# Acceptance type: Intestinal Transplant Poster

# \*Poster of Distinction

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## Decoding donor and recipient cell dynamics in the small bowel graft within six months post-transplantation

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#### Abstract

Introduction: Transplantation of the small bowel is a last resort for patients with severe gastrointestinal failure. The procedure, however, is costly and of high risk. Half of all patients endure acute graft rejection within 5 years and we do not know why.

The gut constitutes the largest reservoir of immune cells in our bodies. How and when these cells repopulate after transplantation is yet to be specified. We hypothesize that the recipient immune cell population in the graft grows after transplantation and that this process is disrupted in small bowel graft rejection. Furthermore, we think that graft rejection is preceded by impaired substitution of donor immune cells with recipient cells in the transplanted small intestine.

Methods: We studied three patients up to six months post small bowel transplantation. We longitudinally sampled 28 small intestine biopsies of the graft, dissociated these and profiled >90.000 cells using single-cell RNA sequencing. Post-sequencing, we applied the python package “Souporcell” which uses the genetic background to distinguish donor from recipient cells.

Results: We are able to differentiate between donor and recipient cells. Overall, recipient cells show more myeloid cell presence, whereas the donor immune cells population consists mainly of T cells. We observe a similar recipient immune cell composition in the first 30 days post-transplantation for the three transplants (figure1). Recipient immune cell counts are variable over time post-transplantation and with rejection grades (figure2).

Conclusion: We find no evidence for the expansion of the recipient immune cell population with time post transplantation. Furthermore, we state that donor immune cell presence is independent of graft rejection, although we see increased recipient immune cell presence in high grade rejection.

figure 1

figure 2

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## First intestinal transplant model in rats to assess the impact of aging on cellular rejection kinetics, clinical manifestation, and survival.

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#### Abstract

Introduction. Recipient age has a substantial impact on alloimmunity and outcomes after organ transplantation. Increased rates of infections, malignancies, mortalities, and a more challenging treatment of acute rejections are characteristic and related to synergistic effects of immune senescence and immunosuppression. Effects of aging on Intestinal Transplantation (ITx) are poorly understood.

Aim. To delineate the effects of aging on alloimmunity and transplant survival in an experimental model of ITx.

Materials and Methods. Intestinal allografts from young (2 months) Sprague-Dawley rats were transplanted into either young or old Wistar rats (2 or >9 months, respectively, n=7/group). Intestinal graft and blood samples were collected at 30 minutes, 5, 7, 9 post-operative days (POD) and at the clinical endpoint time, determined by clinical score. Recipient survival, histopathological analysis assessing acute cellular rejections (ACR) based on the Wu Score, intestinal absorptive capacity, kinetics of CD4 and CD8 frequencies (flow cytometry) were collected. Donor specific allorecognition responses using splenocytes of old and young recipient rats were evaluated by Mixed Lymphocyte Reaction (MLR) assays.

Results. Intestinal graft analysis performed by 6-8 POD demonstrated comparable number of acute rejection episodes, but with different degree of severity (Figure 1). Furthermore, glycemia curves were similar in both groups, demonstrating comparable graft absorptive capacity.  Prior to transplantation, old rats exhibited a reduced number of CD4+ T-cells systemically. After ITx, kinetics of CD4+ and CD8+ frequency in blood and gut tissue was similar in both groups. Allo-specific response of CD4 and CD8 cells after allogenic antigen stimulation by MLR assay demonstrated age-independent proliferation rates. Despite of the difference of rejection severity rate between groups, the survival of old recipient was prolonged (11.8 ± 1.6 vs 8.3 ± 0.2 POD in old vs. young recipients, Figure 2), this was determined by less severe clinical score mainly due to a reduced amount of body weight loss (OR: 20% vs YR: 25%).

Conclusion. The preliminary results of using OR for intestinal grafts showed an increase severity of the rejection episodes observed, but with lower impact in clinical score. This experimental study is of translational relevance supporting the concept of transplanting older recipients in need of intestinal transplants. It is to highlight the need to further using the model with standard immunosuppression, to understand the response to therapy, and the immunobiology related to aging.

Figure 1. Severity grade of ACR in OR and YR according to Wu Score

Figure 2. Survival curves defined by Clinical Score

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## The first report of three-way macrochimerism in a patient receiving multivisceral transplantation following loss of an initial liver-intestine transplant

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#### Abstract

**Introduction:** The success of intestinal transplantation is compromised by high rejection rates. Our previous studies demonstrated that macrochimerism (≥4% peak level of donor T cells) in recipient blood and slower replacement of donor T cells in the intestinal graft by recipient are associated with less rejection. Intestinal graft-derived hematopoietic stem and progenitor cells (HSPCs) contribute to persistent multi-lineage chimerism in blood and may promote immune tolerance. Long-term blood T cell chimerism in re-transplantation has not been explored.

**Methods:** We longitudinally monitored chimerism in peripheral blood and intestinal allograft intraepithelial lymphocytes (IEL) and lamina propria lymphocytes (LPL) of a patient who rejected a liver-intestinal transplant (LITx) and subsequently received a multivisceral transplant (MVTx). HLA typing information for the recipient and two donors was used to identify HLA class I allele-specific antibodies that discriminate cell origin by multicolor flow cytometry. Immunosuppression regimen included anti-thymocyte globulin, tacrolimus, and methylprednisolone.

**Results:** The patient was diagnosed with necrotizing enterocolitis and received LITx at 20 months of age from a 3-month-old donor (Donor 1). Mild rejection occurred (based on pathologic scoring scheme) on postoperative day 15 (POD15), progressing to severe rejection on POD19. Graft loss occurred on POD786 with donor chimerism of T cells in blood never surpassing peak of 2.36% on POD9. Meanwhile, recipient T cell chimerism in graft surpassed 95% by POD19. He received MVTx from a 19-month-old donor (Donor 2) on POD786. 4 episodes of mild rejection and 1 of mild-moderate rejection occurred over the next 5 years. Blood macrochimerism from Donor 2 peaked at 29.9% on POD20. Concomitantly, macrochimerism from Donor 1 peaked at 8.98% on POD48. The majority of these circulating Donor 1 cells were CD8+ (13.3%), not CD4+ T cells (0%). Recipient T cells were slower to repopulate graft this time in both ileal IELs and LPLs. Recipient T cell chimerism in graft did not surpass 25% up to POD251, but gradually increased to 99.4% in IELs and 93.9% in LPLs by POD377, and then remained between 80% and 100% through POD1004 (last timepoint with data). Recent thymic emigrant (RTE) [CD45RA+CCR7+CD31+] analysis revealed CD4+ RTEs only from recipient and Donor 2. CD8+ RTEs, however, were detected from recipient, Donor 2, and Donor 1 from POD5 onward.

**Conclusions:** For the first time, we report development of persistent triple blood T cell chimerism in our patient, with both donors exhibiting macrochimerism in recipient after re-transplantation, associated with improved clinical outcomes compared to initial LITx. The RTE phenotypes of circulating T cells from both donors, especially Donor 1 more than 2 years post 1st LITx, are in line with our previous demonstration that intestinal graft-derived HSPCs promote long-term mixed chimerism in blood and may induce tolerance.

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## The Use of Teduglutide in Intestinal Transplantation: A Case Series

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#### Abstract

**Introduction**: Teduglutide (TDG) is a glucagon-like peptide 2 (GLP-2) analog which improves the absorption of nutrients and fluid in patients with short bowel syndrome (SBS) who are dependent on parenteral support. Teduglutide has become the first medical option for rehabilitation of patients with chronic intestinal failure secondary to SBS. However, the effects of teduglutide on immunosuppressed recipients after small bowel transplantation, who may stay PN-dependent, was not studied yet. We aim to report our experience using sGLP-2 in a selected group of patients after intestinal transplantation.

**Methods**: We report a case series of four patients receiving small bowel transplants between November 2015 and August 2020. One patient (Patient 2) had initially a living donor intestinal transplant and then was retransplanted using deceased donor organ due to severe ischemia of the original graft, with consequence of stenosis of the arterial anastomosis. TDG was dosed at 0.05 mg/kg subcutaneously once daily using actual body weight. The primary outcome was time to parenteral support independence (PSi) from day of intestinal transplant. The secondary outcome included 1-year patient, allograft survival, and weight trends as well as time to stoma closure. History of any type of malignancy, as well as family history of GI cancer, was considered as a contraindication for teduglutide therapy. All patients underwent endoscopic evaluation prior to the treatment and a regular monthly biopsy was made during posttransplant period.

**Results**: A mesenteric tumor, abdominal gunshot wound, SMA/SMV thrombosis and complicated internal hernia were causes of SBS of the recipients in the cohort. All patients gained weight post-transplant and ileostomy closure was successfully done 2-4 months after the transplant. TPN and IV fluids were stopped before or soon after the ileostomy reversal. Patient 1 stopped taking Teduglutide on POD5 due to abdominal pain; Patients 3 and 4 received TDG for 2 months and successfully discontinued the therapy after achieving nutritional autonomy. Patient 2 took Teduglutide for more than 2 years after the second transplantation due to malabsorption. No episodes of de novo GI malignancies of polyps were observed during the follow-up. Currently, all 4 patients maintain nutritional autonomy and have a stable function of the grafts.

