



**Resuscitative Endovascular Balloon Occlusion of  
the Inferior Vena Cava (REBOVC):  
Experimental and clinical studies**

av

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## Abstract

Maria Wikström (2024): Resuscitative endovascular balloon occlusion of the inferior vena cava (REBOVC): Experimental and clinical studies.

Juxtahepatic venous injuries often cause life-threatening hemorrhagic shock, the mortality is high and new management methods are needed. **The aims** were to explore endovascular methods for retrohepatic vascular isolation, their effects on survival, hemodynamics, metabolism, end-organ damage and bleeding, and if ultrasound and anatomical landmarks could be used to guide placement of resuscitative endovascular balloon occlusion of the inferior vena cava (REBOVC). **Study I** explored the effects of different combinations of REBOVC +/- endovascular aortic balloon occlusion (REBOA) +/- the Pringle maneuver (PM) for 5 minutes in anesthetized pigs (n=9). REBOVC was found to be tolerated hemodynamically if combined with REBOA whereas REBOVC alone or combined with PM was not. In **study II**, REBOA was compared to REBOA + REBOVC in normovolemia and in hemorrhagic shock in anesthetized pigs (n=6-7/group). REBOA + REBOVC was tolerated for 45 minutes, but negative hemodynamic and metabolic effects in hemorrhagic shock must be considered. In **Study III**, the effects in anesthetized pigs of different combinations of balloon occlusion (REBOA vs REBOA + REBOVC vs REBOA + infra- and suprahepatic REBOVC + portal vein occlusion) on survival, hemodynamics, retrohepatic bleeding, metabolism, and collateral flow were compared to no occlusion. REBOA was found to most efficiently stabilize hemodynamics and prolong survival despite larger collateral flow and retrohepatic bleeding. The inability of venous occlusion to stabilize hemodynamics as efficiently as REBOA was probably due to a combination of arterial collateral flow combined with reduced venous return. **Studies IV + V** examined if ultrasound (in anesthetized pigs, n=9) and anatomical landmarks (computerized tomography images from 50 humans) could be used to position REBOVC and found that subxiphoidal ultrasound and external landmarks can be useful tools to adequately position REBOVC in the inferior vena cava.

*Keywords:* Retrohepatic inferior vena cava, trauma, injury, hemorrhagic shock, endovascular, REBOVC.