Alcohol Septal Ablation for Hypertrophic Obstructive Cardiomyopathy, the First Cases Series in Thailand

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Background: *Alcohol septal ablation (ASA) is an emerging percutaneous technique to treat patients with hypertrophic obstructive cardiomyopathy (HOCM) and refractory to medical therapy. ASA in Thailand has never been reported.*
Material and Method: *The authors reviewed clinical and hemodynamic data of four patients with HOCM before and after ASA performed between November 2007 and May 2008 in Songklanagarind Hospital.*
Results: *ASA without myocardial contrast echocardiography was done successfully in all four patients with HOCM and refractory to medical therapy. The authors used the anatomical characteristics of vessel and pressure-guided technique to identify the optimal septal perforator artery. The averages of left ventricular outflow tract (LVOT) peak/mean pressure gradients (PPG/MPG) were 105/56 before and 32/18 mmHg immediately after ASA, consecutively. There were further falls in LVOT PPG and MPG to averages of 14 and 8.5 mmHg respectively at 6-12 week follow-up. The mean absolute alcohol volume was 2.5 $\pm$ 0.41 ml. Transient complete atrioventricular block occurred in one patient. All patients reported substantial symptomatic improvement.*
Conclusion: *The authors reported the first cases series of HOCM patients who underwent ASA in Thailand. ASA without myocardial contrast echocardiography in carefully selected patient is feasible, effective, and safe.*

Keywords: *Hypertrophic obstructive cardiomyopathy, Alcohol septal ablation*

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Hypertrophic cardiomyopathy (HCM) is the most common genetic cardiac disease with heterogeneous clinical and phenotypic expression[1]; however, HCM is uncommon in the general population. About 20-30% of patients with HCM have left ventricular outflow tract (LVOT) obstruction at rest, the entity is called hypertrophic obstructive cardiomyopathy (HOCM), caused by mitral-septal contact during systole[2]. In patients with HCM, LVOT obstruction at rest is a strong, independent predictor of progression to severe symptoms of heart failure and of death[3]. Surgical septal myectomy or alcohol septal ablation (ASA) are the treatments for patients with HOCM who are refractory to medical therapy[2,4]. The hemodynamic and functional improvements after ASA are similar to those of surgical septal myectomy[4].

In the present study, the authors report the successful, immediate, and short-term results of ASA to treat the patients with medically refractory symptom HOCM. Although a small case number, this report is the first cases series reporting patients with HOCM who underwent ASA in Thailand.

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Material and Method

Between November 2007 and May 2008, four patients with medically refractory symptom HOCM underwent ASA at Songklanagarind Hospital. The patients need to meet all following criteria[5,6]: 1) symptoms that interfere with quality of life despite optimal

medical treatment; 2) septal thickness at least 16 mm; 3) resting LVOT peak systolic pressure gradient (PPG) at least 30 mm Hg or at least 50 mmHg with provocation; 4) accessible septal branch; and 5) the absence of intrinsic mitral valve dysfunction and of other conditions for which cardiac surgery is indicated. Informed consent for the procedures was obtained from each patient. The report was approved by the Ethics Committee, Faculty of Medicine, Prince of Songkla University.

ASA procedure

A 5 French (Fr) pigtail catheter was inserted via either the femoral artery to confirm the LVOT pressure gradient (pull back left ventricle-ascending aorta). If there was significant LVOT gradient, the operator performed coronary angiography to assess the suitability of the first septal branch of the left anterior descending artery (LAD) and co-existing coronary artery disease. After insertion of a "stand-by" temporary pacing wire through the right internal jugular vein, a 7 Fr JL guiding catheter was used to engage the left main coronary artery. Aspirin 300 mg was given at least 2 hours before the procedure. Heparin 70-100 units/kg and Fentanyl 1 microgram/kg were given in the catheterization laboratory.

