



## Case Study

### **Malposition of the ventricular pacing lead in the left ventricle**

G. Neroutsos\*, V. Tafrali<sup>1</sup>, P. Mplatsiotis<sup>2</sup>, N. Daskalopoulos<sup>3</sup>, I. Mantas<sup>4</sup>.

1,2,3,4. Department of Cardiology, General Hospital of Chalkida, October 2020.

\***Corresponding Author: Dr G. Neroutsos**, Department of Cardiology, General Hospital of Chalkida, October 2020.

**Received Date:** February 22, 2021

**Publication Date:** March 01, 2021

### **Introduction**

Pacing in the left ventricular is a rare condition found among patients that are being implanted with a permanent pacemaker. The main complication is the increased risk for embolic strokes. We present a case of a malpositioned ventricular lead in the left ventricle.

### **Case Report**

A 73-year-old male patient, with a medical history of hypertension and implantation of a permanent pacemaker 3 months ago made an appointment in our hospital cardiology office.

The patient had a DDDR pacemaker implantation due to high atrioventricular block, which caused him episodes of dizziness. The patient remained asymptomatic post-surgery and recovered uncomplicated to a normal daily schedule. Approximately, one month later he underwent a treadmill test without developing any pathological symptoms. In a scheduled visit to his cardiologist, during a transthoracic heart ultrasound, it was found that the ventricular lead of the pacemaker might be implanted into the left ventricle. The physician moved on to a 12 lead ECG, which depicted a normal rhythm, without the pacemaker assistance. Presumably, the patient had restored a sinus rhythm and the pacemaker was inhibited by its program. Upon the pacemaker's triggering with a magnet, the HCG was altered and presented an RBBB pattern, instead of LBBB that was normally expected.