**Conclusion**: Ileostomy reversal in isolated intestinal transplant patients can be achieved early (2-4months) after transplant when TDG is used perioperatively. Additionally, sGLT-2 analogs could potentially help to shorten time for achieving nutritional autonomy without additional risk of de novo tumor of gastrointestinal tract.

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## Safety of endoscopic surveillance of the transplanted small intestine: A 15 years experience of a large UK Transplant center

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#### Abstract

Safety of endoscopic surveillance of the transplanted small intestine: A 15 years experience of a large UK Transplant centre

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Introduction: Intestinal transplantation is a lifesaving procedure for patients with intestinal failure. Endoscopy with biopsy remains the gold standard for surveillance of the graft and early detection of rejection. The aim of this study is to evaluate the risk of complications during surveillance of the transplanted small bowel.

Methods: We performed a retrospective review of all surveillance procedures of the transplanted bowel between 2007 and 2022 in Addenbrookes hospital. We collected demographics and baseline characteristics of patients, as well as procedures-related factors. We investigated any adverse events including bleeding, perforation, and sedation-related side effects. Regression analysis was performed to identify potential risk factors.

Results: We screened a total of 1136 procedures for 131 unique adult patients. Median age of the patients was 45 years (IQR: 34-55), 52% were females and the median procedures per patient was seven. Only 33/131 (25%) patients were symptomatic at the time of surveillance; 20/33 (60%) had fever, 11/33(33%) reported change in stoma output and 9/33 (27%) had abdominal pain. Almost half of the patients, 64/131(49%) were on therapeutic dose anticoagulation. On the day of the procedure, median PT was 13 seconds (IQR: 12-15), median platelet count was 246(IQR: 163-383) and median haemoglobin was 88 g/L (IQR: 80-100). Total of 20/1136 (1.8%) adverse events were encountered. All were post-biopsy bleeding, which was identified early at the time of the procedure and did not require endoscopic intervention. All specimens were obtained by paediatric, non-spiked forceps, as is our standard practice. The majority, 17/20 (85%) did not require any further management post-procedure. Two patients needed platelets transfusion and one needed one unit of RBC transfusion. On regression analysis; fever, increasing age, Higher CRP and PT at day of the procedure were potential risk factors (table 1). Interestingly, no perforation or sedation-related side effects were encountered.

Conclusion: Careful surveillance of transplanted bowel is not associated with increased risk of major complications compared to standard procedure risk. Post-biopsy minor bleeding is the main one, and increased age, fever and high CRP and PT are potential predictors.

Table-1: Regression analysis of bleeding risk factors.

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## Current Status of Japanese Small Bowel Transplantation

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#### Abstract

**Introduction:** Small bowel transplant (SBT) in Japan was initiated in 1998. SBT has already been covered by Japanese national health insurance. However, organ donation was limited, and only small cases of SBT were performed. We figured out the current status of SBT in Japan and registered it for future improvement. We will report the results of the Japanese SBT registry.

**Methods:** Survey requests were sent to each registered SBT facility, and a case survey form on the web was filled in. Analysis was performed based on the registry form. We investigated the number of patients, age, sex, cause of death, surgical procedure, primary disease, immunosuppressants, postoperative survival rate, and the effects of transplantation on patients who underwent cadaveric SBT or living donor SBT. The survival rate was determined using the Kaplan-Meier method, and the Log-rank method was used for the test.

**Results:** By 2021, 37 cases of SBT have been performed in 33 patients in Japan. By donor, 22 cases were deceased donors, and 13 cases were living donors. The procedure was isolated SBT in all patients except for one patient who underwent simultaneous liver and small bowel transplantation. Patient survival rates were 1-year: 91%, 5-year: 73%, and 10-year 59%. The graft survival rate were 86%, 64%, and 47% at one year, five years, and ten years, respectively. All were partially weaned from parenteral nutrition, and approximately 90% were able to wean completely from parenteral nutrition. Only about 30% of the patients required fluid replacement. The intestinal function was maintained if the SBT was successfully done. Approximately 80% of the patients had a PS of 1 or less. The QOL of patients after SBT was extremely good.

**Conclusion:** The results of SBT in Japan were comparable to those of other organ transplants, and the QOL after transplantation was also good.

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## Long term outcomes after intestinal transplantation at a single center in Argentina.

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#### Abstract

Introduction: The establishment of the first multidisciplinary comprehensive intestinal failure (IF) program in Argentina opened the possibility to patients (Pts) with IF to receive Intestinal transplant (ITx) when indicated. The field has evolved favouring intestinal rehabilitation over ITx worldwide, impacting on the ITx activity. We aim to report the long term ITx applicability and outcomes at a single center.

Methods: Retrospective analysis of a prospectively filled database of ITx Pts from 03-2006 to 01-2023. Number of ITx performed, indications for ITx, time on the waiting list (WL), type of ITx, mean total ischemia time (TIT), mean warm ischemia time (WIT), 1, 3, 5 and 10 year actuarial Pts and graft survival, cause of death and graft loss are reported overall, and divided by periods: 2006-2013 (P1) and 2014-2023 (P2), and according to age group: Children (C) and Adults (A).

Results: 53 ITx were performed in 48 pts (20 ITx/19 A, 33 ITx/29 C), 36 Male (68%); 40 ITx were done in P1 and 13 in P2 (p=0.04). Short gut syndrome was present in 79%, the main indications for ITx were: lack of central venous access (47%) followed by PNIFLD (23%), and catheter related sepsis (8%). Mean time on PN before ITx was1732± 2049 days. The overall mean time on the WL was 240±258 days (P1:186±187 days and P2:405±369 days [p=0.007]). Thirty nine ITx were isolated (74%, 27 C and 12 A; 3 re-Tx, 31 in P1), 8 multivisceral transplants (MTV) (15%; 3 C and 5 A; 1 Re-Tx, 1 mMTV, 2 with kidney (KD), 6 in P1), and 6 combined liver-Itx (11%, 3 C and 3 A; 1 Re-Tx, 2 with KD, 3 in P1).  Mean TIT was 399±126 min, TIT in P1 was 420±128 min., while in P2 was 332±96 min (p=0.02). Mean WIT was 39±11min, 40±10min in P1,and 38±14 min in P2 (p=ns). Overall pts and graft survival at 1, 3, 5 and 10 years were: 70%, 64%, 55% and 40% and  69%, 61%, 50%, 29% respectively. No statistical differences were observed when periods, recipient age and type of Tx were compared. Sepsis remains the main cause of early death, while severe exfoliative rejection and chronic rejection continue to be the leading causes of graft loss.

Conclusions: Over the first 17 years, our program was able to sustain ITx activity despite a significant reduction in the number of cases, and longer time on de WL. TIT was improved, type of Tx proportions remain unchanged. Late graft loss has progressively increased, mainly as consequence of late acute or chronic rejection. The overall long-term survival remains comparable to larger programs. This activity has positioned our center among the 20 most active programs worldwide, and the most active in the region.

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## Intestinal transplantation for intestinal motility disorders

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#### Abstract

Introduction: Intestinal mobility disorder (MD) is a major cause of severe intestinal failure requiring intestinal transplantation (ITx), especially in Asian countries. This study aimed to assess the outcome of ITx for patients with MD.

Methods: Between 2003 and 2022, 11 patients underwent ITx at our institution. Underlying MD was identified in eight patients, and short gut syndrome in the remaining three. Patients with MD were divided into two groups according to Era: Era I (2003-2010, n=4) and Era II (2011-2022, n=4). A retrospective review was performed to evaluate the patient characteristics, operative data, patient and graft-survival rates, and incidence of complications, including acute rejection (AR).

Results: Patient’s age at the time of primary ITx in Era I was higher than in Era II (median, 20 years vs. 15 years). In Era I, hypoganglionosis (n=2) and chronic idiopathic intestinal pseudo-obstruction (CIIPS) (n=2) were diagnosed, while in Era II, hypoganglionosis (n=1), CIIPS (n=1), megacystis microcolon intestinal hypoperistalsis syndrome (n=1), and extensive aganglionosis (n=1). An induction immunosuppressive treatment included an interleukin-2 receptor antagonist in Era I and rabbit antithymocyte globulin in Era II. Furthermore, the donor type was living (n=2) and cadaveric (n=2) in Era I and all cadaveric (n=4) in Era II. Median durations of follow-up after ITx were 102 and 81 months in Era I and II, respectively. One-, 5-, and 10-year patient survival rates were 100%, 75%, and 44.4% in Era I and 100%, 100%, and 100% in Era II, respectively (p=0.1). Three patients in Era I died: one due to sepsis, another due to abdominal bleeding, and the other due to acute pancreatitis. In comparison, 1-, 5-, and 10-year graft survival rates were 75%, 50%, and 25% in Era I and 100%, 100%, and 100% in Era II, respectively (p=0.07). The incidences of moderate or severe AR and medical complication including renal deficiency and diabetes mellitus, were 100% and 50%, respectively, in Era I and 50% and 75%, respectively, in Era II. Three patients (one in Era I; two in Era II) were completely weaned from parenteral nutrition.

