

**Case Report****THE GIANT "HIGH-RIDING" PERICARDIAL RECESS****Emrah Dogan<sup>1</sup>, Utku Tapan<sup>2</sup>, Ozge Oral Tapan<sup>2</sup>**<sup>1</sup>*Department of Radiology, Faculty of Medicine, Muğla Sıtkı Koçman University, Muğla, Turkey*<sup>2</sup>*Department of Pulmonology, Faculty of Medicine, Muğla Sıtkı Koçman University, Muğla, Turkey***ABSTRACT**

The presence of prominent physiological fluid in the posterior part of the superior pericardial recess is known as "high-riding pericardial recess" (HRPR). Our case report is one of the largest reported HRPRs with a size of 4.8 cm. The sizes of the HRPR are maximum of 1.4 cm, even in studies with a large number of patients. HRPRs have clinical significance since they are in the differential diagnosis with lymph nodes and mediastinal cysts. We present a 57 year-old patient with clinical and radiological findings.

**Keywords:** Superior pericardial recess, High-Riding, Mediastinum, Aortic recess

**RESUMEN**

La presencia de un fluido fisiológico prominente en la parte posterior de la cavidad pericárdica superior se conoce como "High-Riding del receso pericárdico" (HRRP). Nuestro caso clínico es uno de los mayores HRPR reportados con un tamaño de 4.8 cm. Los tamaños de la HRPR son como máximo de 1,4 cm, incluso en estudios con un gran número de pacientes. Las HRPR tienen importancia clínica ya que forman parte del diagnóstico diferencial de los ganglios linfáticos y los quistes mediastínicos. Presentamos un paciente de 57 años con hallazgos clínicos y radiológicos.

**Palabras clave:** Receso pericárdico superior, High-Riding, Mediastino, Receso aórtico

**INTRODUCTION**

The presence of prominent physiological fluid in the posterior part of the superior pericardial recess is known as "high-riding pericardial recess" (HRPR) (Truong et al., 2003). This

anatomical region is also called the posterior portion of the superior aortic recess (Salamonsen et al., 2015). This area is bounded anteriorly by the ascending aorta and brachiocephalic artery, posteriorly by the trachea, right lateral to the superior vena cava and azygos vein, and left lateral by the bifurcation and right branch of the pulmonary artery. This recess is usually seen on one or two thick collimation of computed tomography (CT) images obtained in the coronal section. When liquid increases, the recess is seen in different shapes. A radiologist needs to know the anatomy of this region detailly since misinterpretation of HRPR as a cystic mass or lymphadenopathy is quite common (Choi et al., 2000). Indeed, the lesion of our patient was previously thought to be a cystic mass and was consulted by us with this preliminary diagnosis. However, there was evidence of HRPR in the radiologic evaluation. We present a 57-year-old male patient with CT and magnetic resonance imaging (MRI) findings

