Chapter 10- HIV and solid organ transplant

Kidney/Pancreas Transplant

- Case report of 56 year-old male with HIV-associated nephropathy on ritonavir-boosted darunavir with abavavir and lamivudine, CD4 count of 344, undetectable HIV viral load, and HCV-coinfection.

- Hahnemann University Hospital's experience with 120 HIV+ kidney transplant recipients
- Includes immunosuppression approach to reduce rejection, including cases of belatacept use, management of cART and donor selection criteria

- Updated British Transplant Society Guidelines

- Summary of renal disease caused by HIV that can occur after transplantation

- Retrospective analysis using SRTR data and pharmacy prescription records to evaluate outcomes between HIV+ KTR on PI-regimens vs non-PI regimens

- Compared duration of viral suppression prior to kidney transplant and incidence of acute cellular rejection. Patients with < 2 years of viral suppression are 2.48 times more likely to experience rejection compared to those with viral suppression for 2 years of longer. Note: Reported p value in abstract is different from the results section.

- Examined SRTR of kidney retransplant recipients from 2004-2013.
- Compared to HIV- kidney re-transplant recipients:
  - HIV+ kidney retransplant recipients were more commonly African American, infected with HCV and had longer median times on dialysis.
• HIV+ re-transplant recipients experienced a 3.11 fold increased risk of death and 1.96 fold increased risk of graft loss


• Case report of the use of belatacept as part of CNI-sparing immunosuppression regimen in kidney transplant patient. Patient was free of rejection at 18 months.


• Case report with 1-year follow-up of kidney transplant recipient with DGF converted at belatacept at 14 weeks post-transplant.


• Analyzed 78 HIV+ patients, 31 on CsA and 47 on TAC
• Acute rejection at 1 year occurred in 58% and 21% among patients on CsA and Tac, respectively (P =0.003)
• Choice of CNI was the only factor significantly associated with acute rejection (HR for TAC vs CsA 0.25 [95% confidence interval, 0.11-0.57], P = 0.001)
• Authors concluded that TAC may be preferred CNI for HIV+ kidney transplant recipients


• Large cohort comparing clinical outcomes among induction agents: ATG, IL-2 receptor blocker or no induction.
• Patients receiving induction therapy were less likely to have DGF and less death-censored graft failure one year post transplant compared to patients not receiving induction therapy. Patients receiving ATG had lower rates of acute rejection.
• Infection rates were similar among induction agents and slightly lower with no induction


• Case report of HIV+ patient with increase in serum creatinine after initiation of dolutegravir


• Good general overview of HIV in kidney transplant with special attention to HIV+ to HIV+ transplants

Review of the controversy and obstacles of kidney transplantation in HIV positive patients including HIV-associated nephropathy (HIVAN), HIV patients on the waitlist, the improvement of outcomes in the modern era of HAART, drug-drug interactions with immunosuppression, and the use of HIV+ donors.


- Follow up publication out of South Africa highlighting the outcomes of the now 14 HIV+ to HIV+ transplants performed in that country.

- Multicenter, retrospective, observational study of HIV positive vs. HIV negative renal transplant recipients in Spain

- First reported kidney transplants (4) from HIV+ donors to HIV+ recipients out of South Africa.

- Meta-analysis with helpful summary tables of efficacy and safety from previous studies as well as random effects Forrest plots for outcomes and safety data.

- Well documented report of European experience with transplantation of HIV+ recipients, including information on immunosuppressive regimens, efficacy outcomes, and safety outcomes.

- One of the only, larger-scale prospective studies of HIV+ transplant, conducted in kidney recipients; highlights very important data regarding risk of rejection, infectious complications, and data on the use of induction therapy.

- UNOS data review describing predictors of patient and graft survival in HIV-positive population undergoing transplant

- Prospective, observational study of thymoglobulin in HIV+ renal transplant recipients for the treatment of rejection with commentary on safety and efficacy

- Incredibly unique study in which outcomes of HIV+ kidney recipients and the HIV negative recipient of the contra-lateral kidney from the same donor were compared.
Liver/Intestine Transplant

- Prospective, multi-center of 700 HCV+ patients (507 coinfected with HIV) assessing incidence of hepatic complications at one and two years post transplantation.

- Unique case report of a living liver transplant from HIV positive mother to HIV negative child in Africa that includes data from one year post transplant

- ATC abstract of a HIV positive recipient underwent multivisceral transplant
- Developed bowel perforation and an EBV-positive liver mass 8 months post-transplant
- Received rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisolone
- Developed bone marrow suppression, pancytopenia, and sepsis dying on POD 425

- Multi-centered prospective case cohort evaluating the frequency, histopathological characteristics, and outcomes of HIV-infected OLT recipients with incidental hepatocellular carcinoma (iHCC) comparing to non HIV infected OLT recipients with iHCC
- No patients developed HCC recurrence post transplant
- HIV-infected patients have lower survival and higher frequency of HCV recurrence as a cause of death

- Retrospective cohort evaluating retransplantation incidence, survival, and prognostic factors in 600 HIV + liver transplant recipients.