Conclusions: The ages and underlying disease of patients had enlarged by Era. Although patient- and graft-survival rates in Era II were superior to those in Era I, the incidence of AR and medical complications were similar between Era.

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## Is there a long term effect on cardiac function in small bowel transplant patients?

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#### Abstract

Long term use of tacrolimus in solid organ transplantation and recurrent fluid , electrolyte balance may be associated with cardiac dysfunction in long term.

Aim: To assess cardiac dysfunction in long term follow-up of intestinal transplantation (ITx)

 Methods: Retrospective review of all patients who have had small bowel transplantation and echocardiograms from Apr 93-Mar 20. Patients who did not have congenital heart disease (CHD) survived for more than 2 years and had  two years of follow-up clinical outcome data were included in the study . Echocardiogram data was compared pre-transplant with the most recent follow-up scan to assess for any changes in left and right ventricular function.

 Results: 110 transplants were done in 104 children in study period.  2 patients were excluded from the study as they had co-existing CHD. 38 had >2 years of follow-up as well as having echocardiogram data available. Median outpatient follow-up period of these 38 patients was 10 years. 55% were male. Median age at transplant was 3.3 years. There were 11 cases of PTLD, of which 3 required chemotherapy. There was severe rejection in 9 patients, and two of these patients required repeat small bowel transplantation.

27 patients had follow-up ECGs at median 8 years. All ECG’s were normal with no ST/T changes, no pathological Q waves, normal intervals and no RVH/LVH

 Most recent echocardiogram was performed at median 6.4 years from transplant. Two patients had intracardiac thrombus noted, 2 patients had mild mitral valvular disease.

4/38 (11%) had small and hemodynamically insignificant pericardial effusions noted at a median of 3.5 years from transplant. All these patients had some evidence of rejection and were on treatment.

 Assessing LV systolic function on most recent follow-up echocardiogram, all patients had normal parameters, with fractional shortening >30%, ejection fraction >55%, and MAPSE >11mm. Median FS 37%, EF 63% and MAPSE 16mm. Only four patients had GLS measured and these were all normal. LV diastolic function was normal using E/A and E/E’ ratios. RV systolic function was similarly normal in all patients with median TAPSE 20mm and RV S’ 12cm/s.

 Assessing change in function between pre-transplant echocardiogram and follow-up, only one patient had a >5% reduction in ejection fraction, but the most recent EF was still normal (55%). No patients had a reduction in MAPSE or TAPSE of >2mm.

 Discussion: There is no significant effect on LV systolic or diastolic function, or RV systolic function, from transplantation. Treatment of PTLD or transplant rejection also has no effect on ventricular function. Pericardial effusions are not uncommon and may be related to underlying inflammation in patients with rejection. Conclusions:

  Conclusion. Cardiac function is well preserved in small bowel transplants in the long term and  five-yearly screening echocardiograms would be a reasonable interval post small bowel transplant, with no need for routine 12-lead ECGs.

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## Visceral transplantation for chronic intestinal pseudoobstruction: a long term, single center report

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#### Abstract

Background: Chronic intestinal pseudo-obstruction (CIPO) is a rare, debilitating syndrome of severe intestinal dysmotility resulting in intestinal failure and need of parenteral nutrition (PN). The long-term complications of PN, including catheter sepsis and PN-associated liver disease may mandate a visceral transplantation (VTx). Reports on the long term outcomes of patients with CIPO undergoing VTx are few and inconsistent.

Herein, we reviewed our centers’ experience with VTx for CIPO with emphasis on nutritional autonomy as well as on long-term renal and liver outcomes. We also analyzed survival outcome for patients with CIPO in comparison to VTx recipients with other underlying etiologies.

Methods: We retrospectively studied seven patients diagnosed with CIPO who were transplanted between October 1998 until February 2020 at Sahlgrenska University Hospital in Gothenburg. Six patients received multivisceral grafts whereas one received an isolated intestinal graft. Patients had frequent follow-up at the transplant center with measurements of glomerular filtration rate, laboratory testing and nutritional assessments.

Results: Five out of six (83%) patients achieved nutritional autonomy within 104 (48-955) days after transplantation. Renal function for patients with native kidneys declined by median 8%, 33% and 50% at 1-, 5- and 10-years. None of the patients had intestinal failure-associated liver disease at follow-up. Survival was 86% at one, five and 10 years in CIPO patients whereas the non-CIPO population (n=27) had survival of 81%, 62% and 49 % at one, five and 10 years, respectively (but without statistical significance, p=0.17).

Conclusions: These results support that nutritional autonomy can be achieved in most patients with CIPO. Overall survival is very good. Frequent follow-up of the glomerular filtration rate is necessary to optimize and preserve renal function. More research considering the appropriate timing for intestinal transplantation is needed but due to the debilitating manifestations of the disease, earlier intervention might be justified.

### 120

## Painful hands in a multi visceral transplant patient

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#### Abstract

A 44 year old female with a history of superior mesenteric vein (SMV) thrombosis attributed to the oral contraceptive pill, on parenteral nutrition (PN) with resulting intestinal failure-associated liver disease (IFALD) underwent a liver/ small bowel transplant.

Approximately 6 months post op, she developed new onset back pain and leg weakness. MRI confirmed spondylodiscitis of T11-T12 with spinal cord compression. Neurosurgical intervention took place with immediate decompression. Bone biopsy intra operatively revealed aspergillus. Microbiology advised a prolonged course of voriconazole, guided by therapeutic levels. Following several months of treatment she developed new onset bilateral hand pain. An X ray of her hands was performed (see fig 1)

Fig 1

Her hand X ray revealed fluffy periosteal bone formation along the shafts of multiple proximal and intermediate phalanges and metacarpals, in keeping with hypertrophic osteoarthropathy, secondary to commencement of voriconazole. As a result she was switched to isavuconazole. Following this, we observed rapid, significant and sustained improvement in her symptoms.

In closing, we highlight the risk of hypertrophic osteoarthropathy secondary to prolonged voriconazole. The literature does highlight such a concern with 17 described cases (1). The primary method of treatment is ceasing the offending agent with appropriate anti fungal switch which we have demonstrated.

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## Eculizumab as a treatment for early antibody mediated liver rejection in a multivisceral transplant patient

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#### Abstract

A 52 year old female with a background of mesenteric avulsion injury following dilation and curettage (D and C) perforation, subsequent short bowel syndrome and intestinal failure-associated liver disease (IFALD) cirrhosis underwent a liver bowel pancreas transplant.

7 days post op she developed a transaminitis with a bilirubin of 107 micromol/l with multiple high level HLA antibodies, most of which were not donor reactive, but included a high level de novo DQ2 DSA (Luminex MFI about 20,000). Cross sectional imaging showed a high burden of thrombus in graft arteries and veins despite anticoagulation. A liver biopsy confirmed evidence of acute humoral rejection with portal inflammation, including evidence of endothelial damage, and associated zone 3 coagulative necrosis. C4d staining was negative and concurrent bowel graft biopsies were normal.

The initial management approach focused on daily plasma exchange (PEX) with subsequent commencement of weekly eculizumab (dosage 900 mg). Her treatment was commenced in hospital and her follow up infusions were given in her home setting, for a total of 6 months. We noted significant improvement in her ALT and bilirubin within 3 weeks of starting treatment. Her latest HLA antibody screen was negative for donor specific antibodies. Despite prophylactic antibiotics she did develop infections secondary to eculizumab which were managed appropriately.

Discussion

Fan et al reported a case of eculizumab salvage therapy for antibody mediated rejection in an intestinal re transplant patient with success (1). We have reported however a case of eculizumab therapy for acute antibody mediated rejection of the liver as part of a multivisceral transplant with no intestinal involvement.

References

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## Isolated Liver Transplantation in the setting of end stage Paediatric Intestinal Failure Associated Liver Disease: a life-saving measure with reduction of parenteral nutrition requirements and potential for enteral autonomy

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#### Abstract

**Introduction:**

Intestinal failure is defined as the reduction of functional gut capacity below the minimum required for adequate absorption of nutrients for homeostasis and growth. Although a necessary treatment, parenteral nutrition (PN) in these patients has a number of associated complications, ONE being intestinal failure associated liver disease (IFALD), indicating the need for combined liver and intestinal transplantation.

Isolated liver transplantation (ILT) has been used as a life-saving procedure in children with severe IFALD who otherwise would not receive intestine inclusive organs due to long wait times for appropriate size matched donors.

**Methods:**

A retrospective case-note review of all 6 patients who underwent rescue-ILT for life-threatening end-stage IFALD in a single centre between 2014 and 2023.

**Results:**

Six patients (3 female) underwent ILT in the time period. Primary pathology in all was surgical short gut due to: gastroschisis (3), necrotising enterocolitis (2) and antenatal perforation with meconium peritonitis (1).

Median remaining small bowel length was 32cm (10-70cm). Prior to referral for assessment, 1 patient had a trial of Teduglutide and 3 had bowel lengthening procedures.

