



## USEFULNESS OF A PULSE OXIMETER AND MULTIMODALITY IMAGING FOR DIAGNOSING PLATYPNEA-ORTHODEOXIA SYNDROME

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### **History and physical:**

An-81-year-old woman with a history of thoracic vertebral compression fractures (VCF) at the age of 79 and 80 years was admitted to the initial hospital due to dyspnea in the standing and sitting positions following the VCF. POS was suspected because her daughter reported a recording of SpO<sub>2</sub> dropping to 81% on a home pulse oximeter when the patient was in the upright position. Although ASD was detected with a transthoracic echocardiogram (TTE), no obvious exacerbation of the right-to-left shunt (RLS) was observed even in the sitting position. The patient was referred to our hospital for detailed examination and treatment. On physical examination, fixed splitting of the second heart sound was heard; however, there was not an obvious cardiac murmur. Slight bilateral pitting edema of the lower extremities was observed. SpO<sub>2</sub> decreased from 98% to 94% when she changed her position from the recumbency to the Fowler's position during TTE.

### **Imaging:**

TTE detected a secundum ASD with a primarily left-to-right shunt with a pulmonary-systemic flow ratio (Q<sub>p</sub>/Q<sub>s</sub> ratio) of 1.4. In a contrast echocardiogram, a right-to-left shunt was further exacerbated in the Fowler's position. Notably, in the contrast echocardiogram conducted with venous access obtained from the upper limb, the bubble transition was mild compared to that in the examination with venous access obtained from the lower limb and no evident increase of shunt was observed in the sitting position. Computed tomography (CT) revealed 7th and 9th thoracic VCF. Contrast-enhanced CT revealed a distortion of the aorta compressing the right atrium caudally. Four-dimensional (4D) flow magnetic resonance imaging (MRI) demonstrated the blood flow from the inferior vena cava (IVC) to the left atrium through the ASD.



**Indication for intervention:**

In right heart catheterization, the Qp/Qs ratio was 1.59 and the pulmonary artery resistance was 1.07 Wood unit. Furthermore, there was platypnea-orthodeoxia syndrome. Transesophageal echocardiogram demonstrated secundum ASD with a maximum diameter of 18 mm. Though the rim shorter than 5 mm in almost 60 degrees from Superior to Valsalva, we assumed the percutaneous ASD closure would be possible.

**Intervention:**

The ASD was closed using the Occlutech Figulla flex II Occluder 21 mm (Occlutech Holding AG, Schaffhausen, Switzerland) after the stop-flow technique. Postoperative TTE demonstrated stable placement of the device and no residual shunt. A decrease in SpO<sub>2</sub> was no longer observed when the patient was in the upright position.

**Learning points of the procedure:**

POS is recognized as a relatively rare disease and might be overlooked in elder patients with dyspnea. Precise history taking and appropriate examinations using multimodal technologies are important for accurate diagnosis. Especially, 4D flow MRI indicated it was important to obtain venous access from the lower limb in a contrast echocardiogram, and home pulse oximeter was useful to detect oxygen saturation dropping in the sitting position.