**CASE REPORT**

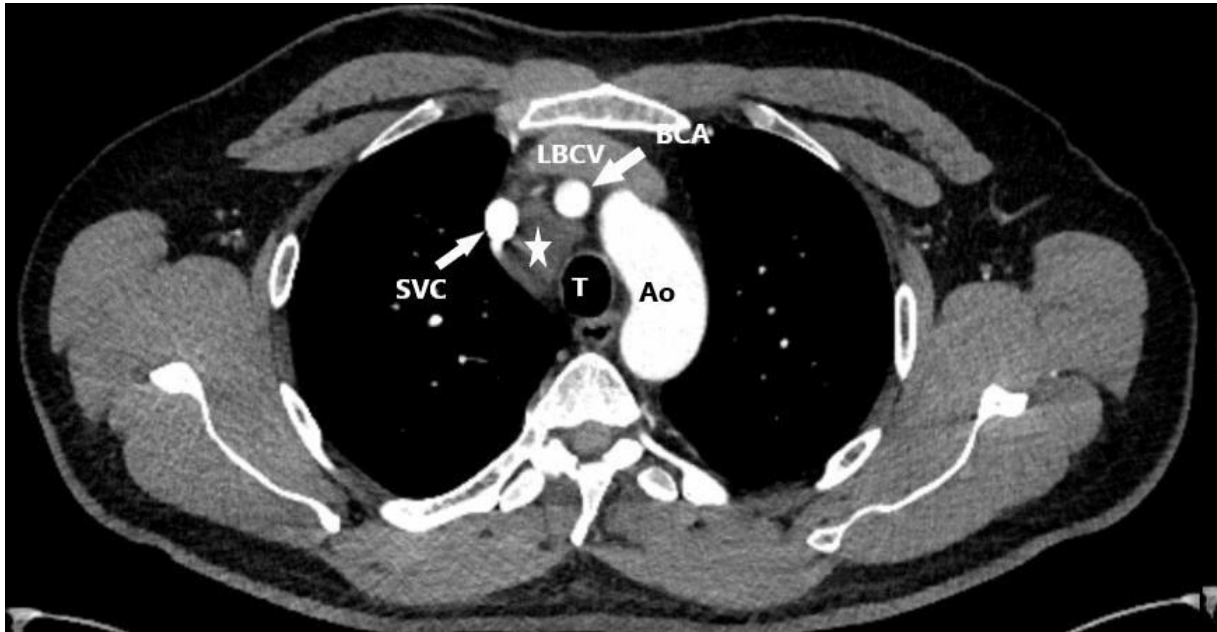
A 57-year-old male patient presented to our hospital with a complaint of back pain. The pain has been present for 4 to 5 months. A herniated cervical disc was detected. The patient's symptoms improved on subsequent admissions.

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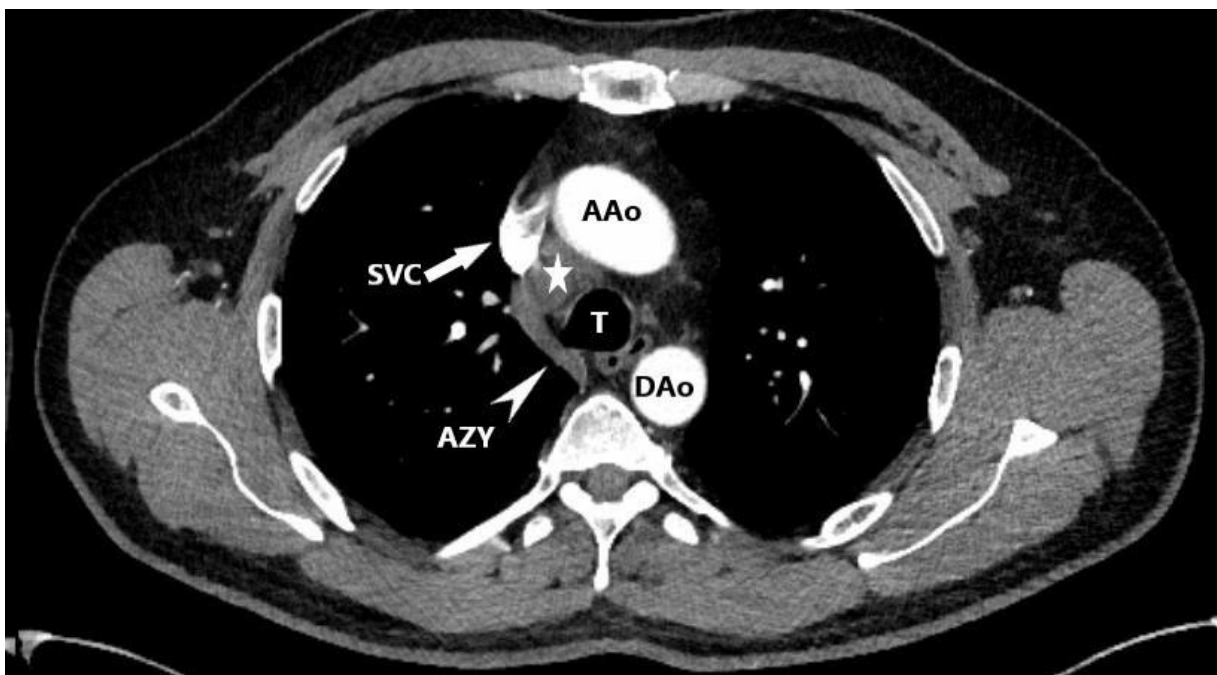
**Received:** 17 February, 2021. **Revised:** 8 March, 2021, 2020. **Accepted:** 18 March, 2021.