Median referral age for transplant assessment was 7.5 months (4-78) with median onset of abnormal bilirubin at 3 months (2-6).

Median bilirubin on referral was 161umol/L (57-419).

At transplant assessment, all patients had evidence of fibrosis with 3 having histological features of cirrhosis. 4 had evidence of portal hypertension.

All transplants performed consisted of reduced livers with duct-duct biliary anastomosis.

Post-transplant,1 patient died from disseminated aspergillosis in the early post-transplant period. 2 patients’ course was complicated by portal vein thrombosis and 3 had acute rejection.

Median follow up for patients was 24 months (1-72). On most recent review, all patients have decreased the quantity of PN with 1 patient weaning from PN entirely. 3 had decreased the number of PN days by 1-3.

Median energy requirements reduced from 75kcal/kg (61-78) to 58.5kcal/kg (0-77), protein 2g/kg (1.7-2.3) to 1.2g/kg (0-2), glucose 13.4g/kg (7-14) to 7.7g/kg (0-12) and fluid 100ml/kg (56-100) to 57ml/kg (0-110).

Median weight Z scores: -1.27(0.34- -1.93) pre-ILT to -2.3 (0.6—2.01) post-ILT, height -2.00 (0.12 - -3.28) to -1.5 (-0.6—2.01).

**Conclusion:**

All surviving patients in this series decreased PN requirements with 1 patient achieving enteral autonomy. Further follow-up is required to establish If further PN weaning can be achieved over time.

Rescue ILT in end-stage IFALD is a life-saving treatment option allowing reduction of PN requirements and the potential for enteral autonomy.

### 123\*

## Three Decades of a Large Single-Center Experience in Intestinal Transplantation

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#### Abstract

Introduction:  Over the past thirty years intestinal transplantation (ITx) has served as a successful therapy for select candidates with intestinal failure.  There is, however, a paucity of detailed long-term outcomes and predictors of success in the field.  Large, single center ITx experiences can highlight advancements, trends and challenges in the field.

Methods: An IRB-approved, prospective database has been maintained since the start of the program in 1991.  All ITx recipients between 1991-2022 were included.  Multiple pre-, peri and post-ITx variables were collected.  Long-term outcomes, predictors of 1-year graft survival, and trends over time were compared using standard statistical methods.

Results: 136 patients received 159 ITx including 40 isolated ITx, 78 liver-ITx, 30 multivisceral and 11 modified multivisceral transplants. 57% were male, 64% were children and 78% had short-bowel syndrome etiologies. Median patient follow-up time was 6 years.  Overall 1-year patient and graft survival was 82 and 69%.  Post-ITx complications included infectious enteritis (69%), PTLD (14%), CMV tissue-invasive disease (7%), chronic mucosal inflammation (10%), one or more episodes of acute rejection (73%), and chronic rejection (15%).   Significant univariate predictors of 1-year graft survival include: age, graft type, ischemia time, PRA, DSA, crossmatch, immunosuppression, and transplant era.

Table 1 shows a comparison of 3 eras (1991-2000,2001-2010 & 2011-present). The second era had the highest ITx volumes. The number of adult recipients and the number of recipients called in for ITx from home increased over time. The graft types shifted from liver-inclusive to non-liver inclusive and survival improved over time.

Conclusion: This large, single-center, 3 decade experience demonstrates important outcomes, complications and trends.  Survival has improved over time despite major immunologic and infectious challenges.

Table 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Era | Overall | Era I  1991-2000 n=21 | Era II  2001-2010  n= 79 | Era III  2011-2022 n=59 | p-value |
| Pre-ITx Location (ICU/Ward/Home) | n= 28/39/92 | n=7/8/6 | n=11/21/47 | n=10/10/39 | p=0.03 |
| Age at ITx (Pediatric/Adult) | n= 102/57 | n= 13/8 | n= 58/ 21 | n= 31/28 | p=0.05 |
| Graft Type  (isolated ITx, OLT-ITx, MVTx, mMVT) | n= 40/78/30/11 | n=3/11/0/1 | n=19/47/10/3 | n=18/14/20/7 | p<0.0001 |
| 1 & 5 year Patient Survival % | 82 / 65 | 65 / 41 | 82 / 69 | 82 / 66 | p=0.07 |
| 1 & 5 year Graft Survival | 69 / 55 | 52 / 33 | 65 /54 | 80/ 61 | p=0.03 |

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## Intestinal Transplantation: The Australian Experience

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#### Abstract

Introduction: A joint adult and pediatric intestinal transplant (ITx) program for Australia was developed in 2010 to provide ITx to patients with irreversible intestinal failure (IF) who have developed life-threatening complications of parenteral nutrition. We analyzed the outcomes of patients transplanted in Australia since its inception.

Methods: This is a retrospective observational study of all patients who underwent ITx at our center between 2010-2022. Patient demographics, clinical characteristics, nutrition support, and transplant outcomes were evaluated.

Results: Twelve patients have received an intestinal graft (n=7 adults, median age 32.9 (IQR 29.7, 45.7) years; n=5 pediatrics, median age 10.6 (9.9, 13.3) years); two-thirds of all recipients were male. Intestinal failure was caused by short-gut syndrome in the majority of patients (58%), with dysmotility (17%), desmoid tumours (17%) and portomesenteric thrombosis (8%) accounting for the remaining transplants.  Recipients waited a median 530.5 (179, 656) days for transplant, of which 7 (58%) were combined liver-intestine transplants, 2 (17%) isolated intestine, and 3 (25%) multivisceral (n=2 full multivisceral, n=1 modified multivisceral). Two patients (17%) also received simultaneous kidney transplant.

Patients spent 10.5 (6, 16.5) days in ICU after transplant, with median hospital length of stay 41 (35, 61.5) days. LOS was not significantly different in adult versus pediatric cohorts (p>0.05). At a median follow up of 1152 (352, 2793) days, graft and patient survival was 75% (n=9) and 83% (n=10), respectively. Two deaths occurred in adult patients due to opportunistic infections. Enteral autonomy was reached in 92% of patients, at median 22 (17, 28.5) days after transplant. Six patients (50%) had a total of 7 episodes of rejection. Of these, 2 were graded severe; 1 resulted in graft loss at 167 days post-transplant, whilst the other was rescued with infliximab. Median onset of rejection was 2 months post-transplant (range 13 days – 11 months). Standard immunosuppression was basiliximab induction followed by maintenance tacrolimus and mycophenolate. There was 1 episode of GVHD (8%), which was managed with immunosuppression minimization.

Conclusions: The first 12 years of ITx in Australia has demonstrated transplantation to be a viable and life-saving option for patients with irreversible IF in our region. Despite small case numbers, outcomes are consistent with the international experience. Enhanced awareness of ITx in Australia may increase patient referrals, transplant activity and ultimately improved outcomes for patients with irreversible IF.

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## A single-centre experience of ileostomy formation and subsequent reconnection surgery in the context of intestinal transplant in children

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#### Abstract

**Introduction**

Ileostomy formation at the time of small bowel transplant (SBT) is common practice and facilitates regular graft surveillance to identify early rejection, without need for ileocolonoscopy. Once the risk of early rejection has decreased, reconnection surgery (RS) is preferable to attain intestinal continuity. We reviewed our centre’s experience of stoma formation in SBT over a 10-year period including the indications and timing of RS.

**Methods**

A retrospective case note analysis of children in the Birmingham Children’s Hospital SBT programme undergoing initial transplant between 2012 and 2022 was performed. Children who had recent SBT (within 12 months) or who died early (within 12 months of transplant) were excluded. We compared baseline characteristics between children who did and didn’t undergo RS and explored individual patient factors and their association with timing of subsequent RS.

**Results**

25 children underwent either isolated small bowel or multivisceral transplant over this ten-year period. 5 children were excluded (4 due to early mortality and 1 child recently transplanted). Among 20 children included, 14 had short bowel syndrome (SBS) and 3 had microvillous inclusion disease (MVID). Early rejection (within 90 days of transplant) occurred in 9 (45%) children (6 classified as mild histologically). Stoma complications were more common in children with early rejection (55.5%) versus those without (36.4%).

At least one stoma complication occurred in 9 (45%) patients and 4 (20%) children required stoma revision (Figure 1). At time of audit, RS had taken place in 12 (60%) children and another 3 are listed for RS. Of 12 children who underwent RS, 7 had SBS and 3 had MVID. Baseline characteristics and pre-transplant morbidity were similar between children undergoing RS and those who didn’t (Table 1). A loopogram was performed prior to RS in all cases where achieving full bowel continuity was intended (not those with colostomy). The mean time between transplant and RS was 563 days (range 96–1577) and mean (SD) admission time for RS was 18 (14.8) days. Reasons for not listing for RS included graft rejection and patient/caregiver choice. Complications post-RS included high stoma output with perianal excoriation and repeat surgery, indicated in two patients (16.7%).

**Conclusion**

Ileostomy formation facilitates monitoring of the small bowel graft post SBT but complications of ileostomy occur in 45% with 20% requiring surgery. Reconnection surgery was achieved in over half of patients. Better understanding stoma complications may facilitate the scheduling of RS earlier in the post-transplant course.