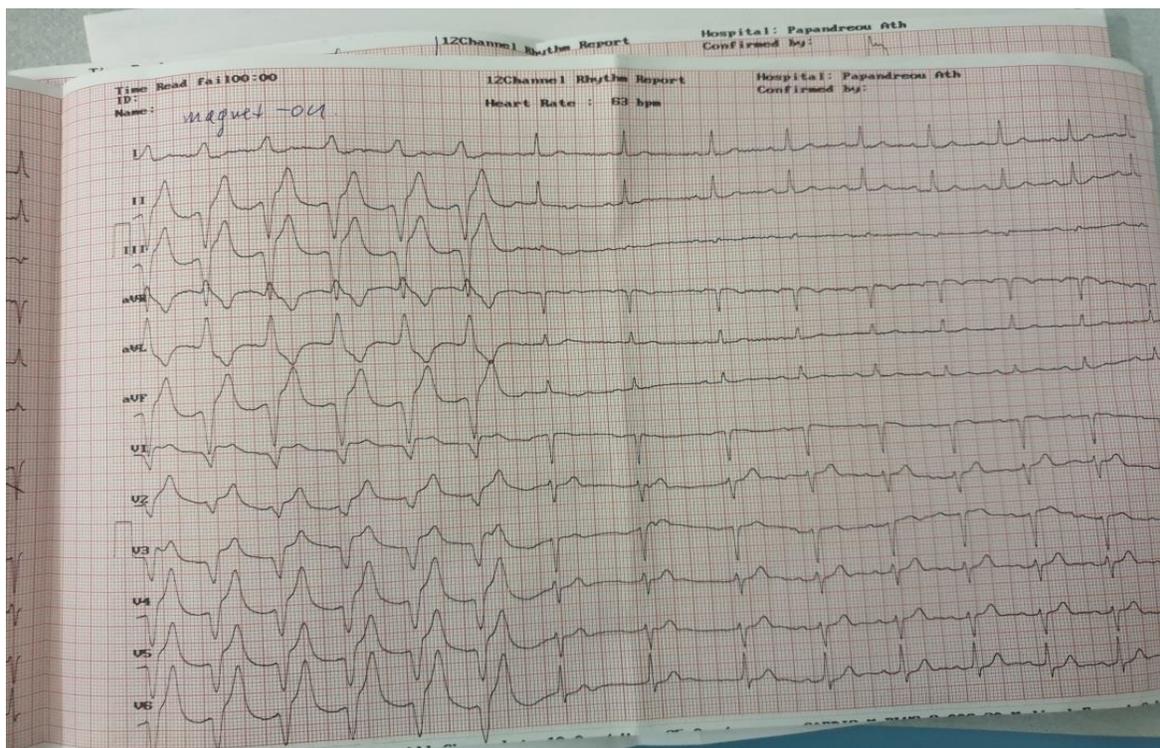


The patient proceeded to an appointment in our hospital office after his physician urged him for additional consultation. We performed a transthoracic heart ultrasound and found that the ventricular lead passed from the right atrium, threw the atrial septal into the left atrium and threw the mitral valve into the left ventricle anchoring on the posterior wall.

The next day the patient underwent a transesophageal ultrasound from which we confirmed the initial findings.

The patient remained asymptomatic for the entire three months post-implantation. The 12 lead surface ECG presented a sinus rhythm. The performed chest x-ray in the face projection did not show any faulty position, whereas the lateral projection did show the ventricular lead in a slightly upper and foreshortened position than expected, a finding that is not pathognomic, on its own, only indicative of an unusual positioning of the lead.

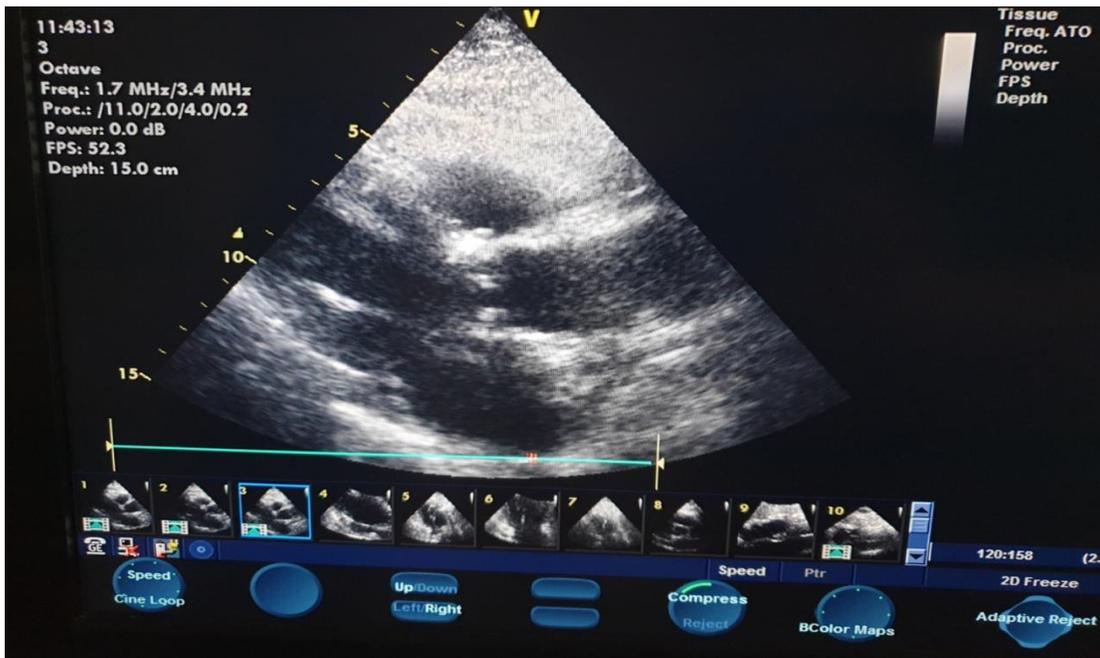
Afterward, the patient was admitted to the department that undertook the original implantation and a second session took place, in which the ventricular lead was removed from the left ventricle and relocated to the right ventricle, as it was originally planned without any further complications.



