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## Aneurysm of Mid and Apical Interventricular Cardiac Septum Dissecting Along the Basal Part – An Uncommon Entity Diagnosed with CT Angiography

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### Summary

**Background:**

Aneurysm of the muscular interventricular septum is a rare entity as compared to the membranous part. Only a few cases of dissecting septal aneurysm have been reported in literature. Two-dimensional echocardiography is the initial diagnostic modality with ECG-gated CT and MRI being non-invasive imaging modalities for comprehensive evaluation. The complications can arise from chronic pressure erosion of the intervening septal myocardium, leading to left-to-right shunting in the form of ventricular septal defect and paradoxical thromboembolism. Radiologists should be aware of imaging findings of interventricular septal aneurysm, because of its rarity of occurrence and complications.

**Case Report:**

A 48-year-old male patient presented to a cardiology department with complaints of intermittent chest pain, palpitations and exertional dyspnoea. CT angiography revealed a wide-mouth large aneurysm arising from the mid and apical portion of the interventricular septum dissecting into the basal part. There was associated significant bowing (>15 mm) of the septum and mild obliteration of the right ventricular cavity. Myocardium surrounding the aneurysm was identified with no associated ventricular septal defect (VSD). No evidence of intraventricular clot was found. Catheter angiography confirmed the CT angiographic findings.

**Conclusions:**

Radiologists should be aware of imaging findings of interventricular septal aneurysm, because of its rarity of occurrence, complication in the form of thromboembolism, dissection and intracardiac shunting and mass effect over adjacent cardiovascular structures. Careful scrutiny is essential to avoid labelling of these cases as cardiac masses.

