A rare cause of AV block III: aneurysm of the right ventricular inflow tract due to an orifice in the right coronary sinus of valsalva

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Abstract
An otherwise symptom free and healthy patient presented with new onset AV block III. Computer tomography revealed an aneurysm of the right ventricular inflow tract with compression of the AV node. Surgical excision and repair with a patch was performed.

Keywords: AV Block III; Sinus of valsalva; Aneurysm; Surgical repair

1. Introduction
Abnormalities of the sinus of valsalva are usually congenital and present with aneurysm formation and the associated symptoms when the aneurysm protrudes into nearby structures as the right atrium or the right ventricle.

However, herein we encountered a case where a square like orifice, located in the right coronary sinus of valsalva, lead to formation of an aneurysm of the right ventricular inflow tract. The only symptoms exhibited by the patient were AV block III which might be caused by external compression or wall distension of the AV node.

2. Clinical summary
A 78-year-old male patient was admitted for pacemaker implantation due to AV block II–III in December 2002 at our department.

During the last 2 weeks the patient reported dizziness, easy fatigability and pre-syncopial episodes. The ECG showed a sinus rhythm with intermitted frequencies of 35 beats per minute and AV block II–III. A transthoracic echocardiography raised the suspicion of a thrombosed aneurysm at the aortic root. The systolic pulmonary artery pressure was slightly elevated with 35 mmHg. Ejection fraction was 80% with overall good contractility and no wall motion abnormalities. A subsequently performed MRI of the heart and MR angiography of the thoracic aorta revealed a 5.5 cm aneurysm at the height of the right coronary sinus with compression of the inflow tract of the right ventricle at the height of the tricuspid valve. There was no visible relationship of the aneurysm to the right coronary artery (RCA). However, it was not feasible to confirm patency of the RCA by angiography. The patient had no history of chest trauma or cardiac related illness.

On January 13 the patient was scheduled for resection of the aneurysm.

After opening of the pericardium an aneurysm in the area of the right ventricular inflow tract with the size of a tennis ball becomes visible (Fig. 1A). The ascending thoracic aorta appeared normal in respect to shape and dimensions. After implementing cardiopulmonary bypass, the aorta was cross clamped and the aneurysm sac opened and inspected. After removing thrombotic masses a 2 cm wide square like orifice in the height of the right coronary leaflet into the ascending thoracic aorta became visible. No morphological changes could be observed around the defect. Thereafter the ascending aorta was incised 3 cm above the aortic root to more precisely investigate the defect and to identify the RCA which was located closely beneath the orifice. A direct
communication between the orifice and the inflow tract of the right ventricle was seen (Fig. 1B).

A pericardium patch with a 5/0 prolene running suture was used to close the defect from the inside of the ventricular incision (Fig. 2). The aorta was closed in a conventional manner and the aneurysm sac of the right ventricle was excised and the remainder was closed with 4/0 prolene in a continuous manner.

Coronary artery bypass grafting to the RCA with a saphenous vein graft was performed to avoid impairment of the RCA due to the close location of the defect to the coronary artery and the fact that preoperative angiography was not able to confirm vessel patency.

The patient experienced an uneventful postoperative course and could be discharged 7 days after surgery.

Histopathological analysis revealed a real aneurysm originating from the right ventricular wall, composed of all three cardiac wall layers. No signs of an inflammatory or malignant process could be detected.

3. Discussion

In this case report we described the unusual cause of AV block III which might be caused through external compression or wall distension from an aneurysm in the area of the right ventricular inflow tract, which was obviously caused by a 2 cm square like orifice in the right coronary sinus of valsalva leading to over distension of the right ventricular inflow tract over the time.

From the morphology of the orifice a congenital origin can be assumed, as the size of 2 cm seems too large to be acquired. Furthermore no pathologic changes around the orifice were apparent, so that infectious or inflammatory causes can be excluded.

A direct communication between the orifice and the inflow tract of the right ventricle was seen, which leads to the assumption that the aneurysm developed through over distension of the right ventricular wall by the flow, resulting in a ‘wind sock’ effect and compliance chamber initiated by the orifice.

Furthermore, it was obvious that the AV node was impaired by the thrombotic masses inside the aneurysm and thus leading to AV Block III.

Unfortunately, even after extensive literature research, we were not able to identify the underlying aetiology of this entity. Even though our case displays some similarities with congenital sinus of valsalva aneurysms, the case described herein is different in respect to the above mentioned characteristics [1–3]. Probably our case presents a late form of congenital sinus of valsalva aneurysm after rupture of the sinus valsalva aneurysm occurred and resulted in development of a second aneurysm in the area of right ventricular inflow tract.
References

