Policy: Liver/Kidney Transplant: Patient Management Protocol  
  
Vision Strategy: Patient Care  
  
Policy Statement: The Emory Transplant Center and all the solid organ transplant programs will comply with all applicable federal, state, and local laws, regulations, policies and protocols regarding the management of transplant patients.  
  
Basis: This protocol is necessary for the protection of patients, physicians and staff  
  
Admin Responsibility: All transplant program physicians, practitioners and clinical staff members are responsible for compliance with this clinical protocol.

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| **TITLE:** **Liver/Kidney Protocol** | |
| **APPLICABLE FACILITIES:** (check all that apply)  □EUH **□**EUOSH □EWWH □EUHM □EJCH □ESJH □TEC □ESA □ERH | |
| **EFFECTIVE DATE:** | **ORIGINATION DATE:** |

**SCOPE:** Liver/Kidney Post Transplant patient management

**PURPOSE:** The purpose of this protocol is to standardize patient management for liver/kidney transplant patients post transplantation.

**PROCEDURE:**

1. Define the patient’s primary nephrologist
   1. Transplant Nephrologist at the time of hospital discharge
      1. Liver inpatient coordinator enters information in the transplant page
2. Ureteral stent-schedule appointment for removal within first 4-6 weeks post transplantation with urology
   1. Inpatient coordinator to schedule with urology
3. Lab-TIMED ORDER SET-Outpatient post renal transplant weeks 1-10 lab orders
   1. DEXA-first year at 6months
   2. Timed-Lipid panel,A1c, PTH, Vit D, Urine Analysis, UPCR -month 1, month 3, month 6, month 12
   3. Timed-BK CMV-monthly for 1 year
   4. Follow Liver High Risk protocol

**FOLLOW UP- <1 YEAR:**

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|  | **Week**  **1** | **Week**  **2** | **Week**  **3** | **Week**  **4** | **Week**  **5** | **Week**  **6** | **Week**  **7** | **Week**  **8** | **Months**  **3-5** | **Month**  **6-9** | **Month**  **12** |
| **Visits and Reports** | | | | | | | | | | | | |
| Weekly/Monthly Provider Visits/Lab frequency | Liver Surg/3x weekly labs | Liver Surg/3x weekly  labs | Liver Surg/3x Weekly  Labs | Liver Surg/3x  Weekly  Labs |  | Liver Surg/2x Weekly  Labs |  | Hepat/Neph  Weekly labs | Hepat/Neph  Monthly labs | Hepat/Neph  Monthly  labs | Hepat/neph |
| Labs Only |  | | | | 2x/weekly  Labs |  | Weekly Labs |  | | | Every 2-3 Months |
| UNOS report  Completed | complete |  | | | | | | | | complete |  | |

**FOLLOW UP- >1 YEAR:**

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|  | **Month**  **18** | **Month**  **24** | **Month**  **30** | **Month**  **36** | **Year**  **3>** | |
| **Visits and Reports** | | | | | |
| Provider/Labs | Hepat/Neph | Hepat/Neph | Hepat/Neph | Hepat/Neph | Yearly  Hepat/Neph | |

**IMMUNOSUPPRESSION MANAGEMENT-SLK Patients will remain on Tac+MMF**

* 1. < 1 yr (will stay on MMF and tac)- Follow liver protocol, Discuss with both Liver and Kidney Team
     1. Tac trough 8-12 till Month 3, then 6-8
     2. MMF 1g bid
  2. > 1yr – Discuss with both Liver and Kidney Team
     1. Tac trough 3-5
     2. MMF 1g bid or 500mg bid depending upon history of rejection post transplant
  3. Prednisone is off at day 90 except in autoimmune which may benefit from continuation of steroids.
     1. Patients with PSC or PBC should be off steroids in 6 months.

