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Review Article

Simultaneous liver kidney transplant

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ABSTRACT

A significant number of patients awaiting liver transplantation have associated renal failure. Simultaneous Liver and Kidney (SLK) transplantation is increasingly offered especially since the introduction of Model for End-Stage Liver Disease (MELD). The appropriate selection of candidates for SLK is more complex and less well defined than for liver transplant alone (LTA) due to our inability to predict accurately the extent of reversibility of acute or functional renal injury, particularly in patients who also have some background renal impairment. The current allocation policy is flexible, providing a kidney to any liver transplant candidate based solely on local physician opinion. This latitude has resulted in tremendous diversity of opinion and practice. More studies are required to delineate the predictors of renal recovery, the factors which influence renal recovery and to understand the complex interplay between the background renal impairment, the functional effects on kidney of advanced liver disease, and the effect of nephrotoxic drugs including CNIs. The long-term results of SLK are comparable to those of isolated LT. The liver protects the kidney from disease recurrence and allograft loss in metabolic diseases and its immunoprotective effect has enabled renal transplant in highly sensitised patients with positive cross-match and previously failed renal transplants.

1. Introduction

Single-organ transplantation was originally thought to be a major undertaking. In the current era, double-organ transplantation is becoming more frequent. In fact, with certain combinations of organs such as the kidney and pancreas, graft and patient survival rates can be improved with double-organ transplantation. Until recently, renal failure was a contraindication to liver transplantation (LT), but Simultaneous Liver Kidney (SLK) transplantation is currently the answer for selected recipients.

The model for end-stage liver disease (MELD) scoring system was implemented in 2002 by the United Network for Organ Sharing (UNOS) to allocate liver grafts, and is widely accepted as an objective scale of liver disease severity and accurate predictor of liver waitlist mortality.[1,2] Renal dysfunction is an important predictor of patient survival for those awaiting liver transplantation.[3] Hence, serum creatinine is heavily weighted in the calculation of MELD score.

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Table 1 – Indications for combined liver and kidney transplantation.

I. Advanced liver disease with chronic kidney disease
  A) Coincidental
    1. Glomerulonephritis/glomerulopathy (membranous, membranoproliferative, IgA nephropathy, focal glomerulosclerosis, anti-GbM disease, scleroderma, SLE, diabetes mellitus)
    2. Interstitial renal disease (chronic pyelonephritis, analgaesic nephropathy, sickle cell anaemia, renal transplant failure, sarcoidosis)
    3. Structural (obstructive uropathy, medullary cystic disease, nephrolithiasis, malignant hypertension, renal artery thrombosis)
  B) Associated
    1. Polycystic disease
    2. Glomerulonephritis/glomerulopathy associated with viral hepatitis (HBV, HCV)
    3. HCV chronic liver disease in chronic renal failure patients on haemodialysis
  C) Calcineurin inhibitors (CNI) toxicity
II. Advanced liver disease with acute renal failure/acute on chronic
  1. Hepatorenal Syndrome (HRS)
  2. Acute Tubular Necrosis (ATN)
III. Metabolic
  A) Affecting both organs
    1. Sickle cell disease
    2. Alpha 1 antitrypsin deficiency
    3. Glycogen Storage Disease type I
  B) Affecting mainly kidney, liver serving as a gene therapy for correcting the metabolic disorder
    1. Primary hyperoxaluria I
    2. Amyloidosis
    3. Haemolytic uraemic syndrome
    4. Methylmalonic acidaemia
IV. Miscellaneous
  Immunoprotection of kidney in positive cross-match

Although significant renal dysfunction was previously considered a contraindication for LT, SLK has become a therapeutic option for End-Stage Liver Disease (ESLD) and End-Stage Renal Disease (ESRD) since SLK was first reported by Margreiter et al, in 1984.[4] The decision to perform SLK is generally driven by concern over the likelihood of recovery of renal function in patients with ESLD and renal dysfunction and the associated increase in mortality in patients with nonrecovery of renal function following liver transplantation alone (LTA). Unfortunately many of the current indications for SLK remain controversial, due to our inability to accurately predict whether renal function will improve, stabilize or continue to deteriorate following transplantation in patients with renal dysfunction at the time of LT. This has created an organ utilization conundrum in the setting of a critically limited donor pool. The term clinical equipoise has been suggested to describe the use of SLK in the absence of standard criteria.[5] The main concerns are two-fold: (1) the incremental benefit attributable to the kidney transplant in SLK recipients is unknown and difficult to assess; (2) SLK diverts deceased donor kidneys away from candidates for kidney transplant alone, which has created a vigorous debate about best use of organs and the ethical ramifications of allocating kidneys to LT candidates.[6] This review attempts to analyse the available data and guidelines for SLK and enumerate the critical issues during intraoperative and postoperative care of SLK recipients.

2. Renal dysfunction in the setting of chronic liver disease

Renal dysfunction is common in liver transplant candidates and 1–8% of these patients have renal failure in the lead up to transplantation requiring dialysis.[7] Pre-transplant renal failure is an important determinant of morbidity and mortality following liver transplantation (LT).[8] Pre-transplant renal dysfunction is known to increase post-LT infectious complications and adversely affect long-term renal function.[9,10] It is associated with a significantly increased incidence of bacterial (52.2% vs 26.4%) and fungal infection (39.0% vs 10.6%), postoperative renal failure requiring renal support (40.9% vs 17.2%), and hospital mortality (29.5% vs 13.6%) compared to patients without pre-transplant renal dysfunction.[11]

The persistence of preoperative renal dysfunction following LT has been associated with inferior patient survival.[12] In addition, kidney waitlist survival is comparatively worse for candidates with a previous LT.[13] Hence transplant programmes often follow centre-specific decision-making process to ensure adequate posttransplant renal function while considering the appropriateness of SLK. Perfoming an unnecessary SLK takes away available kidneys for recipients awaiting kidney transplant alone, but failure to restore renal function may jeopardize the life of the liver recipient. However the key determinants of renal nonrecovery with a high degree of predictive value remain poorly defined. Few studies exist on the natural history of renal failure in the setting of liver failure and subsequent LT to support a universal algorithm that serves the LT patient yet preserves kidney resources. One has to assess the cause, duration, severity and chronicity of pretransplant renal dysfunction as well as intra- and postoperative events that impact renal recovery while selecting of candidates for SLK.

2.1. *Indications for SLK*

The current indications for SLK are listed in Table1. The decision to perform dual transplantation is straightforward for