The patient's history showed that he worked at the construction and was retired from the civil service. He had a history of smoking for 30 years. He has not smoked for 6 years. There was a history of hypertension and chronic prostatitis. In his family history, lung cancer in both father and

uncle was present. Ultrasound showed dilatation of the ascending aorta 42 mm in size (normal range: 40 mm). Hypertrophy of the left ventricular muscles was detected. The ejection fraction was 60%.



**Figure 1:** Axial contrast-enhanced CT images Abbreviations: Ao= Aorta, BCA= Brachiocephalic artery, LBCV= Left brachiocephalic vein, SVC=Superior vena cava, T=Trachea and High-riding pericardial recess (star)

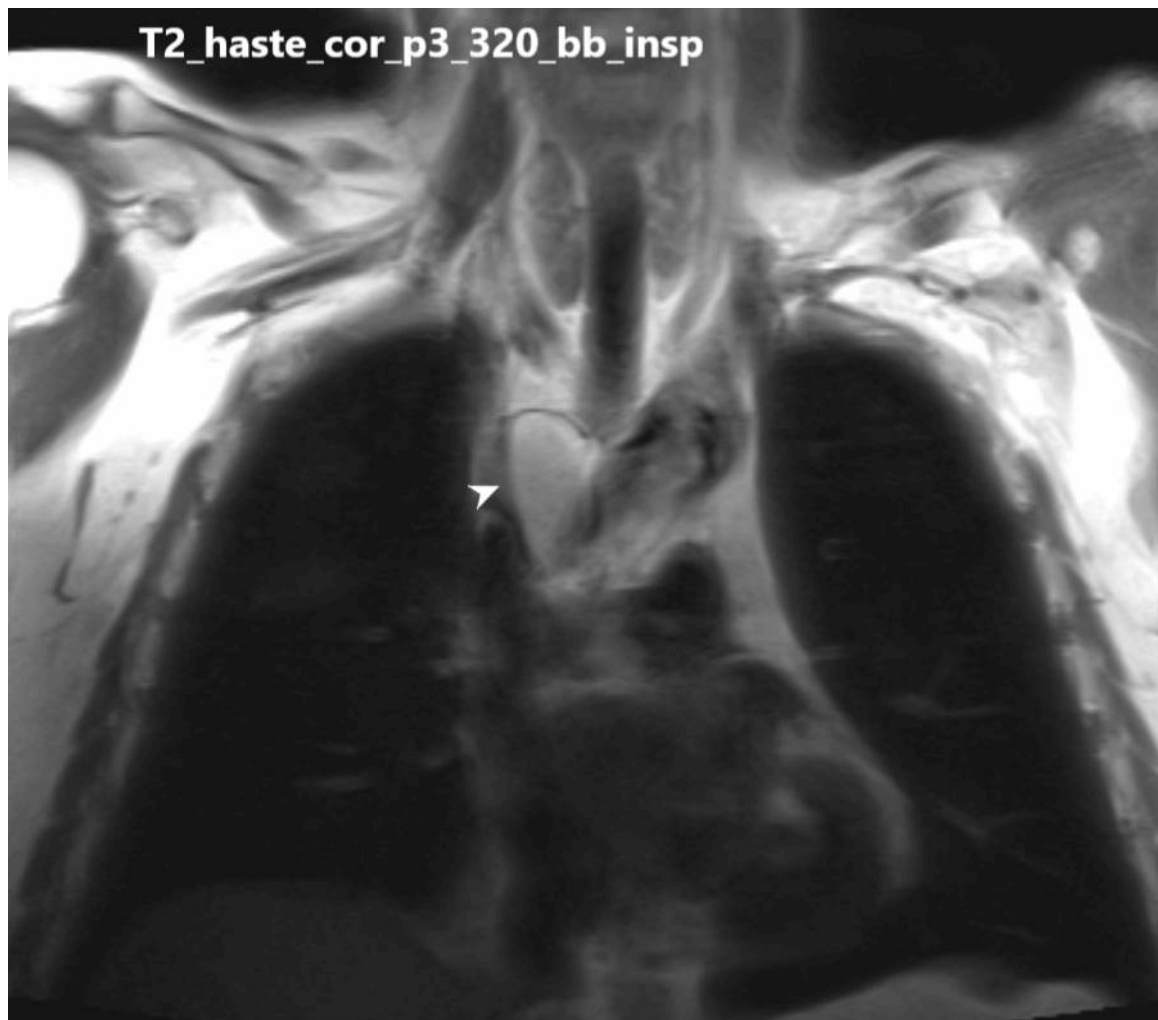


**Figure 2:** Axial contrast-enhanced CT images Abbreviations: AAo=Ascending Aorta AZY= Azygos vein DAo= Descending Aorta SVC= Superior Vena Cava T= Trachea and High-riding pericardial recess (star).

Chest CT scan showed paraseptal and centrilobular emphysema prominent in upper lobes. Fibrous changing was observed in apical lobes. Fibroatelectatic changes have been observed in the basal lobes and pericardiac areas. A 43 x 38 x 31 mm hypodense lesion was observed in the posterior part of the superior aortic cavity, bounded by vascular structures (Figure 1-2). The Haunsfield unit (HU) value of lesion was measured at  $7 \pm 9$ . On the coronal

images, this area has a pyramid shape. MRI was requested. The lesion was hyperintense in T2 weighted image (WI), hypointense in T1WI, and its intensity was similar to fluid intensity. No contrast enhancement.

