English summary

The development of acute renal failure (ARF) in the perioperative period continues to be a serious condition associated with high morbidity and mortality rates which have been unchanged for several decades.

ARF may be classified as prerenal, intrinsic, and postrenal, while this classification is useful in establishing a differential diagnosis; many pathophysiologic features are shared among the different categories.

Renal dysfunction in the surgical patient is usually multifactorial: the commonest cause is ATN as a result of hypoxic damage to nephrons in the medullary region of the kidney secondary to hypotension, hypovolaemia, and/or dehydration and among the common associated risk factors are: preexisting renal insufficiency; type 1 diabetes mellitus; patient age over 65 yr; major vascular surgery; cardiopulmonary bypass times over three hours; and recent exposure to nephrotoxic agents (such as radio-contrast dyes, bile pigments, Aminoglycoside antibiotics, and NSAIDs.

Because ARF is usually not immediately reversible, prevention remains the most effective tool.

The goals of a preventive strategy for the syndrome of ARF are to preserve renal function, to prevent death, to prevent complications of ARF (volume overload, acid-base

disturbances, and electrolyte abnormalities) and to prevent the need for chronic dialysis, with minimum adverse effects.

Potential strategies for renal protection are to maintain adequate oxygen delivery, suppression of renovascular constriction, renal vasodilatation, maintain renal tubular flow, decrease oxygen demand and to attenuate ischaemic reperfusion injury.

These strategies can be performed through pharmacological agents such as diuretics, ANP, calcium channels blockers, growth factors, acetyl cysteine, ACEI, nitric oxide and in addition to vasopressor therapy in vasodilated shock, or through non pharmacological strategies as volume loading and maintenance of optimum haemodynamics.

Once ARF becomes established, therapy should be directed toward the prevention of complications.

Overt disturbances of extracellular volume and body fluid composition remain the objective indications for initiation of RRT in ARF these include volume overload, hyperkalemia, severe metabolic acidosis, and overt uremic symptoms.

Current treatment modalities replace only part of the multiple functions of the kidney. Accordingly, a bioartificial kidney including a renal tubule assist device (RAD) containing cultured renal proximal tubule cells has been engineered

The therapeutic modality used in this device could represent a significant step in efforts to bridge the gap in functionality between wholly artificial renal replacement therapy and normal native kidney functions.