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Case Report

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The Impact of the Trendelenburg Maneuver on Right Ventricular Pressure-Volume Relationship

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Abstract

Intraoperative hypotension defined as a mean arterial pressure less than 65mmHg is associated with postoperative myocardial infraction, acute kidney injury and mortality [1]. When hypotension is due to inadequate venous return and fluid-responsiveness is suspected [2], increasing preload should improve hemodynamics.

Key words: right ventricular PV loops; preload; LVAD

Introduction

Herein, we present three right ventricular (RV) pressure-volume (PV) loops (CD Lycom, Inc) acquired in a 63 year-old patient after undergoing LVAD placement [3] with normal RV function. The Blue loop representing the patient in ~20° reverse Trendelenburg (decreased effective preload and likely fluid responsive), the Orange loop representing a level position, and the Grey loop representing ~20° Trendelenburg. As the patient's position changes and preload to the heart gradually increases, RV end-diastolic volume and pressure (Brown arrow) increase along the end-diastolic pressure-volume relations (EDPVR) curve (dotted Brown line). Because RV end-systolic volume remains relatively unchanged (Black arrow), RV stroke volume (end systolic volume minus end diastolic volume; dotted Blue, Orange, Grey lines, respectively) increases. Furthermore, we documented an incremental increase in RV inotrope (dp/dt) from 177 mmHg/s to 185 mmHg/s to 222 mmHg/s as venous return increases.

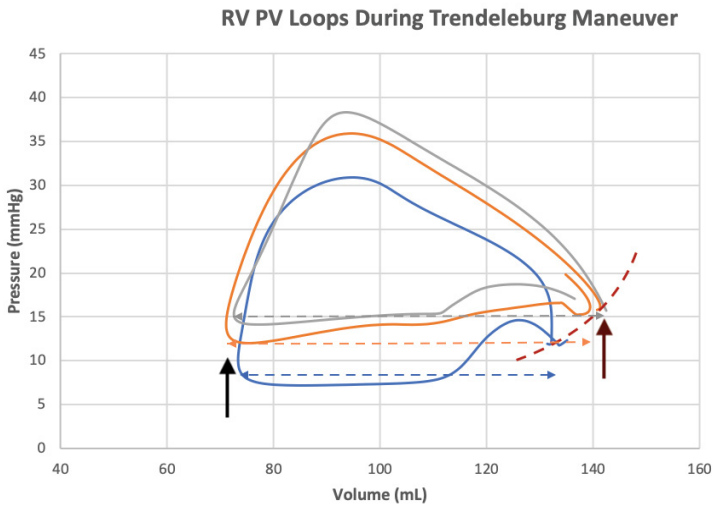

Figure 1: RV PV Loops During Trendelenburg Maneuver.

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In a patient who is fluid-responsive, administering a fluid bolus should lead to improved hemodynamics. Alternatively, and as predicted by the Frank-Starling Law, administering a fluid bolus to a patient who is not fluid-responsiveness can result in acute RV volume overload, distention and failure. As we demonstrate with these RV PV loops, altering preload by changing the position of the operating room table is a temporary and easily reversable alternative to fluid administration when assessing fluid-responsiveness in a hypotensive patient.

Competing Interests

None

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