**Figure 1.** Complications associated with stoma formation at time of transplant. Stoma perforation occurred secondary to biopsy at time of graft surveillance endoscopy.

**Table 2.** Baseline characteristics (recorded at time of transplant).

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## Nutrition status in adult patients with advanced and recurrent non-resectable pseudomyxoma peritonei who undergo intestinal transplantation surgery

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#### Abstract

Introduction:  Our centre has recently reported on intestinal transplantation surgery, undertaken for a series of adult patients with advanced and recurrent non-resectable pseudomyxoma peritonei between 2013 and 2022 (Reddy et al 2022).  This series report does not describe the nutrition status of these patients or the longitudinal changes in nutrition status observed in this series of patients, although, as noted in the discussion of this series, as the practice with these patients evolved, listing for transplantation became earlier as intestinal failure became imminent and HPN measures were being considered (vs ‘traditionally’ for this patient type, being already started [Swain et al, 2021]), in order to try to optimise fitness for surgery (Reddy et al 2022).  This work now aims to describe nutrition status changes in this patient group, from referral to surgery and beyond.

Methods:  Prospectively, and as part of the routine nutritional care to all intestinal transplant candidates and post operative patients at our centre, anthropometry data is collected.  This anthropometry data was used to understand changes to nutrition status from referral, through surgical intervention and into the post operative period for this patient group.

Results: Patients maintained or improved nutrition status initially post operatively.  Patients who died showed a decline in nutrition status prior to death.  As a secondary outcome, nutrrition status was maintained or improved largely via oral nutritional intake post operatively, although this was not the case for all patients (Reddy et al 2022).

Conclusion: Following Intestinal transplantation, patients with advanced and recurrent non-resectable pseudomyxoma peritonei have been seen to improve their nutrition status but numbers in this series are small.  In addition, decline in this parameter is then observed as their non nutritional but overall clinical condition has declined.

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## UK National Adult Small Intestine Transplant (NASIT) Forum: Exemplar of collaborative, multidisciplinary care for intestinal rehabilitation patients being considered for intestinal transplant

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#### Abstract

Introduction

The collaborative working amongst the two adult intestinal transplant centres and the two national intestinal rehabilitation reference centres, along with other designated intestinal rehabilitation centres, is an extremely effective method of reviewing and determining appropriateness for patients to be taken forward for transplant or to be considered for further optimum medical or surgical therapy prior to listing for intestinal transplant. We have sought to review the data for all referrals since the inception of the National Adult Small Intestine Transplant (NASIT) forum. It is an exemplar of how collaborative working could be internationally.

Methods

This was a retrospective audit of all referrals to and outcomes from minutes from meetings of NASIT between 2005-2022. 5 meetings minutes were not available.

Results

Since 2005 622 patients have been discussed, 184 liver containing grafts (79 women, 69 men, 36 not recorded) and 417 liver-free grafts (164 women, 176 men, 76 not recorded) and 22 were unclear. In addition, we have also discussed 2 patients from Spain and 2 from Australia to support decision making for their transplant candidates.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Liver containing |  | Liver free | Not applicable | Total |
| 2005 | 2 |  | 5 |  | 7 |
| 2006 | 7 |  | 11 |  | 18 |
| 2007 | 16 |  | 18 |  | 34 |
| 2008 | 3 |  | 23 |  | 26 |
| 2009 | 4 |  | 29 |  | 33 |
| 2010 | 1 |  | 21 |  | 22 |
| 2011 | 17 |  | 29 |  | 46 |
| 2012 | 13 |  | 20 |  | 33 |
| 2013 | 10 |  | 14 |  | 24 |
| 2014 | 7 |  | 13 |  | 20 |
| 2015 | 11 |  | 16 | 4 | 31 |
| 2016 | 12 |  | 30 | 9 | 51 |
| 2017 | 14 |  | 32 | 2 | 48 |
| 2018 | 15 |  | 22 | 1 | 38 |
| 2019 | 7 |  | 25 | 1 | 33 |
| 2020 | 19 |  | 17 |  | 36 |
| 2021 | 18 |  | 63 | 3 | 84 |
| 2022 | 8 |  | 29 | 1 | 38 |
| Grand Total | 184 |  | 417 | 21 | 622 |

Outcome

A total of ~175 transplants have since occurred.

Conclusion

This demonstrates the importance of collaborative working to ensure the right patients are chosen to have the right graft at the right time. In addition, discussion gives the opportunity for non-transplant options to be considered.

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## An Update on Eosinophilic Esophagitis Disease After Intestinal Transplantation in Children

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#### Abstract

**Background and Objective**

There are published reports of allergic disorders, specifically eosinophilic esophagitis (EoE), in the pediatric solid organ transplant population1. From 2003-2012, the intestinal transplant institute at Medstar Georgetown University Hospital (MGUH) had an estimated prevalence of EoE in children after transplant of 32% (21 of 66). Since the study was published, management of intestinal transplant medicine has evolved, with updated protocols, medications, and operative techniques. We aim to update EoE prevalence data by examining a new cohort of patients transplanted from 2013-2020 and hope to reveal any potential risk factors or associations between the development of EoE and patient demographics.

**Methods and Analysis**

A retrospective chart review was conducted on patient charts via their electronic health record. All children defined as aged 21 or younger at time of transplant receiving intestinal transplants from MGUH 2013-2020 as well as those who transferred care and are followed by the transplant institute at Georgetown were included. In total 67 patients were reviewed. Using documentation from screening upper endoscopies with biopsies, we contrasted patients having signs of EoE (defined as greater than 15 eosinophils per high power field) with those not meeting criteria. Any patients with a diagnosis of EoE prior to transplant were excluded.

**Results**

In total 23 of 67 (34%) of patients from 2013-2020 receiving intestinal transplants had findings of EoE in post-transplant endoscopies. The prevalence appears to have remained stable from prior years. Additionally, the interval between transplant surgery to EoE diagnosis was also similar. 3.9 years in the 2003-2012 cohort compared to 3.7 years in 2013-2020. Full demographic data and cohort comparison are listed in Tables 1 and 2.

**Conclusion**

The prevalence of EoE within transplant patients remains remarkably high, and while roughly stable, it did increase from 32% to 34% over the 17-year interval at our transplant center. For reference, reported prevalence of EoE in the general pediatric population is 3.7%2. The esophagus is normally devoid of eosinophils, but for transplant recipients whose immune systems are incredibly disrupted, there appears to be an increased recruitment of eosinophils to the immunologically active esophagus.

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2. Soon IS, Butzner JD, Kaplan GG, deBruyn JC. Incidence and prevalence of eosinophilic esophagitis in children. J Pediatr Gastroenterol Nutr. 2013 Jul;57(1):72-80.

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## Modified multivisceral transplantation cured chronic intestinal pseudo-obstruction caused by rare autoimmune enteric leiomyositis：world's first case report

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#### Abstract

Introduction: autoimmune enteric leiomyositis is an extremely rare cause of chronic pseudo-intestinal obstruction. Up to 2005, 11 cases have been reported in the literature. During the 17 years from 2005 to 2022, no more cases were reported. The effect of conservative treatment such as immunosuppression was not satisfactory. The prognosis of the patients was poor. There is no report of modified multivisceral transplantation in such patients. Unfortunately, we have no precedent for the postoperative anti-rejection treatment of such patients.

 Methods: In February 2022, our center admitted a patient with intestinal failure caused by chronic pseudo intestinal obstruction. The patient had a course of disease of 8 years, and could not take food orally, i.e., relied on TPN for 3 years. Preoperative enteroscopy revealed chronic pseudo intestinal obstruction and neuropathy. On July 24, 2022, we performed small intestine transplantation - modified multivisceral transplantation.

 Results: Preoperative parenteral nutrition support and terminal ileostomy (done in local hospital). High output of stoma, 4000-6000ml/d. Postoperative pathology revealed autoimmune enteric leiomyositis. The patient's immune system was hyperactive after operation, and a large number of CD8 and CD3 positive T lymphocytes were expressed in the mucosal stroma. Graft villi were repeatedly attacked, signs of acute rejection appeared, and conventional anti-rejection dose was difficult to suppress. The total anti-rejection dose of the patient was higher than that of the patients receiving small bowel transplantation. The concentration of tacrolimus was maintained at 15-20ng/ml. ATG is used 5 times in total, 100mg each time. 500mg steroid pulse therapy for 3 times. After 51 days of hard exploration, the patient's immune status finally became stable. At 79 days after operation, the patient's immune system began to attack the muscular layer of the transplanted intestinal mucosa, which indicated that the primary disease began to recur. We timely added 0.5g of MMF twice a day. At present, the patient takes food completely by mouth, and the nutritional status is satisfactory at 5 months after the operation.

 Conclusion: This case is the first patient in the world who was diagnosed as chronic pseudo-intestinal obstruction caused by autoimmune enteric leiomyositis and received small bowel transplantation, and recovered satisfactorily. The patient's immune system is hyperactive after operation, and the routine anti-rejection program is difficult to work, so it is necessary to strengthen the anti-rejection. The recovery period also showed signs of recurrence of the primary disease. Close monitoring of immune status and regular colonoscopy pathological examination are the keys to ensure a good prognosis of patients. While increasing the anti-rejection dose, the infection of bacteria, fungi and viruses should be consciously prevented.