**MeSH Keywords:**

**Angiography • Heart Aneurysm • Multidetector Computed Tomography • Ventricular Septum**

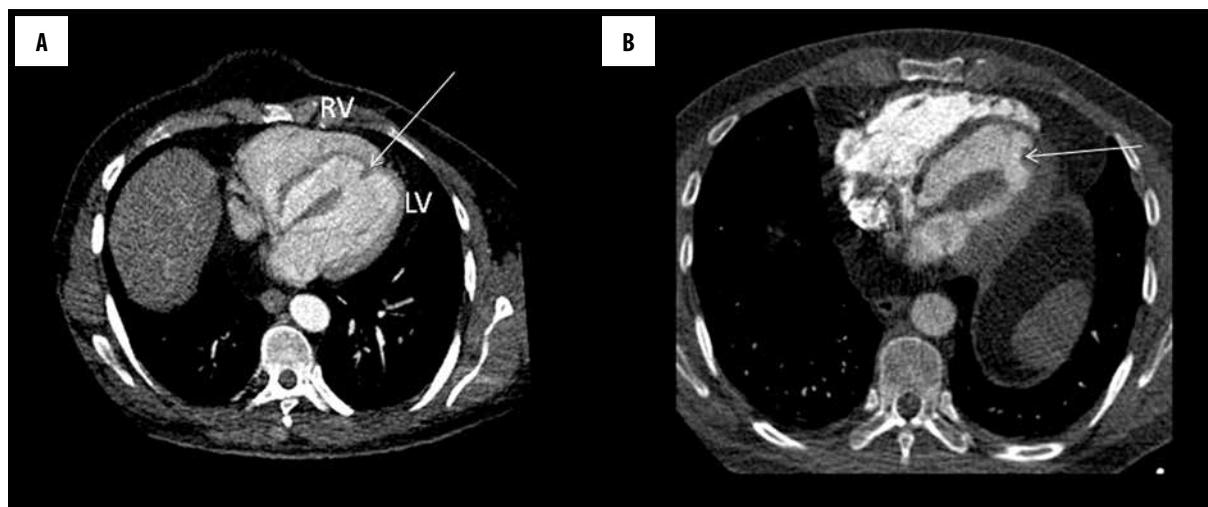
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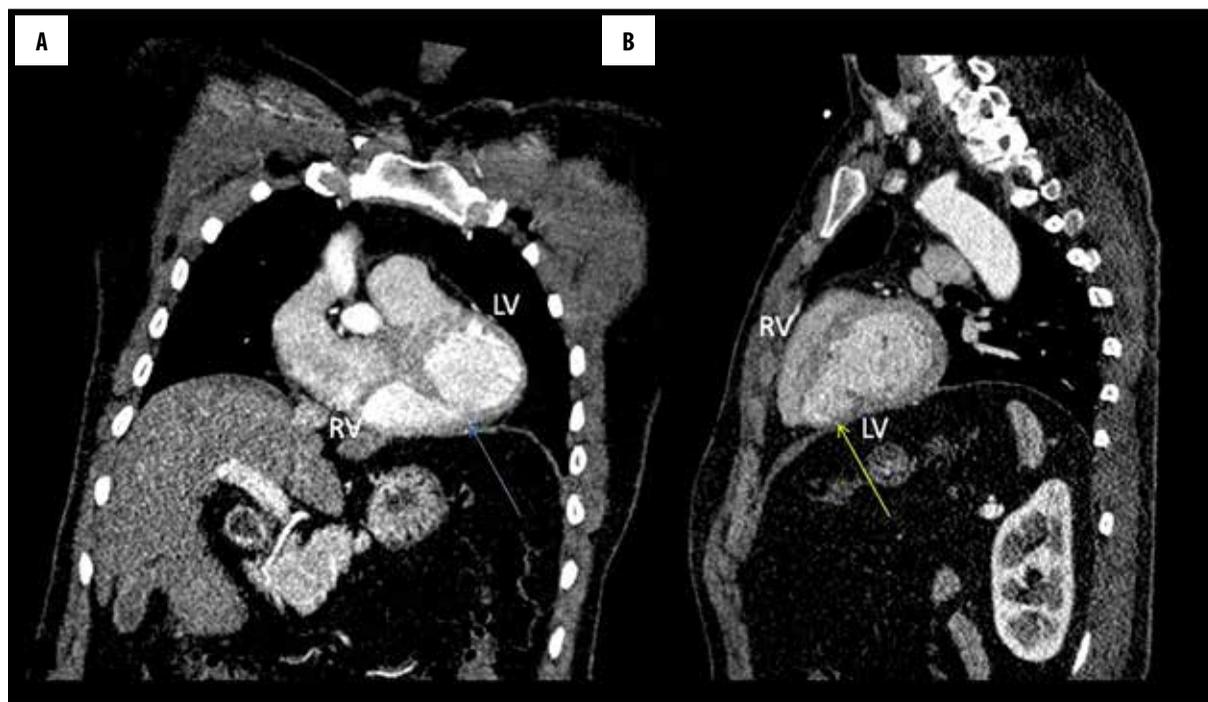
### Background

Aneurysm of the muscular interventricular septum is a rare entity as compared to the membranous part. Only a few cases of dissecting septal aneurysm have been reported in literature. Majority of cases are due to a previous history of myocardial infarction (MI) and VSD closure. However, our patient had no history of MI or cardiac intervention.

We reported a case of an aneurysm of the mid and apical interventricular septum, dissecting into the basal part, causing septal bowing and partial obliteration of the right ventricular cavity. Two-dimensional echocardiography is the initial diagnostic modality with ECG-gated CT and MRI being the non-invasive imaging modalities for comprehensive evaluation. The complications can arise from chronic pressure erosion of the intervening septal myocardium, leading to left-to-right shunting in the form of ventricular septal defect and paradoxical thromboembolism.



**Figure 1.** (A, B) Axial CT angiography images showing a large aneurysm (white arrow) arising from the mid and apical portion of the interventricular septum dissecting along the basal part with associated bowing of the septum causing mild obliteration of the right ventricular cavity.