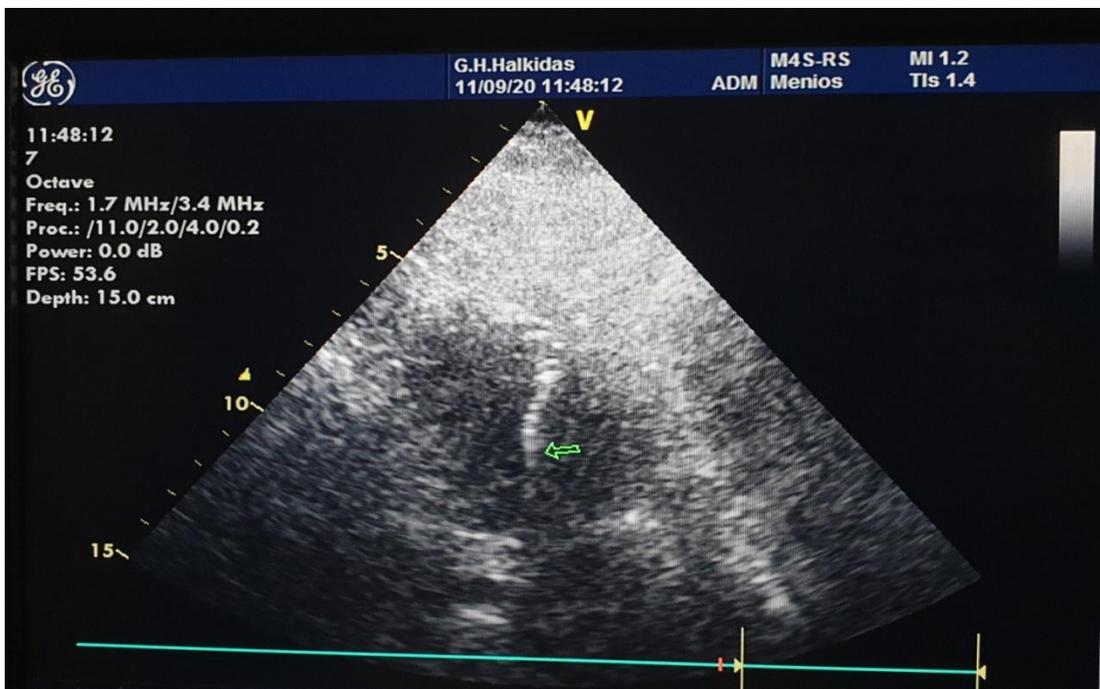
**Figure 1:** 12 Lead ECG with and without magnet



