Successful surgical management of a congenital giant right atrial appendage aneurysm: a case report on a rare cardiac anomaly

Channabasavaraj Shivalingaiah Hiremath¹ · Siddharth Amboli¹ · Utkarsh Sanghavi¹ · Aditya Narsipur Doddamane¹ · Anuradha Kamath² · Shekhar Rao¹

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Abstract

Aneurysms of the right atrial appendage are usually congenital in origin, with rare citations. We report a case of a large atrial aneurysm in an adult male presenting with atrial flutter and right ventricular dysfunction, who underwent a successful aneurysmectomy, repaired with a novel technique with uneventful recovery.

Keywords Giant right atrial appendage aneurysm · Heart block · Aneurysmectomy

Introduction

Aneurysm of the right atrium was first reported by Bailey in 1955 [1]. Since then, reports have noted its occurrence anytime during fetal and adult life. Patients may present asymptotically, or with atrial tachyarrhythmias, pulmonary/systemic thromboembolism or in right heart failure, in rare instances [2]. Noting that the risk of thromboembolism is a major morbidity, we emphasize the importance of surgical excision of right atrial aneurysms even in asymptomatic patients.

Case report

A 37-year-old man presented with complaints of frequent palpitations restricting his daily activities. On evaluation, he was found to have right atrial flutter with 2:1 conduction block. A transthoracic echo assessment revealed a large aneurysmal

right atrial appendage extending up to the right ventricle (RV) apex and compressing the ventricular mass, causing ventricular dysfunction resulting in hemodynamic instability (Fig. 1a, d).

Cardiac magnetic resonance imaging showed a right atrial appendage aneurysm (RAAA) measuring $14.5 \times 6.8 \times 10$ cm extending up to, and compressing both the RV and right atrium (RA) (Fig. 1b, c). There was no presence of thrombus in the aneurysm cavity. RV ejection fraction was 19%.

After routine preoperative evaluation, the patient was chosen for elective surgery. Routine sternotomy was performed and conventional cardiopulmonary bypass was instituted with aortic and bicaval cannulation. Root cardioplegia was administered after cross clamping the aorta and body temperature was cooled to 28 °C.

On-table examination revealed two large aneurysmal sacs arising from the right atrial appendage: one posterior measuring $6 \times 4 \times 3$ cm and the anterior measuring $5 \times 3 \times 3$ cm. The anterior sac was encroaching onto the right atrioventricular groove (Fig. 2a).

The posterior aneurysmal sac was excised and the anterior sac was obliterated by filling gel foam within the sac and sewing with the wall of RA. The residual RA defect was closed with an untreated pericardial patch (Fig. 2b).

Excision of the aneurysm sac excision was challenging as it was encroaching the right atrioventricular groove.

After weaning off cardiopulmonary bypass, on-table transesophageal echocardiography (TEE) showed no residual RA aneurysm and good biventricular function (Fig. 2c).

✉ Channabasavaraj Shivalingaiah Hiremath
hiremath.cs@sssihms.org.in

¹ Department of Cardiovascular & Thoracic Surgery, Sri Sathya Sai Institute of Higher Medical Sciences, Whitefield, Bengaluru 560066, India

² Department of Anaesthesia, Sri Sathya Sai Institute of Higher Medical Sciences, Whitefield, Bengaluru 560066, India

Fig. 1 **a** Preoperative chest X-ray showing RA enlargement. **b, c** Cardiac magnetic resonance images of RAAA. **d** On-table preoperative TEE showing RAAA compressing RV

Fig. 2 **a** Excision of the posterior aneurysm sac with demarcation of normal atrial wall and thinned out aneurysm wall. **b** Obliteration of and closure of the anterior aneurysm sac close to right atrioventricular groove. **c** Post aneurysmectomy on-table TEE. **d** Post-op chest X-ray. **e** TTE on follow-up

Results

The postoperative period was uneventful and the patient was in normal sinus rhythm at discharge. On histopathological examination of the aneurysm sac wall, fibrosis and endocardial thickening were noted. Transthoracic echocardiography on follow-up showed normal biventricular function and no residual RA aneurysm (Fig. 2d, e).

Comment

Right atrial aneurysms are mostly congenital by origin and patients can be asymptomatic or present with palpitations, thromboembolic sequelae such as pulmonary embolism, heart failure, or sudden death in rare instances [1, 2]. Our patient presented with palpitations, in atrial flutter and had right ventricular dysfunction (ejection fraction of 19%). It can be seen on imaging at any instance of life, from antenatal to adult life. RAAA must be differentiated from other causes of right atrial enlargement such as Ebstein's anomaly, pericardial cysts, and tricuspid valve regurgitation. Routine chest radiographs may be confounding hence necessitating additional imaging modalities such as TEE, transthoracic echocardiography with agitated saline contrast [2], computed tomography, or magnetic resonance which can aid in establishing diagnosis.

In 28% of the cases reported by Zhang et al. [3], atrial fibrillation or atrial flutter is the presenting arrhythmia while atrioventricular block and refractory supraventricular tachycardia were also acknowledged. Ectopic foci in the RAAA or reentrant circuit created by an admixture of fibrous tissue and atrial muscle fibers, as was noted in the histopathological examination of our case, have been proposed as possible etiologies for the arrhythmias [2].

Owing to the atrial tachyarrhythmia, patients are at a high chance of pulmonary and systemic thromboembolism (left atrial involvement in atrial fibrillation). Due to the paucity of cases reported, there is an incomplete picture of the natural course of this cardiac anomaly and hence the thromboembolic risk factor should be weighed in to tip the scales towards surgical aneurysmectomy even for asymptomatic cases of right atrial aneurysm [2, 3].

Fibrosis or inflammation of the area around the sinus node, often in great proximity to the aneurysmal area, can cause right atrial flutter, as was noted in our case with 2:1 block. Presence of aneurysmal mass involving or over the sinus nodal area can cause dilation of the latter which can produce sick sinus syndrome.

Fig. 3 Anatomic considerations in making the incision

Catheter ablation of such foci has been reported; however, with high recurrence rates and more confounding friable nature of the aneurysmal tissue bearing the potential to give way and cause tamponade, surgical aneurysmectomy is a more prudent treatment for such cases [3]. Right atrial aneurysms that present in close proximity to the atrioventricular groove possess difficulty in surgical excision, as noted in our experience.

The mean size of right atrial aneurysms reported in literature was $8.83 \pm 4.84 \times 6.05 \pm 2.99$ cm [4]. Our case presented with an aneurysm of $14.5 \times 6.8 \times 10$ cm. The anterior aneurysm sac excision was challenging as it encroached towards the right atrioventricular groove (Fig. 3); hence, it was obliterated by packing gel foam in the sac.

The complete resolution of patient's symptoms and echocardiography at 1 year follow-up are clear evidences that meticulous surgical excision of the RAAA leads to complete resolution of patient's symptoms and assures a near normal life expectancy.

Conclusion

Congenital right atrial aneurysms in asymptomatic patients should be considered for aneurysmectomy owing to the risk of thromboembolism in these cases, and those aneurysms that are present near the atrioventricular groove need to be addressed cautiously. Surgical resection is considered the standard operative procedure in symptomatic patients, who present in tachyarrhythmias and heart failure [4].

Compliance with ethical standards

Funding None.

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval Ethical approval was obtained and no animals were harmed in the course of this study.

Informed consent Informed consent was obtained from all individual participants included in the study.

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