The lesion was interpreted as a HRPR with the evaluation of the relationship with vascular structures, the shape of the recess, the absence of the fatty border between the ascending aorta and the homogeneous contents (Figure 3).



**Figure 3:** a- In T2-haste coronal MRI, Hyperintense HRPR (cut arrowhead). b- In T2-haste axial MRI, Hyperintense HRPR (arrowhead).

## DISCUSSION

The pericardium has two separate layers as visceral and parietal pericardium. Normal pericardium thickness does not exceed 2 mm. Visceral pericardium is in the form of two separate leaves. The first leaf surrounds the aorta and the pulmonary trunk together. The

second leaf covers the superior, inferior vena cava and pulmonary vein. Pericardial recesses are occurred by reflections between the parietal and visceral pericardium and the leaves of the visceral pericardium.

Roughly, pericardial recesses are classified as transverse and oblique sinus. The transverse sinus is located between the two leaves of the

visceral pericardium. It is located more superiorly. The oblique sinus is located in the posterior part of the left atrium. The part of the transverse sinus that extends towards the superior is called superior pericardial recess or superior aortic recess. This recess is divided into three separate parts, anterior, posterior and right lateral. The posterior portion of the aortic recess may extend to the superior section. This situation is known as HRPR (Kuperberg and Shostak, 2019, Jinho et al., 2020).