- Case report of first successful liver transplantation from HIV-positive donor to HIV-positive recipient in October 2015 in Switzerland
- Both patients had been exposed to many years of antiretroviral agents and were infected with multidrug resistant viruses.

- Letter to the editor describing a liver transplant from a HIV/HCV positive donor to a HIV positive recipient
- Rebound elevation in HIV RNA occurred within POD2, antiretroviral therapy was resumed on the evening of POD1
- HIV VL was undetectable by 7 weeks post-transplant
- Retrospective, multicenter study of raltegravir pharmacokinetics in HIV-infected liver transplant recipients. A higher raltegravir exposure was observed in these patients; some patients required dose reductions to tolerate raltegravir. The increased exposure was theorized to be due to inhibition of UDP-glucuronosyltransferase (UGT) activity and P-glycoprotein.

- Compared 5- and 10- year outcomes of HIV patients with matched HIV negative patients.

- Key challenges faced by HIV/HCV coinfection liver transplant patients in the pre- and post operative period including epidemiology, selection criteria, and short/long term outcomes

- Review article of management of patients co-infected with HBV or HCV and HIV
- Includes outcomes data and post-transplant medication management

- Review of liver transplantation in HIV+ recipients

- Compares retransplant incidence and 3-year survival rates in 14 HIV + liver transplant recipients compared to 157 HIV – recipients

- Case series evaluating rapamycin monotherapy in liver transplantation, also describes mTORi specific activity in HIV

- Large, retrospective database review of impact of HIV on outcomes after liver transplant.

Heart/Lung Transplant

• Case report on an HIV positive patient who received lung transplant that details long term outcomes (up to 2 years)


• Case report of 44 year old HIV+ male successfully bridged by MCS to heart transplant


• Overview of epidemiological data and case series/cohorts of HT patients with concomitant HIV infection


• 2 case reports of successful HIV+ to HIV+ OHT


• Retrospective review of UNOS registry data evaluating outcomes associated with using high risk donors vs non-high risk donors in lung transplantation
• Does not focus on lung transplant with HIV+ recipients/donors, just on use of high risk donors


• 3 case reports of lung transplant in HIV+ patients. Of note, all 3 patients experienced acute cellular rejection.


• Brief case report of a successful LVAD bridge to ECD heart transplant in a HIV+ recipient with non-ischemic cardiomyopathy


• Detailed case report of BLT in recipient with CF and HIV/HBV coinfection in Italy


• Brief, fairly superficial case report of a successful heart transplant in HIV+ recipient

- Case report of a heart transplant for dilated cardiomyopathy s/p chemotherapy in a HIV+ patient with history of AIDS, multiple OIs, and Kaposi’s sarcoma

**Concurrent HBV/HCV**


- Single center retrospective study of HIV+/HCV+ coinfected KT recipients (2007-2017). Outcomes were assessed for the pre-DAA and post-DAA (i.e., after December 2013).
- Outcomes of HIV+/HCV+ KT recipients, including HIV-/HCV+ to HIV+/HCV+ transplants, in the DAA era were excellent in this small cohort (13 patients)
  - Less infection and rejection compared to pre-DAA group


- Evaluated treatment outcomes in a prospective registry of HIV/HCV co-infected patients treated with IF-free DAAT in hospitals from region of Madrid between November 2014-August 2016
- DAAT was safe and highly effective in coinfected patients
- Predictors of failure included gender, HIV-related immunosuppression, HCV RNA load, severity of liver disease, and use of suboptimal DAAT regimens


- Majority of trials on anti PD-1/L1 (PD1) agents for tumor treatment excluded patients with solid organ transplant, HIV, HBV, or HCV so the safety and efficacy in this patient population is unknown
- 5 patients with solid organ transplant had melanoma and received pembrolizumab
- Immunotherapy can be given to renal transplant patients without rejection, however this is not universal
- PD1 does not appear to adversely affect the viral control in HIV and HBV and HCV patients


- Several complications related to HIV/HCV while patients are on the waitlist may impact the potential for liver transplant as well as outcomes
- Compared survival of patients on the liver transplant waitlist with HCV with and without HIV infection
- Patients with HCV/HIV coinfection had higher mortality on the waiting list than those with HCV monoinfection
- Donor age > 70, UNOS status 1, MELD, and HIV coinfection had independent negative predictive value for survival
- Review of hepatitis C virus (HCV) antiviral combinations in unique patient populations including HIV/HCV coinfection, liver transplant patients, and patients with end-stage renal disease (ESRD). Implications of drug-drug interactions are also discussed in this review

- 6 HIV/HCV genotype 1 coinfected recipients were treated with ledipasvir-sofosbuvir post kidney transplantation. All patients tolerated the regimen well and achieved SVR12. All patients were alive with functioning allografts at last follow up, mean of 265 days after the end of therapy. Tac required dose adjustment, but ART regimen required no dose adjustments.