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|  | **Week**  **1** | **Week**  **2** | **Week**  **3** | **Week**  **4** | **Week**  **5** | **Week**  **6** | **Week**  **7** | **Week**  **8** | **Month**  **3** | **Months**  **4-11** | **Months**  **12** |
| **Immunosuppression** | | | | | | | | | | | | |
| Prednisone | 20mg daily | 20mg daily | 20mg  Daily | 20mg  daily | 10mg  Daily | 10mg  Daily | 10mg  Daily | 10mg  Daily | 5mg  Daily | \*refer to note (#1) below\* |  |
| Tacrolimus/prograf (target level)\*refer to note (#2) for dosing. | 8-12 | | | | | | | | | 6-8 | 6-8 \*refer to note (#3) below  3-5  \*refer to note (#4) below | |
| Mycophenolate mofetil (MMF/CellCept) | 1000mg  BID | | | | | | | | | | | |
| Basiliximab(Simulect); renal sparing | All patients with renal insufficiency: CrCl <60 ml/min, Scr > 1.5, will receive 20mg after reperfusion in the OR and second dose of 20mg on POD #4  \*please refer to Post Liver Transplant Inpatient Immosuppression Protocol for more details. | | | | | | | | | | | |
| Alloantibody Screen | Collected on: month 3, month 6, month 12 and annually for liver/kidney patients | | | | | | | | | | | |

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| **IMMUNOSUPPRESSIVE LEVELS** | **0-3 Months** | **3-6 Months** | **6-12 Months** | **>1 year** |
| **Drug** | | | | |
| Tacrolimus(Prograf)\* | Level 8-12 | Level 6-8 | Level 6-8 | Level 3-5 |
| Cyclosporine (Gengraf)\* | Level 150-180 | Level 100-150 | Level 75-125 | Level 50-100 |
| Sirolimus (Rapamune)\*  Everolimus(Zortress)\* | Level 8-12 | Level 6-12 | Level 4-10 | Level 3-8 |
| MMF (Cellcept)\* | 1000mg | | | |

* The use of generic immunosuppressant is allowed. The transplant team encourages patients to take generics from the same manufacturer, when possible, to minimize potential effects on trough levels
* Consider decreasing or eliminating MMF (cellcept) after 1 year post transplant on a case by case basis.
* Immunosuppressive regimes will be individualized on a case by case basis based on creatinine, serum potassium, liver function profile, history of rejection, MCV status and/or underlying disease process.

**ID PROPHYLAXIS-**

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|  | **Week 1** | **Week 2** | **Week 3** | **Week 4** | **Week 5** | **Week 6** | **Week 7** | **Week 8** | **Month 3-5** | **Month 6-9** | **Month 12** |
| **Infection Prophylaxis**  **Management** | | | | | | | | | | | |
| CMV Prophylaxis | High risk (D+R-) will receive valcyte for 3 months  Intermediate(R+) and Low risk(D-R-) will receive acyclovir for 3 months  Collect CMV PCR-every month for 1 year | | | | | | | | | | |
| PCP Prophylaxis | Bactrim SS Daily months 0-6 | | | | | | | | |  |  |
| Polyoma BK Virus (liver/kidney only) | Collect BK PCR monthly for 12 months | | | | | | | | | | |

**CARDIOVASCULAR RISK FACTOR MANAGEMENT-**

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|  | **Weeks**  **1-4** | **Weeks**  **5-8** | **Week**  **10** | **Week**  **12** | **Month**  **4** | **Month 5** | | **Month 6** | **Month 7** | | **Month 8** | **Month 9** | **Month 12** | **>12**  **Months** |
| **Cardiovascular Risk Reduction** |  | | | | | | | | | | | | | |
| BMI Goal < 25  BP< 130/80  Cholesterol < 200 | 🗹 |  | | | | | | | | | | | 🗹 | Annual |
| Lipid Panel | 🗹 |  | | 🗹 |  | | 🗹 | | |  | | | 🗹 | Annual |

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|  | **Week 1-4** | **Weeks**  **5-8** | **Week**  **10** | **Week**  **12** | **Month 4** | **Month 5** | **Month 6** | **Month 7** | **Month 8** | **Month 9** | **Month 12** | **>12**  **months** |
| **Diabetes Management** |  |  |  |  |  |  |  |  |  |  |  |  |
| Hgb A1C (if on steroid)  Ophthalmology | If blood glucose is consistently > 150, obtain endocrine consult | | | 🗹 |  |  | 🗹 |  |  | 🗹 | 🗹  🗹 | Q 3 months/  annual |

**VACCINATION**

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|  | **Weeks 1-4** | **Weeks**  **5-8** | **Week 10** | **Week 12** | **Month 4** | **Month 5** | **Month 6** | **Month 7** | **Month 8** | **Month 9** | **Month 12** | **>12**  **Months** |
| **Vaccinations (starting 3 months post transplant)** |  |  |  |  |  |  |  |  |  |  |  |  |
| Influenza | Annual | | | | | | | | | | | |
| Pneumococcal | Every 5 years | | | | | | | | | | | |

