

Review

Exploring the Utility of Renal Resistive Index in Critical Care: Insights into ARDS and Cardiac Failure

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Abstract: The renal resistive index (RRI), a Doppler ultrasound-derived parameter measuring renal vascular resistance, has emerged as a promising non-invasive tool to evaluate renal hemodynamics in critically ill patients, particularly those with acute respiratory distress syndrome (ARDS) and heart failure (HF). This narrative review examines the current evidence for RRI measurement in these conditions, exploring its physiological bases, methodology, clinical applications, and limitations. In ARDS, RRI reflects the complex interactions between positive pressure ventilation, hypoxemia, and systemic inflammation, showing a role in predicting acute kidney injury and monitoring response to interventions. In HF, RRI is able to assess venous congestion and cardiorenal interactions and can also serve as a prognostic indicator. Many studies have shown RRI's superiority or complementarity to traditional biomarkers in predicting renal dysfunction, although its interpretation requires consideration of multiple patient-related factors. Key challenges include operator dependency, lack of standardization, and complex interpretation in multi-organ dysfunction. Future research should focus on measurement standardization, development of automated techniques, investigation of novel applications like intraparenchymal renal resistive index variation, and validation of RRI-guided management strategies. Despite its limitations, RRI represents a valuable tool that offers bedside and real-time insights into renal hemodynamics and potential guidance for therapeutic interventions. Further research is needed to fully clarify its clinical potential and address current limitations, particularly in critical care settings involving multiple organ dysfunction.

Keywords: renal resistive index; critical care; ARDS; heart failure; duplex Doppler sonography



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1. Introduction

Renal resistive index (RRI), an ultrasound vascular Doppler-derived parameter, evaluates renal resistance and compliance; it was first described by Pourcelot in 1974 [1,2].

RRI was primarily explored as a diagnostic tool in situations in which intrarenal impedance is altered, particularly renovascular and chronic kidney disease; however, it

Renal Problems In Critical Care

**Claudio Ronco, Rinaldo Bellomo, John A.
Kellum**



Renal Problems In Critical Care:

Renal Problems in Critical Care Lynn Schoengrund, Pamela Balzer, 1985 A comprehensive source for the critical care nurse dealing with patients with acute renal failure The book includes anatomy and physiology of the normal kidney pathophysiology of acute renal failure nutritional needs and drug therapy in renal failure treatment of renal failure and specific nursing interventions for all treatments Critical Care Nephrology Claudio Ronco, Rinaldo Bellomo, John A. Kellum, 2009-01-01 This 2nd edition of Critical care nephrology continues to provide comprehensive coverage of the latest advances in critical care procedures for the adult or pediatric patient with renal diseases or disorders It presents a common language and standardized guidelines to help multi disciplinary physicians caring for the critically ill communicate more effectively **BOOK JACKET**

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Ricci unparalleled leaders in this field Addresses key topics with expanded coverage of acute kidney injury stress biomarkers and sepsis including the latest developments on mechanisms and management Provides up to date information on extracorporeal therapies from new editor Dr Zaccaria Ricci Expert Consult™ eBook version included with purchase This enhanced eBook experience allows you to search all of the text figures and references from the book on a variety of devices

Cardiorenal Syndromes in Critical Care Claudio Ronco,Rinaldo Bellomo,Peter A. McCullough,2010 Critical care nephrology is an emerging multidisciplinary science in which the competences of different specialists are merged to provide a unified diagnostic and therapeutic approach to the critically ill patient The volume at hand places great emphasis on cardiorenal syndromes and the multidisciplinary collaboration between cardiology and nephrology Several contributions describe the cardiorenal syndrome in its different varieties and subtypes and report the results from the most recent Acute Dialysis Quality Initiative Consensus Conference as well as proposing new diagnostic approaches based on early biomarkers of AKI Other papers discuss advances in technology for renal replacement therapy and multiple organ support therapy Moreover special emphasis is placed on the potential role of extracorporeal therapies in patients affected by H1N1 influenza and a summary of the most recent trials in the field is included Containing the proceedings of the 2010 International Vicenza Course on Critical Care Nephrology this publication is a state of the art appraisal of today's technology and current issues related to cardiorenal syndromes

Classic Papers in Critical Care Mitchell P. Fink,Michelle Hayes,Neil Soni,2010-03-11 Every medical specialty has as its basis a core of classic papers which both reflects the historical background and gives insight into its present and future developments The selected papers in this volume highlight landmarks in the development of critical care medicine Internationally acclaimed experts have chosen what they consider to be the most important papers in their respective subspecialties Each entry follows a set format starting with the abstract and the reference to the original source of publication This is followed by analysis of the strengths and weaknesses of the paper and the contribution it has made to the development of critical care Additional information including citation score of each paper is given together with detailed analysis of the top 500 most widely cited papers

Core Knowledge in Critical Care Medicine Wolfgang Krüger,Andrew James Ludman,2014-08-25 This book provides a detailed review of state of the art knowledge on critical care topics as well as the latest research findings It covers the core aspects in excellent detail but is not so comprehensive as to make its daily use unfeasible For each condition considered discussion of the pathophysiology is integrated with observations on diagnosis and treatment in order to allow a deeper understanding The book is scientifically based with extensive references to published research This will allow readers to investigate their individual interests further and will enable physicians to justify measures by providing a coherent evidence based strategy and relevant citations where needed Core Knowledge in Critical Care Medicine will appeal to experienced practitioners as an aide mmoire but will also be of great value to a wide range of more junior staff wishing to complement their background knowledge with important facts

applicable to everyday practice **Blood Purification in Intensive Care** C. Ronco,R. Bellomo,Claudio Ronco,G. La Greca,2001-07 In the last twenty years critical care medicine has been established as a specialty with its own therapies and procedures with significant implications for clinical nephrology regarding severe acute renal failure This typically multifactorial condition is today predominantly seen in intensive care units The complex knowledge and skills necessary to handle it have resulted in a field called Critical Care Nephrology where nephrologist and intensivist either work side by side or have formally acquired expertise and training in both specialties Extracorporeal renal replacement therapies although originally used to treat end stage renal disease patients rapidly gained importance for acute patients This has had far reaching implications for the initiation and possible role of blood purification in the management of critically ill patients widening the scope of interaction between the nephrologist and the intensivist Experts in the field have contributed to the present book providing a comprehensive review of the different blood purification techniques relevant in the intensive care unit in the case of multiple organ failure The resulting mix of established knowledge and recent results from both clinical trials and basic research constitutes a valuable tool for all professionals involved in the care of the critically ill patient **Critical Care Update 2010** Vineet Nayyar, John V Peter, Roop Kishen, S Srinivas,

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