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TITLE: Alcohol septal ablation through an anomalous dominant septal artery in hypertrophic cardiomyopathy patient: with separate ostium from right coronary sinus

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**ABSTRACT**

**Introduction**

Hypertrophic cardiomyopathy (HCM) is a genetic disease characterized by left ventricular hypertrophy that has variable morphologic and hemodynamic manifestations. Alcohol septal ablation (ASA) has emerged as a widely accepted alternative to surgical myomectomy for the management of HOCM. In this percutaneous, catheter-based procedure, pure ethanol is injected into the septal perforator coronary artery that supplies the hypertrophied myocardium, leading to infarction and thinning of the myocardium in that area.

**Case Report**

62 y/o Female with known history of HCM presented with progressive dyspnea, dizziness and intermittent chest pain, despite high doses of beta-blocker and calcium channel blocker use. Echocardiography revealed asymmetric septal hypertrophy with septal thickness of 16-19 mm, systolic anterior motion of the anterior mitral leaflet and a resting LVOT gradient of 35-40mmHg, which increased to 124mmHg with Valsalva. Non-selective angiogram revealed an anomalous septal artery arising from a separate ostium in the right coronary sinus (Bonapace’s artery). Bonapace’s artery fed the hypertrophic basal septum and was a suitable target for alcohol septal ablation.

**Conclusion**

In this report, we describe a rare case of clinically important Bonapace’s artery in the absence of coronary artery disease. Additionally, this artery was utilized to perform successful ASA to achieve gradient reduction and relief of symptoms in HOCM. The presence and clinical importance of an anomalous septal artery should be sought in HOCM patients with lack of dominant septal artery from the left coronary system.

**Keywords:** HOCM, ASA, aberrant septal artery
TITLE: Alcohol septal ablation through an anomalous dominant septal artery in hypertrophic cardiomyopathy patient: with separate ostium from right coronary sinus

INTRODUCTION
Hypertrophic cardiomyopathy (HCM) is a genetic disease characterized by left ventricular hypertrophy that has variable morphologic and hemodynamic manifestations. Alcohol septal ablation (ASA) has emerged as a widely accepted alternative to surgical myomectomy for the management of HCM. The septum is usually supplied by septal arteries arising from the proximal left anterior descending (LAD) and distal right coronary artery (RCA).

Septal coronary branches arising from the proximal right coronary artery (RCA) or the right coronary sinus, known as descending septal artery (DSA) or Bonapace’s branch, have rarely been described. However, the DSA plays an important role in certain situations like patients with hypertrophic cardiomyopathy, highlighting the need for its proper identification and evaluation [1, 2].

CASE REPORT
62 year old female with known history of hypertrophic cardiomyopathy, hypertension and hypothyroidism referred to clinic with worsening dyspnea despite high doses of metoprolol and Cardizem. Echocardiography revealed asymmetric septal hypertrophy with septal thickness of 16-19 mm, systolic anterior motion of the anterior mitral leaflet and a resting LVOT gradient of 35-40 mmHg, which increased to 124 mmHg with Valsalva (Figure 2A). Subsequently, she underwent cardiac catheterization as her symptoms were worsening and she had elevated cardiac biomarkers which showed origin of anomalous septal artery from separate ostium of right coronary sinus (Bonapace’s artery) and no significant coronary artery disease. (Figure 1, Video 1). Computerized Tomographic scan of her chest for pulmonary embolus which showed incidental right subclavian artery originating from descending thoracic aorta and no pulmonary embolus. Elevated cardiac biomarkers were assumed to be secondary to hypertensive urgency and her antihypertensive medications were adjusted. After 6 months, she returns to office with worsening dyspnea despite adequately controlled Blood pressure. Electrocardiogram shows
normal sinus rhythm with no interventricular conduction delays. Alcohol septal ablation of septal artery was planned as she refused to undergo surgery. Bonapace’s artery fed the hypertrophic basal septum and was a suitable target for alcohol septal ablation. A temporary Trans venous pacemaker was placed through the right internal jugular vein and AR modified guide was utilized to engage the septal artery. A sport wire was used to cross the septal artery, an echocardiogram was obtained with contrast was injection to confirm (Video 2). Then gradual 0.5 cc increments of alcohol were injected to a total of 2 cc. Subsequently, there is significant reduction in gradient from peak of 40 to 15. The temporary pacemaker wire was removed after 48 hours without any evidence of heart block. Two months post ablation, her gradient on resting echo was confirmed maintenance of low LVOT gradients both at rest (10.5 mmHg) and with Valsalva (13 mmHg) (Figure 2B). This corresponded with symptomatic improvement, increase exercise tolerance and quality of life improvement for the patient.

**DISCUSSION**

On review of literature there was case of dominant septal artery originating from right coronary artery first described in 1995 [2]. This anomaly has been previously reported in patients but this when present can be safely and successfully utilized for alcohol septal ablation [3]. Kurita et al [4] performed a percutaneous septal alcohol ablation through a DSA, preceded by the demonstration of its contribution to the perfusion of the basal interventricular septum.

It is also important to understand the technical aspects concerning the evaluation of the DSA which can sometimes be missed. Deep cannulation of the RCA may prevent its identification and in some cases a DSA arising from an independent ostium is accidentally identified while attempting to find the RCA. Contrast back-flow during injections in the RCA might reveal its presence [1, 5].

**CONCLUSION**

In this report, we describe a rare case of clinically important Bonapace’s artery, which has a separate ostium on right coronary sinus. Additionally, this artery was utilized to perform successful ASA to achieve gradient reduction and relief of
symptoms in HCM. The presence and clinical importance of an anomalous septal artery should be sought in HOCM patients with lack of dominant septal artery from the left coronary system.

CONFLICT OF INTEREST
The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers’ bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

AUTHOR’S CONTRIBUTIONS
All authors have substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND Drafting the work or revising it critically for important intellectual content; AND Final approval of the version to be published; AND Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES


**FIGURE LEGENDS**

**Figure 1:** Coronary angiogram showing (double arrow) separate origin of septal artery from right coronary sinus.

**Figure 2:** Echocardiographic gradients before and after septal ablation.

**FIGURES**

![Coronary Angiogram](image-url)

**Figure 1:** Coronary angiogram showing (double arrow) separate origin of septal artery from right coronary sinus.
Figure 2: (A) - Pre-Ablation Echocardiographic gradients: Resting (B) - Post-Ablation Gradients

VIDEOS

Video 1: Coronary angiogram showing separate origin of septal artery from right coronary sinus. The supplemental motion image also shows right coronary artery.

Video 2: Still and supplemental motion image of coronary angiogram showing sport wire crossing anomalous septal artery.