The operator used the standard coronary angioplasty guidewire to negotiate the first septal branch followed by insertion of the shortest length over-the-wire balloon with 1.5-2.0 mm in diameter (balloon: vessel diameter ratio = 1:1) to the first septal branch. The balloon was inflated at low pressure (4-6 atmospheres) to occlude the first septal branch and 1:1 diluted contrast media was slowly injected through the balloon central lumen to ensure the lack of spillage into the LAD. Absolute alcohol (Ethanol) was slowly infused through the balloon catheter (1 ml over 1 minute). Repeated injections of ethanol were administered, if needed, to achieve final pressure gradient of less than 20 mmHg. The balloon was kept inflated for at least 5 minutes after the end of alcohol infusion. The electrocardiogram was closely monitored for evidence of bradycardia and heart block, and the ethanol injection was aborted upon the development of high-grade atrioventricular (AV) block. Patients were observed in intensive care unit for at least 24 hours; the pacemaker lead was kept for at least 48 hours if there were no episodes of high grade AV block.

Follow-up

Clinical symptoms were assessed and echocardiography was done at 6-12 weeks after the ASA procedure.

Statistical analysis

Data were analyzed and expressed as mean value and standard deviation (SD).

Results

The clinical and hemodynamic data before and after ASA, and the outcome in four patients, are shown in Table 1. ASA was successful in all four patients. The mean alcohol volume was 2.5 ± 0.41 ml. The averages of LVOT peak/mean pressure gradients (PPG/MPG) were 105/56 before and 32/18 mmHg immediately after ASA, consecutively. No patients experienced any major complications as the result of the procedure. One patient developed transient complete heart block in catheterization laboratory and improved spontaneously. There were further falls in PPG and MPG at 6-12 week

Table 1. Clinical and hemodynamic data

Patient No.	Age/sex	Functional class: Pre ASA	Alcohol volume (ml)	Pre-ASA LVOT-PPG/ MPG	Immediately Post-ASA LVOT-PPG/ MPG	6-12 weeks LVOT-PPG/ MPG	Complications	Functional class: Post ASA
1	47/M	3	2.5	108/55	29/18	17/9	None	1
2	40/M	3	3.0	123/76	38/21	19/10	CRBBB	1
3	37/F	3	2.0	100/42	42/19	12/9	Transient CHB	1
4	73/F	3	2.5	88/52	18/13	10/6	None	2
Mean value (SD)			2.5 (0.41)	105/56	32/18	14/8.5		

M, male; F, female; ASA LVOT-PPG/MPG, alcohol septal ablation left ventricular outflow tract peak pressure gradient/ mean pressure gradient; CRBBB, complete right bundle branch block; CHB, complete heart block

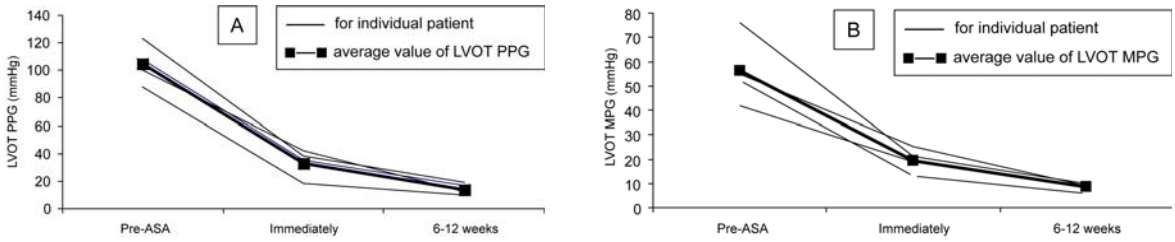

Fig. 1 A: Left ventricular outflow tract (LVOT) peak pressure gradient (PPG) and, B: LVOT mean pressure gradient (MPG) pre-ASA, immediately and 6-12 weeks after alcohol septal ablation (ASA)

