

Case Report

Delayed aortic regurgitation due to traumatic pseudoaneurysm of the sinus of Valsalva

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Case: Pseudoaneurysm of the sinus of Valsalva (PSV) caused by trauma is rare. Surgical intervention is the standard treatment approach for traumatic PSV, as it has a high risk of rupture and is potentially fatal. We hereby report a 59-year-old man with traumatic PSV due to a traffic accident. Imaging studies revealed traumatic PSV. However, he refused surgery due to the lack of symptoms and was discharged on day 9. Two years later, he visited our hospital with cardiac failure due to severe aortic valve regurgitation (AR) induced by PSV.

Outcome: A Bentall operation was carried out and the patient was discharged without any complications.

Conclusions: This case illustrates progression to aortic valve regurgitation as a complication of traumatic PSV and stresses the point that surgical intervention should be considered even in asymptomatic cases of traumatic PSV.

Key words: Aorta injury, aortic regurgitation, sinus of Valsalva

BACKGROUND

PSEUDOANEURYSM OF THE sinus of Valsalva (PSV) due to chest trauma is rare. Traumatic PSVs have a risk of rupture and are potentially fatal; acute surgical intervention is the standard treatment approach. We describe a patient who had traumatic PSV but refused acute surgical intervention and developed severe aortic regurgitation (AR) 2 years later.

CASE

A 59-year-old man had an automobile accident during driving; he was transferred to the emergency room. He was conscious and had an open airway, normal breathing with a respiratory rate of 30 breaths/min, and oxygen saturation of 88% on room air, with chest pain and dyspnea, blood pressure of 83/52 mmHg, and a pulse rate of 60 b.p.m.

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Computed tomography revealed ascending aortic dissection, bilateral lung contusion, and right hemopneumothorax. After insertion of a drainage tube in the right chest, he was transferred to our hospital for further examination and treatment of the aortic injury. On admission to our hospital, he had stable vital signs with no worsening symptoms of chest trauma. An electrocardiogram was normal. Troponin I and creatine kinase-MB levels were slightly elevated: troponin I, 0.28 ng/mL (normal range <0.09 ng/mL); creatine kinase-



Fig. 1. First computed tomography image of a 59-year-old man with traumatic pseudoaneurysm of the sinus of Valsalva (arrows) due to a traffic accident.

MB, 26.4 U/L (normal range <5.2 U/L). Thus, a watchful waiting approach was chosen. Subsequent follow-up examination on day 7 by coronary computed tomography angiography and echocardiography revealed expansion of the sinus of Valsalva (diameter, 37.5 mm) and moderate AR, with a regurgitant jet along the left coronary cusp and non-coronary cusp (AR pressure half-time, 300 mm) and normal left ventricular wall function (ejection fraction, 60%; Figs 1 and 2). Surgical treatment for PSV was planned. However, the

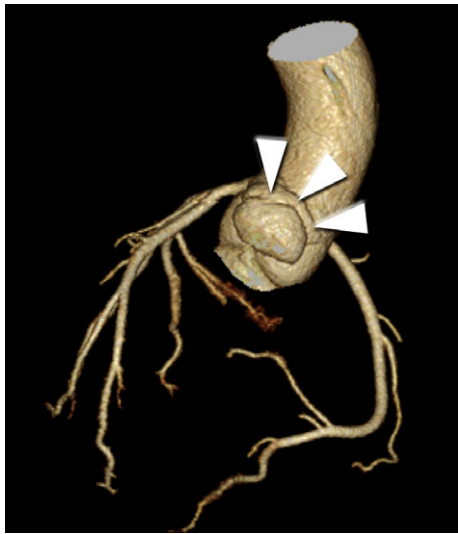


Fig. 2. Three-dimensional reconstruction of multidetector computed tomography of a 59-year-old man. Arrows indicate the traumatic pseudoaneurysm of the sinus of Valsalva due to a traffic accident.

patient refused surgery due to lack of symptoms. He was discharged on day 9 and was lost to follow-up.