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## Elevated Absolute Lymphocyte Count is an Indicator for Acute Cellular Rejection in Intestinal Transplant

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#### Abstract

**Introduction:** Acute cellular rejection (ACR) is a common adverse event in the early period post intestinal transplantation, occurring in up to 80% of patients. Identifying ACR early is imperative as timely diagnosis and treatment can help prevent morbidity and mortality related to intestinal ACR, including development of exfoliative rejection.

**Methods:** We performed a single-center retrospective cohort study evaluating children age <18 years who received an isolated intestinal transplant or combined intestinal and liver transplant from 2000-2021 at Cincinnati Children’s Hospital Medical Center. Patients were divided into 3 groups based on development of no ACR, mild or moderate ACR, and exfoliative rejection within the first 45 days post-transplant. Baseline demographics and operative characteristics were compared between the 3 groups. Bivariate analysis was used to compare risk factors for development of ACR including differences in immunosuppression regimen, infections, and absolute lymphocyte count (ALC).

**Results:** Using univariate and bivariate analysis, baseline demographic and operative characteristics were similar between all groups (p > 0.05). There were also no differences between infections pre- and post-transplant (including EBV/CMV mismatch between donor and recipient). No differences between the 3 groups were noted with regards to the immunosuppression regimen including total dose of anti-thymocyte globulin induction, time to achieve tacrolimus (TAC) trough > 10, and TAC trough at time of rejection. However, patients with mild to moderate ACR had significantly higher ALC at time of their rejection compared to those who had exfoliation (1460 vs 462) or never developed early ACR (1460 vs 642) with ALC at day 45 post-transplant being used for comparison in this group (p = 0.0025). During further analysis of those patients with exfoliative rejection, it was found that these patients also had elevated ALC at time of their initial mild or moderate rejection which decreased at time of exfoliation.

**Conclusion:** Elevated ALC may be an early sign of mild or moderate ACR in intestinal transplant patients. Further prospective studies are needed to validate these findings.

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### 132\*

## Nutritional status of intestinal transplant recipients: one year follow-up data from a UK adult transplant centre

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#### Abstract

**Background**

Many recipients of intestinal transplants (ITx) have a history of intestinal failure with complications. One of the main outcome measures of successful transplant is nutritional autonomy, though patients can develop specific nutritional and metabolic complications. We describe here the status of ITx recipients at one year in a UK adult intestinal transplant centre.

**Methods**

This was a retrospective analysis of all recipients of an intestine-containing graft at Addenbrooke’s hospital, Cambridge between 2014 and 2021. Data collected included basic demographics, anthropometrics, performance status and post-transplant comorbidities.

**Results**

74 patients (mean age 41, SD 13.3 and 51% female) were included in the study. Short bowel (42%) and cirrhosis (20%) were the main underlying aetiologies leading to transplantation. 71% of patients were receiving parenteral nutrition pre-transplant. Graft types included: Liver/intestine (7%), Modified multivisceral (34%), Multivisceral (32%), intestine only (27%). 86% of patients received a colon as part of their graft. One year follow up data was available for 62 patients.

The percentage weight change from day of transplant was minimal (median +1.7%, IQR: -11.7 to 5.3), with a median BMI of 23.5 (IQR: 19.9-27.5) at one year. 92% of patients had a Karnofsky performance status of 70 or more and all patients had nutritional autonomy at one year (no need for parenteral nutrition).

Anthropometric data was available for 29 patients at one year. Mean handgrip strength in the non-dominant hand was 79% of that predicted for age and gender (IQR: 68-89). 69% of patients had a mid-arm muscle circumference <50th centile and 65% had triceps skin fold thickness <50th centile.

25% of patients had one or more malabsorptive conditions (including small intestinal bacterial overgrowth in 8%, rejection-related malabsorption in 6%). Median vitamin D levels were 62.7 nmol/l (IQR:  43.7, 91.3); 14.5% had low folate levels at 1 year but all patients had normal B12 levels. 8% of patients had a HbA1C >48 mmol/l and 20% of patients received anti-hypertensive therapy.

**Conclusion**

The performance status and graft function of ITx recipients at one year is excellent in our centre. Despite good function, the majority of patients have poor anthropometric measurements at one year, though further studies are needed to see how this compares with their measurements at assessment and if they improve with time. Contrary to previous reports, there is little change in weight at year one post-transplant. However, malabsorptive and metabolic complications are relatively common and clinicians need to be vigilant for these conditions.

### 133

## Journey of short bowel syndrome patients with chronic intestinal failure thatunderwent intestinal transplantation in Brazil

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#### Abstract

Introduction: The prevalence of Short Bowel Syndrome (SBS) with chronic intestinal

failure (IF) in Brazil is unknown. Intestinal transplantation (IT) is the last life-saving

therapy for SBS-IF patients when they fail parenteral nutrition (PN). However, only two

hospitals are authorized to perform this procedure in adults in Brazil. Therefore, this

study was conducted to describe the clinical course of SBS-IF patients who go for IT in

Brazil.

Methods: This was a multicenter retrospective observational study. All SBS-IF patients

that underwent IT in Brazil from April 2011 to December 2021 and provided informed

consent were included. The primary aim was the time from SBS-IF diagnosis to IT and

the time from transplant indication to the date the procedure was performed. The

secondary aim was patient and transplant characteristics, PN description and PN

complications.

Results: Only seven patients performed IT during this period. Of those, 71% were

referred to Sao Paulo to get transplant indication before IT. Thirteen other patients had

transplant indication and were in the waiting list. The patients&#39; median age at

transplantation was 23 years old (IQI 18-35.5), all were male, and 42.8% were

underweight before transplantation. The median time from SBS-IF diagnosis to IT was

15.7 months (IQI 7.5-22.1), and the median time from transplant indication to

transplantation was 8.1 months (IQI 4.5-29.7) (Table 1). In addition, 57.1% of patients

were SBS type 2, and 28.5% were type 1. The median length of the remaining bowel was

15 cm (IQI 10-40) and of the remaining colon was 40 cm (IQI 20-60). The most common

SBS-IF underlying condition was surgical complication (57%) and intestinal volvulus

(29%). The median volume of parenteral nutrition was 1500 mL/month, and the median

frequency was 6.0 days/week (Table 2). The most common PN complication was venous

catheter infections (59% of patients) and catheter replacement (57% of patients).

Conclusions: To be evaluated and included in the waiting list for IT in Brazil, the patient

needs to be living in Sao Paulo and receiving PN; therefore, there may have many more

patients with IT indications in Brazil. The time from diagnosis to transplantation is

usually longer than 23 months, which highlights the IT&#39;s complexity and the burden of

the disease. Another important finding is related to the SBS-IF patients&#39; quality of life,

which requires frequent PN and susceptibility to PN complications.

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## Multi-visceral transplantation for the treatment of mitochondrial neurogastrointestinal encephalomyopathy (MNGIE)

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#### Abstract

**Introduction:** Mitochondrial neurogastrointestinal encephalomyopathy (MNGIE) is a rare autosomal recessive disease resulting from thymidylate phosphorylase deficiency and characterized by progressive multisystemic neurological and gastrointestinal manifestations including dysmotility, pseudo-obstruction and abdominal pain. Hematopoietic stem cell transplant and orthotopic liver transplant have been shown to permanently restore enzyme activity and correct biochemical imbalances, however patients’ gastrointestinal symptoms often fail to significantly improve. Here we report on the first use of multivisceral transplantation for the treatment of MNGIE in a patient with significant GI involvement.

**Methods:**This is a retrospective report on a single patient who underwent multivisceral transplant for the treatment of MNGIE.

**Results:** The patient is a 26-year-old female who was diagnosed with MNGIE at age 24 after a history of chronic vomiting, intermittent pseudo-obstruction, abdominal pain, cachexia, progressive hearing loss, visual impairment and leg pain/numbness. At the time of presentation to our institution the patient had significant leg weakness requiring assistance with ambulation, hearing impairment, PO intolerance, and constant abdominal pain requiring continuous intravenous narcotics. Due to her severe gastrointestinal manifestations, we elected to attempt multivisceral transplant as a novel therapy, with the goal of halting neurodegeneration while eliminating pain and restoring enteral independence. She was listed for transplant in March 2021 and underwent transplant in January 2022. The graft was from a five-year-old standard criteria donor. Surgery involved explant of recipient liver, pancreas, spleen, small bowel and the distal 2/3 of the stomach. The en bloc graft contained distal stomach, pancreas, liver, small bowel, and right colon. The patient did well in the immediate post-operative period and underwent thymoglobulin induction and was started on tacrolimus for maintenance immunosuppression. Enteral feeding was started on post-op day 11, the patient began taking food by mouth three weeks post-op and her narcotic requirement was gone at two months post-op. The patient experienced two episodes of mild acute cellular rejection and one episode of graft-vs-host disease all of which resolved with routine treatment. Eight months post-transplant, enzyme levels were normalized, the patient was tolerating oral intake with fifteen-pound weight gain, and neurological symptom progression ceased with improved mobility. Unfortunately, the patient developed aspergillosis eight months post-transplant and had a prolonged hospital course which included numerous infections eventually resulting in septic shock and death at eleven months post-transplant.

