

# Refractory Postural Orthostatic Tachycardia Syndrome: A Difficult Clinical Scenario

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## Introduction

- Postural orthostatic tachycardia syndrome (POTS) describes a chronic, debilitating condition in which the individual experiences orthostatic tachycardia without orthostatic hypotension.
- Current treatment strategies include increasing fluid and salt intake, exercise programs, compression stockings, and medications such as propranolol, metoprolol, clonidine, alpha methyldopa and midodrine.
- We report a case of POTS refractory to most recommended treatment modalities and a patient centered treatment approach.

## Case Presentation

- A 21-year-old female with a long history of refractory POTS presented with complaints of ongoing palpitations and pre-syncope.
- At home managed with metoprolol and clonidine.
- She ingested 150 mg of metoprolol without relief. On admission was found to be tachycardic with a heart rate (HR) of 166 beats per minute (bpm).
- Laboratory and imaging were unremarkable including electrolytes, urine drug screen and chest X-Ray. EKG showed sinus tachycardia.

Figure 1. Recorded heart rate throughout hospitalization in bpm.



## Case Presentation

- She was admitted to the intensive care unit for acute exacerbation of POTS and observation for possible metoprolol toxicity. A chart review revealed she had been at multiple large tertiary care centers prior to visiting us where control of her autonomic dysfunction was not achieved.
- Her treatment regimen was changed to Ivabradine and Verapamil. Upon 12 hours of initiation of therapy, her HR decreased to 80-90 bpm that persisted throughout her hospital course.
- On hospitalization day 5 she achieved alleviation of all symptoms and discharged to outpatient follow up.

## References

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## Discussion

- POTS is a difficult condition to manage and patients frequently are not controlled with first line therapy agents.
- This clinical scenario is unique in that the management included Ivabradine and Verapamil.
- Ivabradine functions by inhibiting  $I_f$  (sodium funny channel), which increases diastolic filling time, lowering heart rate without affecting systemic vascular resistance.
- In many studies Ivabradine has shown to be a successful second line agent for refractory POTS.
- For our patient, Verapamil (a non-dihydropyridine calcium channel blocker) was part of the therapy. While not commonly used, it is often beneficial in a hyperadrenergic subtype of POTS. Our patient with palpitations, anxiety, and chest discomfort would fall into this category.

## Conclusion

- We provide a difficult clinical scenario of refractory POTS in which the patient's symptoms and HR were able to be well managed through an innovative therapy including Ivabradine and Verapamil.
- Further research is needed on the application of these therapies in refractory POTS patients.

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