

Pacemaker Syndrome - A Dyssynchronous Future

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Introduction

Intradialysis hypotension (IDH) is the most common complication experienced in patients undergoing hemodialysis (HD) sessions with a frequency of up to 12%. This risk may be increased in patients with leadless ventricular pacemakers due to atrial and ventricular dyssynchrony, a phenomenon known as pacemaker syndrome.

Case Presentation

A 71-year-old male with a past medical history of HTN, T2DM, ESRD on HD via tunneled CVC, and single chamber leadless pacemaker presented after developing chest pain and hypotension during hemodialysis sessions. He had 3 emergency room visits for the same presentation within the 2 previous weeks. EKG showed sinus rhythm with 1st degree AV block. Left heart catheterization revealed non-obstructive CAD. Echocardiogram with normal LV function, no structural abnormalities, and distal tip of the CVC was seen in the right atrium. While hospitalized, he had multiple episodes of chest pain and hypotension associated with dialysis. In these scenarios, telemetry showed intermittent runs of ventricularly paced rhythm. Interestingly, symptoms and paced rhythm would resolve with repositioning to an upright position and fluid resuscitation. Maintaining the patient in upright position with head of bed at 45 degrees in addition to decreasing rate of ultrafiltration resulted in no further episodes for the remainder of his hospital stay.

Discussion

Although IDH is a common complication in patients on hemodialysis, this patient was at increased risk due to his pacemaker. Moreso, a leadless pacemaker functions by

sensing atrial mechanical signals instead of electrical signals seen in more traditional pacemakers. The fluid dynamic changes during rapid fluid removal in HD, distally placed tunneled CVC, and his preference for hunched over positioning are factors contributing to altered atrial mechanical signal, leading to AV dyssynchrony. This dyssynchrony is termed pacemaker syndrome in which devices pace the ventricles in isolation leading to improper or mistimed atrial and ventricular contraction leading to reduced cardiac output.

Conclusion

This is an interesting case of a patient who had recurrent IDH during his HD sessions due to pacemaker syndrome. Although commonly seen in many undergoing HD, this patient was more at risk due to the presence of a single chamber leadless pacemaker. Now with increased use of leadless pacemakers, IDH rates can be anticipated to increase.