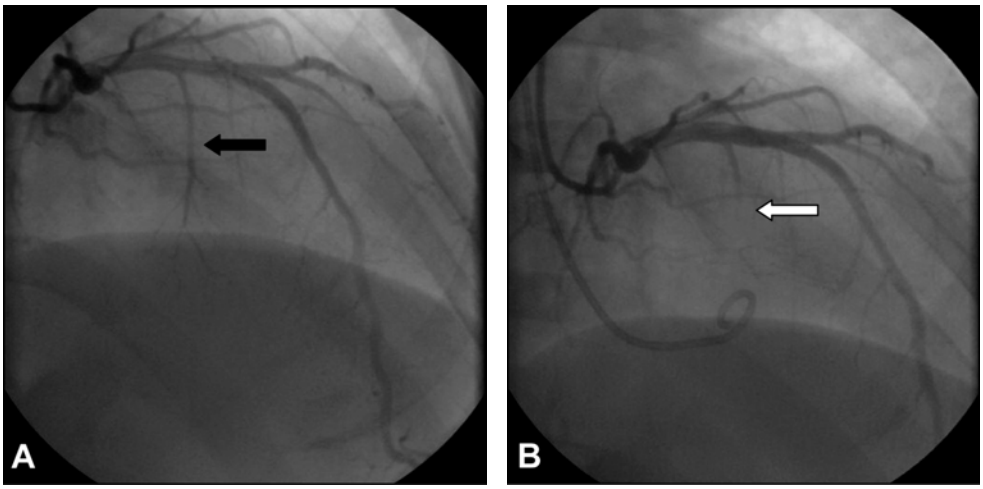

Fig. 2 A: The first septal perforator branch of the LAD before ASA (black arrow), B: No contrast filling beyond mid part of the first septal branch after ASA (white arrow)

Fig. 3 Simultaneous pressure tracing of the left ventricle and ascending aorta in the patient No.1, A: LVOT peak pressure gradient (PPG) before ASA was 108 mmHg, B: LVOT-PPG immediately after ASA was 29 mmHg

follow up echocardiography. All patients had substantially symptomatic improvement. No complications were observed during 6-12 weeks follow-up.

Discussion

Medical treatment, including beta-blocker, verapamil, or disopyramide, is the initial treatment for symptomatic HCM. Patients with LVOT obstruction and severe symptoms unresponsive to medical therapy represents about 5% of the patients with HCM and are candidates for surgical myectomy or ASA to relieve the obstruction[3]. Surgical myectomy is still considered the "gold standard" in the non-pharmacological treatment of obstructive HCM[7,8]. However, clinical data have demonstrated both clinical and hemodynamic efficacy of ASA. In a comparison study, the hemodynamic and functional improvements at one year are similar to those of surgical myectomy[4]. A recent nonrandomized study also showed that four-year survival free of all mortality in patients undergone ASA was similar to that of age- and gender-matched patients who had undergone surgical septal myectomy[5]. However, a randomized-controlled trial comparing surgical septal myectomy and ASA has never been done.

The present study found that ASA in carefully selected patient is feasible, effective, and safe. Without myocardial contrast echocardiography, selection of the optimal or suitable septal perforator is the most challenging step. Myocardial contrast echocardiography was applied to identify the optimal septal branch. However, myocardial contrast echocardiography was not available in Thailand. In each of the four patients, the target septal perforator was the "typical" first septal perforator (isolated, the largest septal branch without adjacent branch). Besides using typical septal anatomy to select the optimal septal branch, the authors also used the pressure-guided technique. Falling of LVOT pressure gradient after balloon inflation in the septal perforator (without alcohol injection) can indicate the optimal septal perforator[9]. In cases with small, multiple septal perforator branches from the LAD or coronary arteries other than the LAD supplied LVOT area, using myocardial contrast echocardiography to identify mitral-septal contact is mandatory.

A recent randomized control trial comparing low dose and standard dose of alcohol for ASA with myocardial contrast echocardiography-guided in 54 patients with HOCM showed that lower dose (1.5 ± 0.4 ml) was as effective as standard dose (2.6 ± 0.6 ml)[1]. The ASA technique in that study was different from the "standard" technique in the present study. The mentioned study aimed to decrease LVOT gradient > 50% from baseline whereas the present study aimed for lower gradient (< 20 mmHg). The difference in LVOT gradient target explains the different dose of alcohol.