**Conclusion:** This case demonstrates that MVT can be an effective option for restoring enzymatic function, halting neurological symptoms, and restoring bowel function in patients with MNGIE.

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## CHRONIC GRAFT-VERSUS-HOST DISEASE AS THE MAIN COMPLICATION OF MULTIVISCERAL TRANSPLANT IN A PATIENT WITH TRICOHEPATOENTERIC SYNDROME TYPE II

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#### Abstract

**Introduction**. Tricohepatoenteric syndrome (THES) is a complex condition that confers a poor life prognosis. We describe a conventional multivisceral transplant (MVT) in a patient with THES type II (THES II), who developed multiple infectious complications and graft versus host disease (GVHD).

**Methods**. Clinical, therapeutic and outcome of a MVT in a patient with THES II are analyzed.

**Results**. A 7-year-old male patient who received a first conventional MVT due to the development of intestinal failure associated liver disease related to THES II is described. He had also severe colitis treated with tocilizumab and a humoral immunodeficiency with several studies of cellular immunity without alterations, so it was decided not to perform a hematopoietic stem cell transplant (HSCT) prior to the MVT. Transplant was performed with a non-depleting immunosuppression protocol with basiliximab, tacrolimus, and corticosteroid, with excellent immediate evolution, so he was discharged 46 days after MVT. Three months after MVT, he developed CMV and adenovirus infections, which required 3 admissions and multiple treatments, and the immunosuppression was changed to sirolimus at 5 months post-transplant. At 10 months post-transplant, being autonomous from the digestive point of view, he was admitted for chronic severe GVHD with ocular, cutaneous-mucous, and respiratory involvement. Intravenous corticotherapy at 2 mg/kg/day was iniciated without improvement, so ruxolitinib (2.5 mg/12h orally) was added, with clinical normalization and a decrease in the graft chimerism in peripheral blood from a maximum of 60% to 30%. During the admission, the patient presented a CMV reactivation in the blood which required treatment with foscarnet, and a dysfunction of the intestinal graft secondary to a norovirus infection, with a transient worsening of the GVHD clinical manifestations, probably due to malabsorption of ruxolitinib.13 months post-transplant, he showed a decrease in the three blood cell series, with bone marrow aplasia in a bone marrow biopsy. Ruxolitinib was discontinued because a potential bone marrow toxicity, with a reappearance of the GVHD without improvement of hematological manifestations. The patient died from P. Aeruginosa multiresistant sepsis at 15 months post-transplant.

**Conclusions**. THES is a challenging condition. Normal cellular immunity studies may not rule out immunological abnormalities. Our patient developed complications suggesting of the existence of an underlying cellular immunodeficiency, due to the appearance of multiple infectious complications and a chronic severe GVHD. In tricohepatoenteric syndrome, regardless of the results of the immunological studies, it is necessary to carefully evaluate the possibility of performing an HSCT prior to the MVT.

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## FULMINANT EVOLUTION OF A POST-TRANSPLANT LYMPHOPROLIFERATIVE DISEASE AS A COMPLICATION OF MULTIVISCERAL TRANSPLANT

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#### Abstract

**Introduction**. Post-Transplant Lymphoproliferative disease is a serious complication of solid organ transplanted patients. We described a patient who developed a fulminant post-transplant lymphoproliferative disease (PTLD) as a complication of a multivisceral transplant (MVT).

**Methods**. Clinical, therapeutic and evolutionary analysis of a patient with a MVT and fulminant PTLD.

**Results**. A 13-year-old male patient who received a second conventional MVT due to loss of the previous graft from exfoliative rejection is described. He had a history of MVT (1st graft) in 2018 due to short bowel syndrome secondary to mesenteric thrombosis (with an inability to perform an isolated intestinal transplant due to the vascular sequelae of thrombosis), he developed a severe acute cellular rejection that required enterectomy at 52 days post-transplant. The second MVT was performed using a depleting immunosuppression protocol with alemtuzumab, tacrolimus, and corticosteroids. Tacrolimus intoxicationi (100 ng/mL) was the main immediate post-transplant complication, with a clinical findings compatible with reversible posterior leukoencephalopathy, achieving complete clinical remission after normalizing the drug's blood levels. He also had acute rotavirus-related gastroenteritis and Sars-Cov-2 infection at 30 days post-transplant with spontaneous resolution of both. He was discharged 2 months after the transplant without requiring parenteral support (whith the exception of nocturnal intravenous fluid therapy) and with stable immunosuppression levels. 10 days after discharge, he was re-admitted with fever and increased acute-phase reactants, he received broad-spectrum antibiotics with improvement. Blood VEB PCR of 4.67 x e3 UI/mL at admission was observed. He developed progressive clinical deterioration with positive balance and acute pancreatitis, so the antibiotic therapy was escalated without improvement. Ultrasound showed thickening of the transplanted colon. Diffuse large cell lymphoma with activated phenotype associated with VEB was shown in the endoscopic biopsy obtained at that level. In the same day he developed severe hypoxemic respiratory failure that prompted his admission to the Pediatric Intensive Care Unit (PICU), requiring invasive mechanical ventilation and hemodialysis due to anuria, with progressive deterioration until his death 36 hours after PICU admission. Necropsy showed lymphomatous infiltration in transplanted colon, lymph nodes and peripancreatic fat, mesentery and an isolated gastric focus.

**Conclusions**. Fulminant PTLD is extremely rare and the exact causes that predispose to its development are unknown. Intense and prolonged immunosuppression with tacrolimus, T-lymphocyte depletion (alemtuzumab), and multivisceral grafting may have been predisposing factors in our patient.

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## Preliminary experience with Ultrasound of the intestine- a non-invasive tool for acute rejection

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#### Abstract

Acute cellular rejection (ACR) affects 50 – 75% of patients and diagnosis is established on histopathology of biopsies from graft bowel  This is particularly problematic in children due to the requirement for recurrent general anaesthetics. Intestinal ultrasound (IUS) is a promising modality for monitoring bowel disease. It is well tolerated, inexpensive, and does not require intravenous access or general anaesthesia

Aim: To report on our experience with IUS in intestinal transplantation

Methods: We report three patients who presented to our centre with acute rejection correlating IUS appearances with graft histology before and after treatment. IUS were performed within 24 hours of the biopsies and prior to the histology results being available.

Case 1 : 8-year-old male was admitted for fevers, vomiting, abdominal pain, and increased stool output. Histology demonstrated moderate ACR. IUS demonstrated graft bowel wall thickening (maximal 5.2 mm) with prominent stratification, increased vascularity (Limberg 3), mesenteric inflammation (scoring 2) and absent peristalsis.

Two weeks later, repeat graft biopsies demonstrated atrophy and regenerative changes. IUS demonstrated reduced bowel wall thickness (maximal 2 mm) with normal stratification, mild mesenteric inflammation (scoring 1) and improved but still sluggish peristalsis.

Patient 2:  16-year-old male with a multi-visceral transplant ( developed fever, increased stoma output on day 36 and  biopsies demonstrated severe ACR. IUS demonstrated bowel wall thickness (maximal 6.9 mm) with prominent hyperechoic stratification, increased vascularity (Limberg 2), mesenteric inflammation (scoring 2) and absent peristalsis.

Repeat biopsies performed on day 80 post-transplant demonstrated no features of ACR. IUS demonstrated reduced bowel wall thickness (maximal 2 mm) with normal stratification, vascularity, and peristalsis. There was no mesenteric inflammation.

Patient 3:   13-year-old female  was transferred for fever, vomiting and increased stool output with fresh blood mixed in stools. Histology demonstrated moderate ACR . IUS demonstrated bowel wall thickness (maximal 5.1 mm) with prominent stratification, increased vascularity (Limberg 3), mesenteric inflammation (scoring 2) and sluggish peristalsis.

Repeat biopsies performed 8 days later demonstrated resolving ACR with no apoptotic bodies. IUS was not normal, with hypoechoic appearances of the bowel wall with a prominent submucosal layer. However, bowel wall thickness had improved (maximal 2.5 mm) with mild mesenteric inflammation (scoring 1) and no increased vascularity.

Conclusion : Our initial experience suggests that cases of moderate and severe ACR in ITx may be detectable with IUS, and if detected on an initial study, improvement in response to treatment can be monitored and if correlating with clinical improvement, can aid in follow-up.