- Case report of successful treatment of HCV recurrence in HIV co-infected liver transplant recipient

- Review article of experience with liver transplants with HIV/HCV co-infection focusing on donor/recipient selection criteria, minimizing rejection risk, and HCV therapy

- Retrospective US cohort study investigating the effect of HIV on liver transplant patients and graft outcomes when compared to HCV and uninfected patients
- HIV/HCV coinfection was associated with a 2.5 fold increased risk of mortality and an almost 3-fold increase in allograft loss
- HIV monoinfected patients had comparable outcomes to uninfected recipients

- Compared rejection and survival outcomes in 1700 HCV and 243 HIV + kidney transplant recipients compared to the HCV – and HIV – mate kidney recipients

- Compared overall mortality by induction therapy (alemtuzumab, T cell-depleting agents, IL-2 blocking agents and no induction therapy) using SRTR data from 2003-2010. Compared to no induction, patients receiving any induction had similar overall patient and graft survival at 1 year and 3 years.


• Summary of major challenges faced taking care of a HIV infection and long term outcomes that resulted


• Prospective multicenter study evaluating post-liver transplant outcomes of HIV/HCV infected patients compared to HCV monoinfected patients


• Concern that patients with HCV/HIV will have poor outcomes post-liver transplant
• Patient and graft survival in liver transplant patients are lower in HCV-HIV compared to HCV alone
• Rates of treated acute rejection but not HCV disease severity are significantly higher in HCV/HIV compared to HCV recipients


• Unique report of HIV transmission via organ donation highlighting process for screening of HIV in pre-transplant setting.


• Prospective cohort evaluating patient and graft survival in 22 HIV-HBV coinfected liver transplant recipients compared to 20 HBV monoinfected recipients


• Helpful kinetic data on immunosuppressant use in the post-transplant setting.

General/Other


• Updated SOT in HIV-infected patient guidelines from the American Society of Transplantation Infectious Diseases Community of Practice


• Review article of challenges faced in SOT patients with HIV and comparison of survival between HIV-infected vs HIV-non infected patients.

- Single-center study of 42 patients demonstrating higher rates of acute rejection in PI HAART regimens when compared to other HAART regimens at 1, 2, and 3 years.


- Summary of drug-drug interactions between immunosuppressants and anti-infective agents


- Guidelines on use of HIV-positive donors and HIV-positive recipients, HCV viremic donors, and approaches to patients with donor-derived infections


- Survey describing scope of planning among US transplant centers for HIV+ donors to HIV+ recipients
- Assessed knowledge/attitudes about HIV+ to HIV+ transplantation to identify transplant center barriers to implementation of this practice


- Review over factors to consider in transplanting a HIV positive organ such as access, risks, and consent


- Evaluation of the impact of liver and kidney transplantation on survival in HIV-positive transplant candidates and compare outcomes between HIV-positive and negative recipients


- Review of clinical considerations of HIV-to-HIV transplantation


- Extrapolated data from 6 HIV clinics in Philadelphia to estimate the increase in potential donors as a response to the HOPE Act
- First case report detailing a multivisceral and kidney transplantation in an HIV positive patient.

- Review article with recommendations for listing criteria, HAART regimens, and infection prevention in the pre- and post-transplant periods

- Prospective evaluation of CNI level sampling in HIV+ individuals to find the best time point correlation with AUC in abdominal transplant recipients

- Very relevant article highlighting important considerations in an era where HIV+ organ donation is now permissible.

- Guidelines endorsed by ASTS with helpful information regarding general considerations and coordination to reduce inadvertent risks of acquiring blood borne pathogen via transplantation.

- Review on SOT in HIV+ recipients that includes eligibility criteria, outcomes and medical management of abdominal transplant patients (including drug interactions and immunosuppressants, antiretroviral therapy, viral co-infection and microbial prophylaxis)

- Comprehensive review of transplantation into a HIV+ recipient endorsed by AST/Canadian Society of Transplantation; includes criteria for transplantation, drug interactions for antiretrovirals and immunosuppression, prophylaxis and vaccinations

- Review of abdominal transplantation in HIV+ recipients with commentary on HBV and HCV co-infection

Very useful review of drug interactions with immunosuppressants and HIV medications; informative summary tables.

- PK study of CSA and FK with NNRTI and/or PI. PI increases CSA and FK AUC and bioavailability, efavirenz increases CSA exposure and bioavailability.
- Changes with Neviripine not observed.


- Very thorough class-by-class review of drug interactions between antiretrovirals and immunosuppressants including comprehensive table of data presented in various other publications to date.


- Report that estimates the number of potential deceased HIV+ organ donors and the characterization of the donor pool.


- Large-scale meta-analysis of trials evaluating outcomes in HIV+ abdominal transplant recipients.


- Unique article focusing on the potential benefit of utilizing raltegravir-based HIV therapy after transplantation presented as case series of patients.


- Additional safety data for the use of raltegravir in this patient population.


- Review of the development/improvement of outcomes and care in HIV+ transplant recipients.


- Review of immunologic pathogenesis of HIV and rational for immunosuppressant use; includes review of safety data when used in transplant recipients.
  - Details effect of antiretroviral agents (HAART) on immunosuppression pharmacokinetics

  - Older article highlighting social issues surrounding the transplantation of organs into an HIV+ patient.

  - Older general review article on HIV+ transplantation.