**BONE HEALTH-**

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| |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | **Weeks 1-4** | **Weeks**  **5-8** | **Week 10** | **Week 12** | **Month 4** | | **Month 5** | **Month 6** | **Month 7** | **Month 8** | **Month 9** | **Month 12** | **>12**  **Months** | | **Bone Density Management** |  | | | | | | | | | | | | | | PTH | 🗹 |  | | 🗹 | |  | | 🗹 |  | | | 🗹 | Annual | | Vit D | | Bone Density Scan (DEXA)-follow renal protocol |  | | | | | | | 🗹 |  | | | | Annual |   **CANCER SCREENING** | **Weeks 1-4** | **Weeks**  **5-8** | **Week 10** | **Week 12** | **Month 4** | **Month 5** | **Month 6** | **Month 7** | **Month 8** | **Month 9** | **Month 12** | **>12**  **Months** |
| |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | **Weeks 1-4** | **Weeks**  **5-8** | **Week 10** | **Week 12** | **Month 4** | **Month 5** | **Month 6** | **Month 7** | **Month 8** | **Month 9** | **Month 12** | **>12**  **Months** | | **Cancer screening and Prophylaxis** |  | | | | | | | | | | | | | General Exams | Exams by PCP: Breast (>40 years old), Cervical (>18 years old), Prostate (>40 years old) | | | | | | | | | | | Annual | | Dermatology |  | | | | | | | | | | | Annual | | Sigmoidoscopy or Colonoscopy | **Colorectal screening**: Colonoscopy prior to or at 1 year post OLT, if negative, FOBT in 5 years  **Colorectal cancer screening**: If negative, repeat colonoscopy 10 years after previous negative colonoscopy  **PSC and UC**: annual colonoscopy and surveillance biopsies; maintain breast, cervical, prostate exams | | | | | | | | | | | Every 5 -10 years | |  | | | | | | | | | | | |

Policy: Acute Kidney Injury requiring dialysis and CKD management post Liver Transplantation   
  
Vision Strategy: Patient Care  
  
Policy Statement: The Emory Transplant Center and all the solid organ transplant programs will comply with all applicable federal, state, and local laws, regulations, policies and protocols regarding the management of transplant patients.  
  
Basis: This protocol is necessary for the protection of patients, physicians and staff  
  
Admin Responsibility: All transplant program physicians, practitioners and clinical staff members are responsible for compliance with this clinical protocol.

**SCOPE:** Acute Kidney Injury Requiring Dialysis and CKD Management Post Liver Transplantation

**PURPOSE:** The purpose of this protocol is to standardize patient management for liver patients post transplantation who have the diagnosis of Acute Kidney Injury requiring dialysis and CKD who did not qualify for SLK

**PROCEDURE:**

1.Acute Kidney Injury requiring dialysis-

A. Definition: Patients discharged on dialysis to rehab or home

B. Process:

-Nephrology team at the time of discharge should communicate with accepting nephrologist (who is managing dialysis) to watch for signs of renal recovery (UOP, Pre-dialysis labs, 24hr CrCl)

-If patient is in Emory Rehab Emory Nephrology team to monitor patient for signs of recovery and document progress in hemodialysis notes at least once a week

-If patient is showing signs of recovery and dialysis has been held-

\*Need to see Transplant Nephrology(Nephrologist at the time of discharge) once a week or once in 2 weeks

\*Labs three times/week which has to be reviewed with nephrology team by the coordinator

\*Perm cath removal to be arranged by IR

2. Chronic Kidney Disease post liver transplant

A.Definition: Chronic kidney disease defined as calculated creatinine clearance (CrCl) or glomerular filtration rate (GFR) less than 60 mL/min for more than 90 days post transplantation. It is a common complication after liver transplantation and has a major impact on graft and patient survival. Pr-etransplant renal dysfunction is the most important determinant of posttransplant chronic kidney disease; other factors include the presence of diabetes/hypertension, acute kidney injury pre-transplant and post-transplant, and the use of calcineurin inhibitor-based immunosuppression.