Study limitation

Because of the small case number, results of the present study cannot represent the true success rate and incidence of complications, which were not uncommon in prior published studies. Assessment of the pressure gradients pre-ASA and immediately post-ASA was done by using cardiac-catheterization data, whereas the pressure gradient at 6-12 weeks after ASA was assessed by echocardiography.

Conclusion

The authors reported the first cases series of ASA for patients with HOCM and refractory to medical treatment. ASA without myocardial contrast echocardiography in carefully selected patient is feasible, effective, and safe.

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การรักษาผู้ป่วย hypertrophic obstructive cardiomyopathy ด้วยการทำ alcohol septal ablation, รายงานกลุ่มผู้ป่วยครั้งแรกในประเทศไทย

นพดล ชำนาญผล, ตรีชฎา วิสารทพงศ์

***ภูมิหลัง**: Alcohol septal ablation (ASA) เป็นวิธีการรักษาด้วยเทคนิคใหม่ผ่านทางผิวหนังสำหรับผู้ป่วย hypertrophic obstructive cardiomyopathy (HOCM) ที่ไม่ตอบสนองต่อการรักษาด้วยยาและยังไม่มีรายงานการรักษาผู้ป่วยด้วยวิธีนี้ในประเทศไทย*

***วัสดุและวิธีการ**: ผู้รายงานศึกษาข้อมูลทางคลินิกและ hemodynamic ของผู้ป่วย HOCM 4 ราย ที่ได้รับการรักษาด้วยวิธีการทำ ASA ที่โรงพยาบาลสงขลานครินทร์ ตั้งแต่เดือนพฤศจิกายน พ.ศ. 2550 ถึง เดือน พฤษภาคม พ.ศ. 2551 โดยรวบรวมข้อมูลทางคลินิก ผลการตรวจรักษาในห้องปฏิบัติการสวนหัวใจ การติดตามผลการรักษาที่ 6-12 สัปดาห์*

***ผลการศึกษา**: เนื่องจากไม่มี myocardial contrast echocardiography ผู้รายงานจึงใช้การดูลักษณะของหลอดเลือดและการวัดความดันในห้องหัวใจเมื่อหลอดเลือดถูกอุดด้วยบอลลูน (pressure guided-technique) ในการเลือกหลอดเลือด septal perforator ที่เหมาะสม ผลการรักษาทำให้ค่าเฉลี่ยของ left ventricular outflow tract peak pressure gradient (LVOT-PPG) ลดลงจาก 105 มิลลิเมตรปรอทก่อนการรักษา เหลือ 32 มิลลิเมตรปรอททันทีหลังการรักษาและลดลงต่อไปจนเหลือ 14 มิลลิเมตรปรอทที่ 6-12 สัปดาห์ ส่วนค่าเฉลี่ยของ LVOT mean pressure gradient (MPG) ลดลงจาก 56 มิลลิเมตรปรอท เหลือ 18 และ 8.5 มิลลิเมตรปรอทตามลำดับ ปริมาณ absolute alcohol ที่ใช้เฉลี่ยเท่ากับ 2.5 ลูกบาศก์มิลลิเมตร ผู้ป่วยทุกรายอาการดีขึ้นและไม่มีผู้ป่วยรายใดมีภาวะแทรกซ้อนที่รุนแรงจากการรักษา*

***สรุป**: รายงานนี้เป็นรายงานแรกในประเทศไทยที่แสดงผลการรักษากลุ่มผู้ป่วย HOCM โดยการทำ ASA การรักษาโดยการทำ ASA สามารถทำได้ผลดีและปลอดภัย แม้ว่าไม่มี myocardial contrast echocardiography หากมีการคัดเลือกผู้ป่วยที่เหมาะสม*