Sepsis, Kidney and Multiple Organ Dysfunction

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Contributions to Nephrology
(Founded 1975 by Geoffrey M. Berlyne)

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Multiple epidemiological studies have established and continue to emphasize the fact that sepsis is the dominant syndrome in modern Intensive Care Units. Severe sepsis occurs in approximately 50 to 100 cases/100,000 people/year and is the most common cause of death in intensive care patients. Severe sepsis and septic shock are now also the most common cause of kidney failure in intensive care and the most common cause of severe kidney failure requiring in general renal replacement therapy. This kind of kidney failure, however, is rarely seen in isolation. Most commonly, it occurs as part of a syndrome of multiple organ failure, where the kidney is one of several organ systems that become profoundly dysfunctional. In this setting, vasodilatory shock is frequent, mechanical ventilation is frequent and disorders of bone marrow function, acid-base balance, gastrointestinal activity and cerebral function are common. Thus, severe sepsis links kidney function, multiple organ function and patient outcome from the start to the end.

The care of patients with severe sepsis and/or septic shock is complex and typically involves a multidisciplinary approach. Critical care specialists typically co-ordinate resuscitation, fluid administration, and mechanical ventilation. In conjunction with the nephrologist, they deal with issues of electrolyte and water balance, acid-base control and renal support. Increasingly, renal support focuses on complex approaches to extracorporeal therapy, which require the use of sorbents, high-volume plasma water exchange techniques and plasmaphilration or plasma exchange techniques. In conjunction with the infectious disease specialist, critical care physicians and nephrologists co-ordinate antibiotic or antifungal treatment. This requires important adjustments, which
depend on renal function and the technique of renal support being applied. Accordingly, knowledge of pharmacokinetics and pharmacodynamics becomes essential. Finally, emerging evidence indicates that the resolution of the septic state and of multiorgan dysfunction might require optimization of the endocrine environment through replacement of glucocorticoids in patients with loss of adrenal functional reserve, the supplementation of vasopressin in selected patients with vasodilatory shock and, perhaps more importantly, the restoration of normoglycemia through aggressive insulin administration.

The above considerations make it clear that for patients to receive optimal care, the treating physician needs a detailed working knowledge of multiple aspects of care so that appropriate multidisciplinary assistance is sought at the right time and new techniques of organ support are applied in a safe, timely and effective way. In the present book we have combined the contributions of experts in various fields to tackle some of the fundamental and complex aspects of patients care. First we have focused on the epidemiology of acute renal failure in intensive care and on its role in determining outcome. We then present recent advances in the insight into the pathogenesis of ischemic renal failure and of sepsis and multiple organ failure. Because the immune response to infection is central in determining organ injury, the book then focuses on its role in determining renal and lung injury, on the role of immune mediators in inducing dysregulation of the immune response and on the role of genetics in determining such a response. We then move to the issue of fluid resuscitation, the goals of resuscitation, the importance of acid-base control and the issues that surround glucose control and sodium control in the ICU. Pharmacological aspects of care involving the use of common medications such as diuretics and vasopressors are analyzed and the possible role of uric acid modulation discussed. As extracorporeal therapies are being increasingly used in the care of these complex patients, we focus on important technical aspects of such therapies including vascular catheter management, control of circuit blood flow, anticoagulation, choice of replacement or dialysate fluids, the role of information technology and the selection of patients for treatment. As the choice of treatment modality remains controversial, we also discuss different approaches to renal support from intermittent dialysis to continuous therapies and hybrid techniques. Finally, we conclude with a description of advanced extracorporeal techniques of organ support and discuss their role in the management of sepsis and kidney failure in the context of an overall strategy of sepsis management.

The aim of this book is to present all physicians involved in the care of critically ill patients with sepsis and kidney/multiorgan dysfunction with a practical and up-to-date summary of current knowledge and technology as well as a fundamental understanding of pathogenesis and likely future developments in this field. Our endeavour is part of a now long-standing and continuing effort
to improve patient outcome through laboratory and clinical research, education
and consensus development. Working on the development of the specialty of
Critical Care Nephrology and of the Acute Dialysis Quality Initiative (ADQI),
we hope to move steadily in the direction of improved outcomes for critically
patients with kidney and multiorgan dysfunction.

We hope this book will serve as a useful tool for consultation, reference
and informative reading for all professionals involved in the care of critically ill
patients and that it will represent yet another small step toward improving the
standards of care for such patients worldwide.

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