B. Process:

-Consult Transplant Nephrology team

-Labs pre-consultation: UA with UPCR, Ultrasound of native kidney

-Transplant Nephrologist will decide-

\* Need for biopsy which will be done by IR

\* Need to establish care with a nephrologist locally or at Emory

* Frequency of follow up visits defer to Nephrologist

**OPTN Policies Policy 9: Allocation of Livers and Liver-Intestines Effective Date: 6/13/2018**

Medical Eligibility Criteria for Liver-Kidney Allocation If the candidate’s transplant nephrologist confirms a diagnosis of:

Chronic kidney disease (CKD) with a measured or calculated glomerular filtration rate (GFR) less than or equal to 60 mL/min for greater than 90 consecutive days At least one of the following: (The transplant program must report to the OPTN Contractor and document in the candidate’s medical record)

That the candidate has begun regularly administered dialysis as an end-stage renal disease (ESRD) patient in a hospital based, independent non-hospital based, or home setting.

At the time of registration on the kidney waiting list, that the candidate’s most recent measured or calculated creatinine clearance (CrCl) or GFR is less than or equal to 30 mL/min.

On a date after registration on the kidney waiting list, that the candidate’s measured or calculated CrCl or GFR is less than or equal to 30 mL/min.

Sustained acute kidney injury

At least one of the following, or a combination of both of the following, for the last 6 weeks:

That the candidate has been on dialysis at least once every 7 days.

That the candidate has a measured or calculated CrCl or GFR less than or equal to 25 mL/min at least once every 7 days.

If the candidate’s eligibility is not confirmed at least once every seven days for the last 6 weeks, the candidate is not eligible to receive a liver and a kidney from the same donor.

Metabolic disease

A diagnosis of at least one of the following:

Hyperoxaluria

Atypical hemolytic uremic syndrome (HUS) from mutations in factor H or factor I

Familial non-neuropathic systemic amyloidosis

Methylmalonic aciduria

Kidney Transplant Referral -

Prioritization for Liver Recipients on the Kidney Waiting List If a kidney candidate received a liver transplant, but not a liver and kidney transplant from the same deceased donor, the candidate will be classified as a prior liver recipient. This classification gives priority to a kidney candidate if both of the following criteria are met:

1.The candidate is registered on the kidney waiting list prior to the one-year anniversary of the candidate’s most recent liver transplant date

2. On a date that is at least 60 days but not more than 365 days after the candidate’s liver transplant date, at least one of the following criteria is met:

-The candidate has a measured or calculated creatinine clearance (CrCl) or glomerular filtration rate (GFR) less than or equal to 20 mL/min.

-The candidate is on dialysis.

**RELATED DOCUMENT(S)/LINK(S):**

**REFERENCES AND SOURCES OF EVIDENCE:**

1. Long-term Analysis of Combined Liver and Kidney Transplantation at a Single Center *Richard Ruiz, MD; Hiroko Kunitake, MD; Alan H. Wilkinson, MD; Gabriel M. Danovitch, MD; Douglas G. Farmer, MD; Rafik M. Ghobrial, MD, PhD; Hasan Yersiz, MD; Jonathan R. Hiatt, MD; Ronald W. Busuttil, MD, PhD*
2. Patterns of Kidney Function Before and After Orthotopic Liver Transplant: Associations With Length of Hospital Stay, Progression to End-Stage Renal Disease, and Mortality.[Longenecker JC](https://www.ncbi.nlm.nih.gov/pubmed/?term=Longenecker%20JC%5BAuthor%5D&cauthor=true&cauthor_uid=25989501)1, [Estrella MM](https://www.ncbi.nlm.nih.gov/pubmed/?term=Estrella%20MM%5BAuthor%5D&cauthor=true&cauthor_uid=25989501), [Segev DL](https://www.ncbi.nlm.nih.gov/pubmed/?term=Segev%20DL%5BAuthor%5D&cauthor=true&cauthor_uid=25989501), [Atta MG](https://www.ncbi.nlm.nih.gov/pubmed/?term=Atta%20MG%5BAuthor%5D&cauthor=true&cauthor_uid=25989501).
3. Chronic Kidney Disease and Related Long-Term Complications After Liver Transplantation.[Sharma P](https://www.ncbi.nlm.nih.gov/pubmed/?term=Sharma%20P%5BAuthor%5D&cauthor=true&cauthor_uid=26311603)1, [Bari K](https://www.ncbi.nlm.nih.gov/pubmed/?term=Bari%20K%5BAuthor%5D&cauthor=true&cauthor_uid=26311603)2.

**KEY WORDS:**

|  |  |
| --- | --- |
| **REVIEW/APPROVAL SUMMARY:** | |
| **APPROVAL BODY/BODIES:** | |
| **REVIEW/REVISION DATES:** | **APPROVAL DATE:** |