Two years later, he was referred to our hospital with severe AR with heart failure (New York Heart Association class IV). He had progressive PSV (diameter, 39 mm) and AR (AR pressure half-time, 254 ms; regurgitant volume, 60 mL; regurgitant fraction, 56%; effective regurgitant orifice area, 0.3 cm²) due to collapse of the left and non-coronary cusp commissure with impairment of left ventricular wall function (ejection fraction, 23%). The right coronary artery was compressed by the PSV, which caused 50% stenosis. A Bentall operation was carried out. Collapse of the left and non-coronary cusp commissure and the rear of the left coronary sinus were observed. The patient was discharged on day 23 without any complications to date.

DISCUSSION AND CONCLUSIONS

PRIMARY CAUSES OF PSV include infections such as endocarditis and cardiac surgery.^{1,2} In our systematic search of the PubMed database from January 1975 to August 2018 using the keywords “pseudoaneurysm” OR “sinus of Valsalva” AND “trauma”, in works published in English, we found only four case reports of traumatic PSV (Table 1). Thus, traumatic PSV is very rare.^{3–6}

In non-traumatic cases, PSV involves the right coronary sinus (80%) or non-coronary sinus (16%).^{1,7} However, out of the five reported traumatic PSV cases, four involved the left coronary sinus (Table 1), which indicates that the left coronary sinus appears to be the most common site in traumatic cases. The mechanism of traumatic

Table 1. Summary of cases of traumatic pseudoaneurysms of the sinus of Valsalva (reports published in English)

Study	Year	Type of trauma	Age/sex	Location of pseudoaneurysm	Complication	Surgical treatment	Outcome
Gharzuddine <i>et al.</i>	1997	Automobile accident	38/M	Left sinus	Ostium primum atrial septal defect	Closure, coronary artery reimplantation	Unreported
Habib <i>et al.</i>	1998	Automobile accident	69/F	Left sinus	Acute myocardial infarction	Aortic root replacement, coronary artery ligation	Favorable
Iida <i>et al.</i>	2008	Motorcycle accident	23/M	Right sinus	Severe AR	AVR, vascular graft remodeling, coronary artery reimplantation	Favorable
Coner <i>et al.</i>	2017	Automobile accident	23/M	Left sinus	Pulmonary valve gradient increase	Aortic root replacement	Favorable
Our case	2018	Automobile accident	59/M	Left sinus	Severe AR	Bentall operation	Favorable

AR, aortic regurgitation; AVR, aortic valve replacement; F, female; M, male.

PSV was suggested to be increased aortic root pressure by blunt chest trauma at the timing of diastolic valve-closing, leading to tears in components of the sinus of Valsalva.⁸ As shown in Figure 1, the left coronary sinus is located just under the sternum and the dorsal side of the sinus of Valsalva, where traumatic force is applied. The heart hits the sternum, which could cause a contrecoup injury to the left coronary sinus.

Aortic regurgitation occurs in 30–50% of patients in cases of non-traumatic true Valsalva sinus aneurysms;^{1,7} only one case of AR due to traumatic PSV has been reported. The intimal tear might gradually progress, resulting in development of severe AR over a span of 2 years in our case. Therefore, we should consider the risk of progression to AR in cases of traumatic PSV.

As traumatic PSV potentially leads to acute phase rupture and early death after the injury, acute surgical intervention is the standard treatment approach.^{9,10} In our case, traumatic PSV progressed to delayed severe AR and heart failure, which highlights the importance of surgical intervention, even if there are no overt symptoms in the acute phase.

DISCLOSURE

Approval of the research protocol: N/A.

Informed consent: Written consent was provided by the patient to present this case; consent form will be provided upon request.

Registry and the registration no. of the study/trial: N/A.

Animal studies: N/A.

Conflict of interest: None.

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