several alcoholinjections, it is important to rule out collateralsopening up by first injecting contrast, in order toavoid the complications arising from alcohol passingtoward another myocardial area.

References

1. Faber L, Meissner A, Ziemssen P, Seggewiss H. Percutaneous transluminalseptal myocardial ablation for hypertrophic obstructive cardiomyopathy. Long term follow up of the first series of 25 patients. *Heart* 2000;83:326–31.
2. (Gietzen FH, Leuner CJ, Raute-Kreinsen U et al. Acute and long-term results after transcoronary ablation of septal hypertrophy (TASH). Catheter interventional treatment for hypertrophic obstructive cardiomyopathy. *Eur Heart J* 1999;20:1342–54.
3. Knight C, Kurbaan AS, Seggewiss H et al. Nonsurgical septal reduction for hypertrophic obstructive cardiomyopathy. Outcome in the first series of patients. *Circulation* 1997; 95:2075–81.
4. Yuniadi Y, Koencoro AS, Hanafy DA, Firman D, Soesanto AM, Seggewiss H. Percutaneous transluminalseptal myocardial ablation (PTSMA) of hypertrophic cardiomyopathy: Indonesian initial experience. Med J Indones. 2010; 19: 164-71.
5. Agarwal SC, Purcell IF, Furniss SS. Apical myocardial injurycaused by collateralisation of a septal artery during ethanolseptal ablation. Heart. 2005;91:e2.
6. Parham WA, Kern MJ. Apical infarct via septal collateralization complicating transluminal alcohol septal ablation forhypertrophic cardiomyopathy. Catheter Cardiovasc Interv. 2003;60:208-11.
7. Chowdhary S, Galiwango P, Woo A, Schwartz L. Inferior infarction following alcohol septal ablation: A consequence of collateral damage? Cath Cardiovasc Interven. 2007;69:236-42.
8. Rigopoulos A, Sepp R, Palinkas A, Ungi I, KremastinosDT, Seggewiss H. Alcohol septal ablation for hypertrophicobstructive cardiomyopathy: collateral vessel communicationbetween septal branches. Int J Cardiol. 2006;113:e67-9.