HRPR was first described by Choi et al. in 2000. It can be round, oval, triangular, crescent or irregularly shaped in axial images, depending on the width of the interval between vascular structures. Although its prevalence is defined as 6.6% with its routine use in HRCT (high resolution computed tomography), this figure includes all large recesses. As in our case, extensive recess is limited in the literature. HRPR occurs under physiological conditions without pericardial effusion. So, it is a variant of normal (Aribandi, 2007; Basile et al., 2006).

Generally, it mimics the right paratracheal lymph node group in 4R localization in this area. It may even be confused with mediastinal lymph node metastasis in patients with malignancy (Simpson et al., 2019). Cellular lymphadenopathies are the biggest problem in differential diagnosis since their HU values are close to HRPR (HU is the unit showing the attenuation of the substances used in CT. It is very high in dense materials such as bone and metal, and low in substances with very low atomic density such as air. Since lymphadenopathy is solid, higher HU values are expected compared to fluid). However, it can be easily distinguished in MRI (Aribandi, 2007; Basile et al., 2006). Other pathologies that can thought in the differential diagnosis are bronchogenic cysts, pericardial cysts. Bronchogenic cysts and pericardial cysts tend to be oval or spherical in shape. They don't take the shape of the recess. The bronchogenic cyst rarely has a pure homogeneous internal structure on both CT and MRI. Half of them have HU values outside the liquid limits. The protein content is common. Heterogeneity due to levelling and sedimentation within the cyst is quite common (Lyon and Mc Adams, 1993). Also, if there is an aortic dissection or thrombus in the posterior part of the ascending aorta, this mimics the appearance of the pericardial cavity.

Radiological diagnosis criteria of HRPR are as follows.

- Lack of pressure and mass effect
- It has a homogeneous fluid density
- Kinking towards the recess limits
- The typical location along the aortic arch or right paratracheal region

-Lack of fat plane adjacent to the aorta

All of these criteria are present in our case.

There is no need for treatment. It can lead to unnecessary invasive procedures, mistakenly confusing with haemorrhage, especially in the case of trauma. Therefore, it is crucial to know the presence of this entity. It may also be confused with other mediastinal masses mentioned in the differential diagnosis (Aribandi, 2007, Basile et al., 2006).

In a prospective study of 314 people by Basile et al., 21 HRPR were detected. Among these cases, the highest value was 14 mm. Our case was a bigger HRPR with 43 mm in diameter. In 85% of the cases of Basile et al. (2006), HRPRs were triangular, half-moon or irregularly shaped. In this case, HRPR cranially extended and had a pyramidal shape.

Basile et al. calculated HU values in the range of 5-27. It has been stated that if this area is aspirated, a yellow-coloured fluid can be obtained (Basile et al., 2006). However, there is a remarkable contradiction in this part of the information. Normally, the HU values of lymph nodes range from 10-20. HU value of liquid is 0. In dense liquids (haemorrhagic, proteinous content or inflammation), HU can exceed 10. The cause of the high HU values in Basile's study is open to future research. HU values in our case were between 7 to 9. (Basile et al., 2006, Kuperberg and Shostak, 2019)

As conclusion, HRPR is in differential diagnosis with mediastinal cysts and lymphadenopathies. It is rare to see recess in these sizes like our case. Even in series studies with high numbers, the amount of liquid in this area was measured with a maximum 1,4 cm in size. Our case report is the biggest HRPR in diameter. Its diagnosis is radiological. Knowing the radiological diagnostic criteria and detailed anatomy of the pericardial recesses protects the patient from unnecessary medical interventions.

#### **Conflict of interest**

No conflict of interest between authors.

#### **Funding**

The authors declared that no financial support was received.

#### **Informed consent**

The patient signed the consent form on 20.01.2021 before this case report writing.

#### **Ethic approval**

No ethic approval necessary.

### Contributions

The authors in the article made following contributions: ED: Conceptualization, Visualization, Writing / review and editing. UT: Resources. OOT: Resources.

### ACKNOWLEDGEMENT

We are grateful to people who voluntarily donate their body for teaching and research.

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