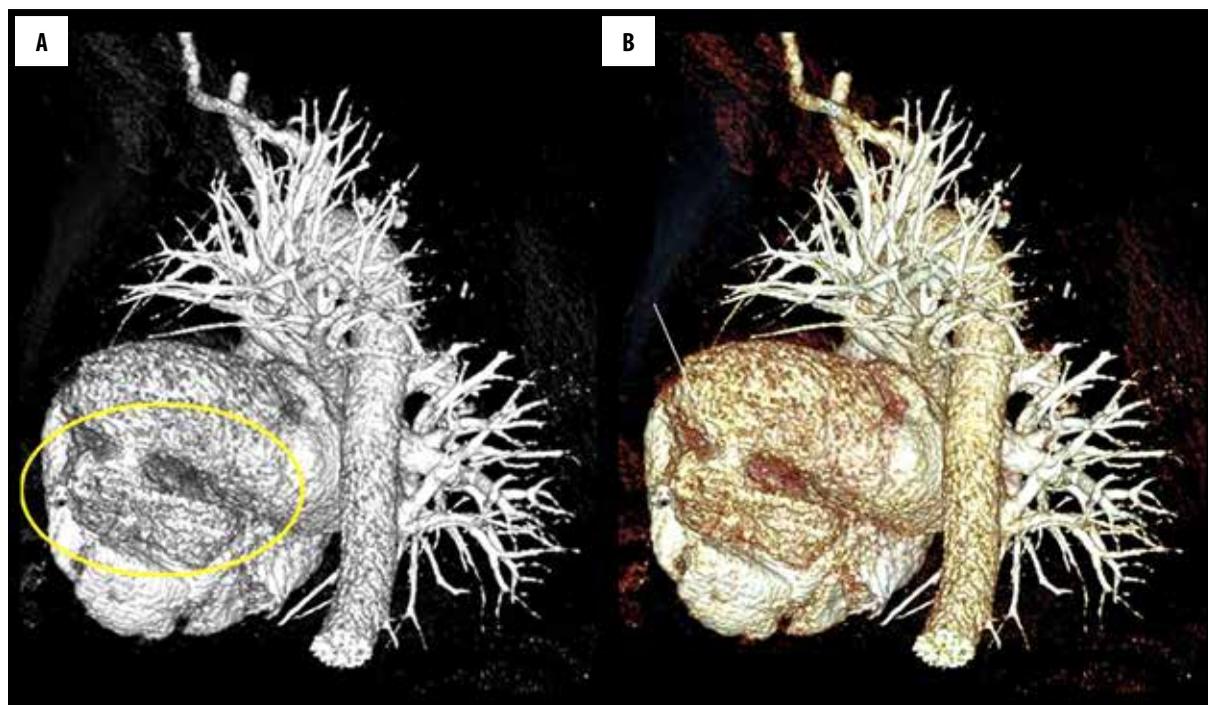
**Figure 2.** (A, B) Coronal and sagittal CT images showing neck (blue arrow) and wide mouth (yellow arrow) of the septal aneurysm.

Radiologists should be aware of imaging findings of inter-ventricular septal aneurysm, because of its rarity of occurrence and complications. Careful scrutiny is essential to avoid labelling of these cases as cardiac masses.

### Case Report

A 48-year-old male patient presented to a cardiology department with complaints of intermittent chest pain, palpitations and exertional dyspnoea. The patient was normotensive with a history of diabetes mellitus and no history of MI or cardiac intervention. There was no personal or family history of congenital heart disease.