**Transthoracic Ultrasound images**



**Figure 2:** Transthoracic Ultrasound images- Long axis view



**Figure 3:** Transthoracic Ultrasound images- Short axis view



Transesophageal views



Figure 4

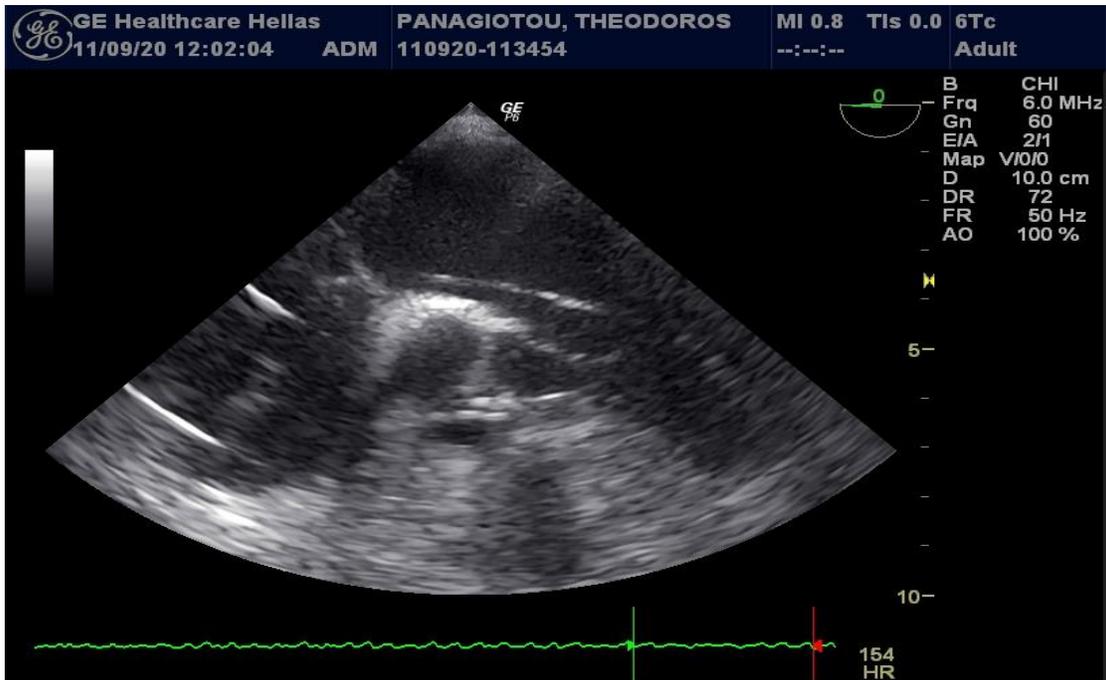


Figure 5

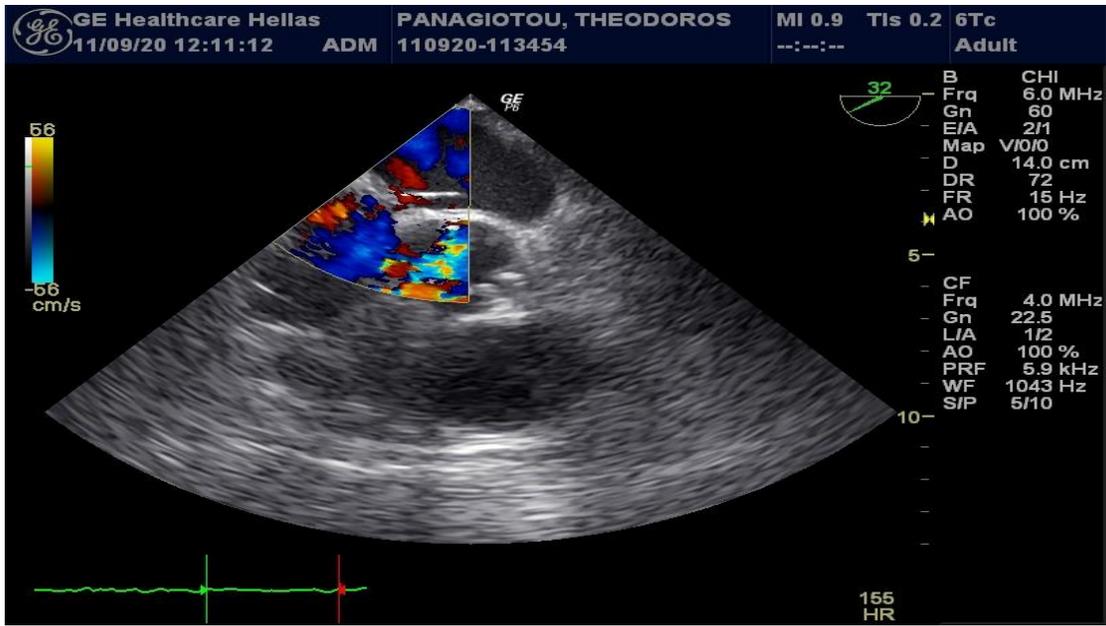


Figure 6

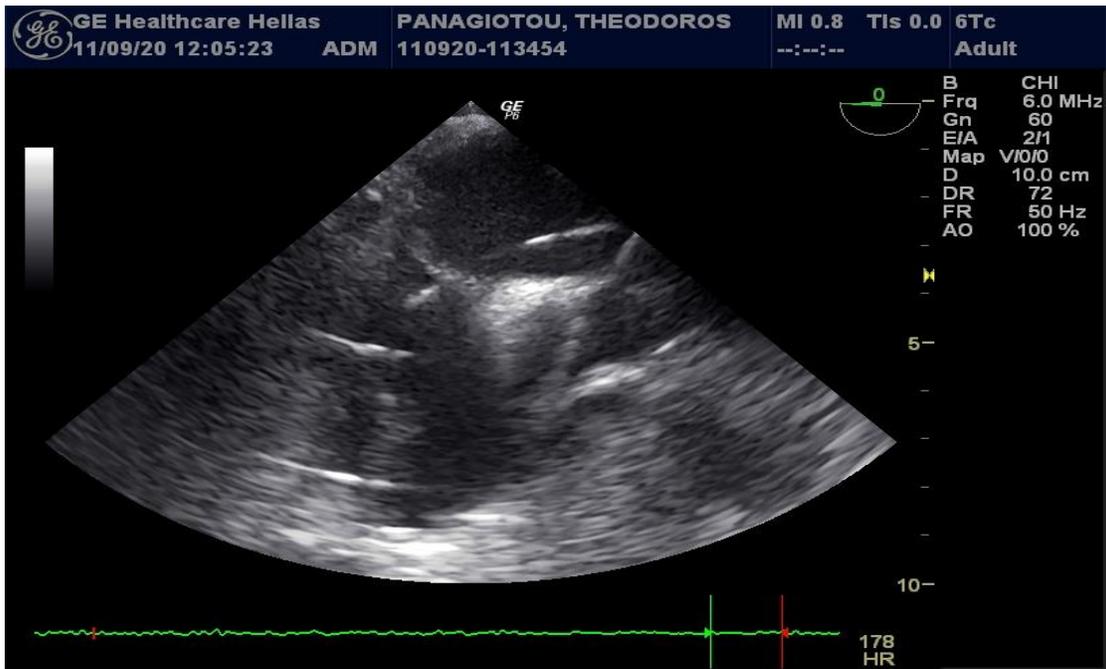


Figure 7

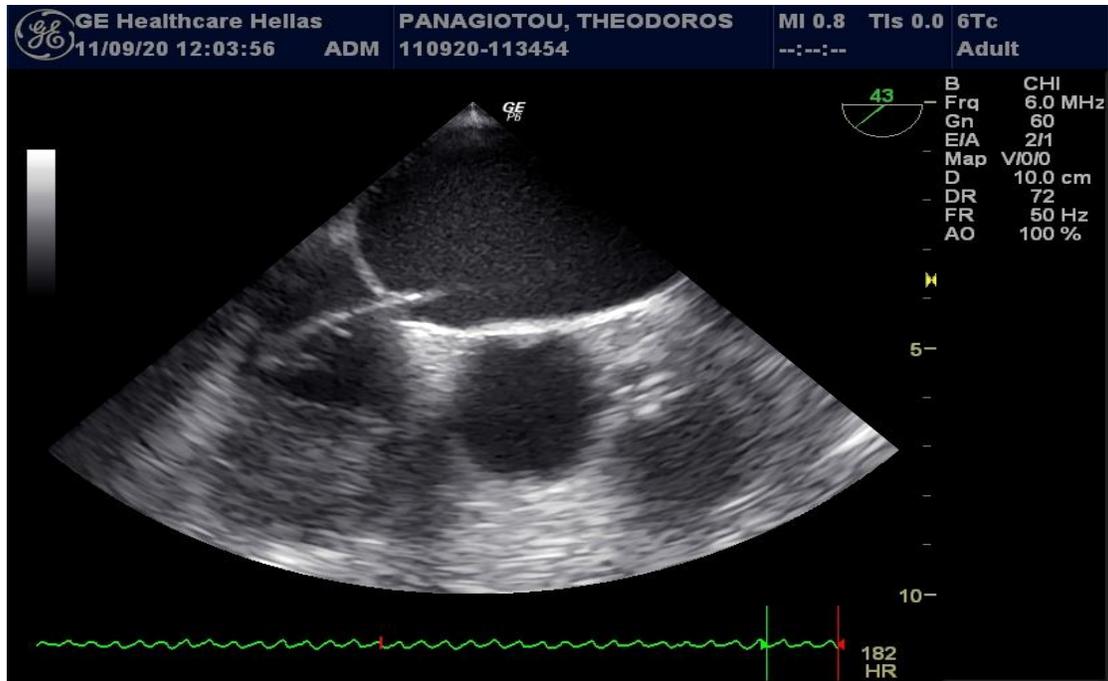


Figure 8



Figure 9



## Discussion

Malposition of the ventricular pacemaker lead in the left ventricle is a rare complication. In the international literature, there are very few case reports regarding this issue and thus, insufficient data are analyzing the severity and the prognosis of the specific condition. There have been reported cases of malposition of the atrial lead to the left atrium, malposition of the ventricular lead in the left ventricle, instead of the right via the aorta and in other cases from the right atrium to the left via a patent foramen ovale. In 2016 a study that was published in Eurospace journal, reports that among 1579 patients that underwent a permanent pacemaker or defibrillator implantation surgery, only 0,34% presented the above complications.

In general, the pacemaker's lead malposition could be underdiagnosed due to low rates of symptomatic patients. A percentage of patients are being diagnosed after manifesting neurological symptoms due to embolic stroke, or faint attacks as a result of inadequate pacing.

The misplacement of the ventricular lead prerequisites the existence of a patent foramen ovale, or a secundum atrial septal defect, for the lead, to penetrate the atrial septum and conclude into the left chambers.

In particular, the foramen ovale is an open flap of the atrial septal high in the atrium, that did not close after birth and it's called patent foramen ovale. It remains open in 15- 25 % of the general population, however, most of them dwell without having any symptoms. The defect is related to increased rates of the atrial septal aneurysm, Eustachian valve, and Chiari network.

Patients with PFO have a higher risk for paradoxical embolism and cryptogenic strokes. The diagnosis of a PFO is set with the transthoracic echo sound when intravenous administration of bubbles reaches the right atrium and passes through into the left atrium and is being demonstrated in the four-chamber apical view. Supporting tools of malposition of a ventricular pacemaker incorporates a 12 lead ECG, which should give us information of improper pacemaking rhythm (RBBB pattern instead of LBBB), a chest x-ray, which can give a hint of misplacement of the lead using both anterior and lateral projections.

The existence of the lead in the PFO further increases the risk for thrombosis. For this reason, patients with malposition of the pacemaker lead via PFO must be started on antithrombotic treatment, mainly warfarin.



Treatment of the malposition compels the removal of the lead and the relocation to the right ventricle as soon as possible. If that is not possible in the cath lab (for example due to extensive scar tissue development around the anchor), we could discuss the alternative of an open surgery removal. Until then, it is highly recommended the patient remains on antithrombotic medication to avoid any unnecessary thromboembolic events.

Precaution measures to secure the right placement of the pacemaker's leads should include a left projection view after the implantation, to expose the anatomical position of the leads and finally before the patient is discharged from the hospital a 12 lead surface ECG.

## Conclusion

The malposition of the ventricular lead during implantation of a permanent pacemaker is a rare complication, which prerequisites a PFO or an ASD. Sometimes it is underdiagnosed due to the lack of symptoms. Nevertheless, it requires immediate correction via intervention for the relocation of the lead either in the cath lab or by open surgery. In the intermediate, the patient must receive antithrombotic prophylactic treatment to avoid thromboembolic events. To avoid the malposition in the first place, the interventional cardiologist must record a left fluoroscopy projection after the implantation to secure the proper deployment of the lead. Supplementally, a 12 lead surface ECG must be made before the discharge of the patient.

## References

- 1) Chiara Rovera , Pier Giorgio Golzio , Giuditta Corgnati , Valentina Conti , Erica Franco , Simone Frea Claudio Moretti J Cardiol Cases. 2019 Sep 12;20(6):228231. doi: 10.1016/j.jccase.2019.08.012. eCollection 2019 Dec. "A pacemaker lead in the left ventricle: An "unexpected" finding?" J Cardio Cases
- 2) 2019 Sep 12;20(6):228-231. doi: 10.1016/j.jccase.2019.08.012. eCollection 2019 Dec. Ahmed Almomani, Amjad Abualsuod, Hakan Paydak, Wilburt Peer, and Waddah Maskoun "Chronic lead malposition diagnosis and management: discussion of two cases and literature review Clin Case Rep". 2017 Mar; 5(3): 270–276 Published online 2017 Feb1. doi: 10.1002/ccr3.819



3) Marc-Alexander Ohlow, Marcus Roos, Bernward Lauer, Hubertus Von Korn, Johann Christoph Geller  
“Incidence, predictors, and outcome of inadvertent malposition of transvenous pacing or defibrillation  
lead in the left heart” EP Europace, Volume 18, Issue 7, July 2016, Pages 1049–1054,  
<https://doi.org/10.1093/europace/euv270>

**Volume 2 Issue 3 March 2021**

**©All rights reserved by Dr. G. Neroutsos**