Clinical examinations revealed tachycardia and systolic murmur. ECG showed intraventricular conduction delay. Chest X-ray revealed no significant abnormality. On 2D echocardiography, apical bulge and septal dyskinesia with reduced left ventricular ejection fraction (~40%) was noted. ECG-gated CT angiography was performed on a 256-slice dual-source scanner (Somatom definition FLASH, Siemens, Germany) for further evaluation. CT angiography revealed a wide-mouth large aneurysm arising from the mid and apical portion of the interventricular septum dissecting into the basal part. There was associated significant bowing (>15 mm) of the septum and mild obliteration of the right ventricular cavity (Figures 1–3). Myocardium surrounding the aneurysm was identified with no associated



**Figure 3.** (A, B) VRT(volume rendered technique) images showing the interventricular septal aneurysm (yellow circle) with its neck (white arrow).

ventricular septal defect (VSD). No evidence of intraventricular clot was seen. Catheter angiography confirmed the CT angiographic findings.

The patient was referred to the cardiovascular and thoracic surgery department and kept on medical management. Decision regarding surgery is awaited and the patient is on regular follow-up.

## Discussion

Cardiac septal aneurysm is defined by bowing of the interatrial or interventricular septum of more than 10–15 mm to either side of adjacent cardiac chambers [1]. Interatrial septal aneurysms are more common than the interventricular variety with prevalence of septal aneurysms being 0.2–3% in the general population [2]. In the interventricular variety, the involvement of the membranous part is more common than of the muscular portion, because of inherent weakness of the membranous septum.[3] Interventricular septal aneurysms are mostly due to post-myocardial infarction or previous spontaneous VSD closure. However, our patient had no history of MI or VSD. Other possible etiologies are traumas and infections.

The muscular variety of interventricular septal aneurysm can arise from the basal, mid or apical part. Basal septal aneurysm or dissection is the most uncommon. In our case the aneurysm was involving all parts of the septum with its origin from the mid and apical portion, with dissection along the basal part.

The complications can arise from chronic pressure erosion of the intervening septal myocardium, leading to left-to-right shunting in the form of ventricular septal defect and

paradoxical thromboembolism. In rare cases, large aneurysms may cause right ventricular outflow tract obstruction [4,5].

Two-dimensional echocardiography is the initial diagnostic investigation for localization of an aneurysm. However, it is operator-dependent and has limitations in delineating the extension and relationship with other cardiovascular structures. ECG-gated CT and MRI angiography are non-invasive imaging modalities for complete evaluation of the site of aneurysm, dissection along the septum and relationship with surrounding cardiac chambers and other major vessels. Routine non-ECG-gated chest CT and MRI are sub-optimal for evaluation, as a septal aneurysm can mimic cardiac masses. Dodd JD et al. (2007) studied three cases of septal aneurysm on ECG-gated cardiac CT and MRI, which were initially suspected to be a cardiac tumor on non-ECG-gated chest CT or MRI [6].

## Treatment

Surgical management is carried out with aneurysm excision and patch closure.

## Differential diagnosis

Cardiac pseudomass – Septal aneurysm can mimic a cardiac mass, especially in the setting of primary malignancy, when evaluated with non-ECG-gated chest CT. The use of ECG-gated CT/MRI angiography with echocardiography is essential for differentiating and avoiding misdiagnosis.

Learning points/take-home message:

- Cardiac septal aneurysm is defined by bowing of the interatrial or interventricular septum by more than 10-15 mm to either side of adjacent cardiac chambers.

- The complications are left to right shunting, ventricular septal defect and paradoxical thromboembolism. Large aneurysms may cause right ventricular outflow tract obstruction.
- ECG-gated cardiac CT or MRI angiography is a non-invasive diagnostic modality for comprehensive evaluation of a septal aneurysm and to avoid confusion with a pseudomass.

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## Conclusions

Cardiac septal aneurysm is defined by bowing of the interatrial or interventricular septum by more than 10–15 mm to either side of adjacent cardiac chambers. Radiologists should be aware of imaging findings of an interventricular septal aneurysm, because of its rarity of occurrence, complication in the form of thromboembolism, dissection and intracardiac shunting and mass effect over adjacent cardiovascular structures. Careful scrutiny is essential to avoid labelling of these cases as cardiac masses.

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