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## CAN DIFFERENT INTESTINAL TRANSPLANTATION SCENARIOS ALTER RADIOACTIVE TRACER  UPTAKE IN A RODENT EXPERIMENTAL MODEL? A PRELIMINARY STUDY

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#### Abstract

Graft rejection is one of the most common complications associated with intestinal transplantation (ITx). The current diagnosis of acute graft rejection (ACR) is made by clinical symptoms, surveillance or indicated endoscopic and confirmed by pathological findings in the intestinal mucosa. This methodology is unable to determine what occurs in all layers and along the whole length of the graft. The search for a non-invasive method for graft monitoring continues to be of much interest. Positron emission tomography (PET) is a non-invasive nuclear medicine imaging approach that allows early detection of oncological 1or infectious processes, due to an increased glycolytic metabolism. During rejection, cell populations may increase its metabolism, and therefore their capacity to uptake the radioactive tracer F-18 fluorodeoxyglucose (FDG). The aim of this preliminary study is to correlate the differences in tracer uptake in different ITx scenarios comparing to the histopathological diagnosis of ACR, to evaluate the potential utility as a noninvasive method for graft monitoring  after ITx.

Allogeneic heterotopic ITxs were performed in rats (Sprague Dawley as donor, Wistar as recipient); tacrolimus 0.6 mg/kg/day was administrated subcutaneously for 7 days as immunosuppressive therapy (TAC group, N=3). Controls without interventions (control, n=4) and without immunosuppressant (w/o IS, N=1) were used. Native intestines from each tacrolimus-treated animal were analyzed. The Wu’ score was used for histopathological diagnosis of ACR. The PET-scan study was performed in recipients and controls, and FDG uptake was assessed as standardized uptake value (SUV).

Histopathological analysis of the graft w/o IS group showed findings compatible with moderate-severe rejection at 7 post-operation days (POD), with epithelial damage and increased mucosal infiltrate, while these same features were observed between 21 and 28 POD in the TAC group. No histological changes compatible with ACR were observed in the control samples and native intestine. The mean ± SEM SUV values were 1.9 ± 0.6, 1.8 ± 0.24, 3.97 ± 0.38 and 12.4 (in control, native, TAC 21 POD and w/o IS 7 POD groups, respectively).

Conclusions: Despite exhibiting similar histopathological features of rejection, the FDG uptake in grafts from animals treated for one week with tacrolimus 0.6 mg/kg/day was reduced three-fold compared to the allogeneic group w/o IS (p<0.001), which could indicate that different underlying mechanisms are involved in the rejection process in each case. When the graft presents histological characteristics without appreciable alterations, as in the case of a control and a native intestine, FDG uptake was significantly reduced (p<0.0001). Accordingly, this preliminary study suggests that PET-scan might be a good complement when a clinical suspicious is present in order to further prescribe the endoscopy and histopathological analysis for early diagnosis of intestinal graft rejection.

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## Clinical Outcomes Of Intestinal Transplant Recipients Receiving Maintenance Basiliximab, Sublingual Tacrolimus And Prednisone: A Case Series

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#### Abstract

**Purpose**: The combination of tacrolimus (TAC) and prednisone (PRED) is cornerstone of maintenance immunosuppression (mIMS) in intestinal transplantation (IT). This study aims to describe clinical outcomes of a novel mIMS consisting of monthly basiliximab (mBASI), sublingual tacrolimus (SL-TAC), and PRED in IT.

**Methods**: We report a case series of 5 IT recipients receiving mBASI, SL-TAC, and PRED as part of mIMS for the first year after IT. All patients received Thymoglobulin induction 1.5 mg/kg using ideal body weight (IBW) on post-operative days (POD) 0-4. The first dose of mBASI 20 mg intravenously was given within the first week of IT. This was continued monthly for 6 months, then every other month up to 1-year after IT. SL-TAC 0.025 mg/kg using IBW was initiated pre-operatively. Dose was adjusted to maintain TAC troughs between 10-15 ng/mL for the first month, and 8-12 ng/mL thereafter. Prednisone was tapered to 10 mg by mouth daily or an equivalent steroid by POD5.

**Results**: Baseline demographics and clinical characteristics are outlined in table 2. There were 4 patients who received isolated IT, 1 patient received pancreas-intestinal transplant. All patients were alive and had a functioning allograft at 1-year. There were 3 patients who experienced biopsy proven rejection. No patients developed viremias. 12-hour SL-TAC levels at months 1, 3, 6, and 12 are illustrated in figure 1.

**Conclusions**: The combination of mBASI, SL-TAC, and PRED is safe and effective novel mIMS in IT

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## Use of anti-inflammatory biologics agents after intestine transplantation – a multicenter survey

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#### Abstract

Introduction: Intestinal transplantation (IT) is a therapeutic option for patients with intestinal failure. A barrier to the success of IT is the significant risk of rejection and possible for disease recurrence in the patient’s graft. A potential option for treating rejection refractory to mainstays of treatment and for managing disease recurrence are anti-inflammatory biologic agents. This survey was conducted to describe the utilization of these agents in IT centers in the United States

Methods: A survey was conducted with questions pertaining to the utilization of biologics in IT in regard to agents used, dosing, infectious prophylaxis, duration, indication, outcomes, adverse effects, and barriers to use. The survey was distributed among centers in the United States via email database.

Results: A total of 6 centers responded to the survey. Three centers treated adult population only; two pediatric and one both.  The most utilized biologic was infliximab, then vedolizumab, and then some minimal usage of ustekinumab and adalimumab. For indications, most biologics were being used for refractory rejection and some minimal usage for Crohn’s disease recurrence and nonspecific ulceration. Infectious prophylaxis use varied among the reported centers:  2 centers did not utilize prophylaxis, 2 used prophylaxis for bacterial, mold and fungal organisms, 1 specifically Pneumocystis jiroveci, and 2 others focused on Pneumocystis jiroveci and Cytomegalovirus. Most centers administered agents anywhere between 1-18 months and 4-6 doses. A center reported over 36 months in the case of 1 patient for inflammatory bowel disease. Only 1 center reported utilizing tumor necrosis factor (TNF) alpha levels to assist with dosing. Outcomes of reported biopsy results were predominantly some improvement and a reported 50% incidence of graft loss due to inefficacy. Lastly, biologics were well tolerated with 1 report of infusion reactions and infections being the more common adverse event. The only barriers reported to initiating therapy was the need for prior authorizations by 3 centers.

Conclusion: This survey provided insight into the practice of using anti-inflammatory biologics in intestinal transplantation. Their utilization appears to have some consistencies as far as agents used and indications for utilization. However, practices differ when it comes to infectious prophylaxis and TNF- alpha levels. As with most novel therapies, insurance approval can lead to barriers with use. Biologics have been proven to be useful agents for specific indications after IT but more guidance and data are needed to streamline utilization and provide data to support use for insurance approval.

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## Covid-19 virus in Intestinal Transplant Patients: Allograft Survival Rate and Associated Therapies – An inclusive UPMC Intestinal Transplantation and Rehabilitation Center Study

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#### Abstract

Introduction: The COVID-19 outbreak was recognized as a global pandemic March 11th, 2020. Throughout medical centers spanning over the entire world, health care adaptation and change occur at a rapid rate. Intestinal transplant patients were considered at the highest level of infection susceptibility and possible complications. The purpose of this study is to describe a single center experience of COVID-19 infection in intestinal transplant (IT) patient’s, treatments used, and effect of the infection on the patient/graft survival rate.

Methods: We performed a chart review of all intestinal transplant recipients with confirmed COVID-19 results between January 2020 through January 2023 and extracted presenting symptoms, documented treatments, hospitalization course and ultimately graft and patient survival.

Results: Eleven adult patients had confirmed COVID-19 infections. Visceral allografts include 7 isolated small bowel transplant, 2 full multivisceral transplant and 1 modified multi-visceral transplant. Seven patients were female (64%) with median age of 45.8 yo (ranging 31 to 63 yo). Maintenance immunosuppression consisted of combination of tacrolimus and corticoids in all the cases. Two patients we also on mycophenolate. All COVID-positive IT patients were vaccinated against COVID. Of the patient’s whose last vaccination is known, the average time to infection was 265 days (range: 24-547). One patient had recurrence of his COVID infection after treatment. Eight patients (73%) required hospitalization at the transplant ward unit (n=6) and ICU (n=2). One patient (50%) of ICU admissions required vent support. Three patients did not require hospital admission. Treatment modalities consisted of monoclonal antibodies (Bebtelovimab, 175 mg x1 dose) in four patients and intravenous antivirals (Remdesivir, 200 mg x1 dose, followed by 100 mg/dose x 2 doses every 24 hours) in five patients. Three patients did not receive any treatment. Two patients developed irreversible respiratory failure and one patient developed exfoliative rejection requiring allograft enterectomy. Eight patients are still alive with good allograft function (73%).

Conclusion: We demonstrated that COVID-19 infections in IT patients remains a considerable morbidity and mortality, with significant admission rates (73%). Interestingly, most of the infections occurred after 2021 suggesting that there is a correlation to either increased virulence of the COVID-19 virus or relaxation of contact precautions, however, further study is required to sustain this observation. To date this is the largest single center report on treatment and outcome in patients with visceral transplantation and COVID-19 infection.

### 142

## Interventional de novo canalization of superior vena cava after modified multivisceral transplant

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#### Abstract

Introduction:   
Vascular access issues are frequent in intestinal failure and transplant patients. We describe thetreatment of a superior vena cava syndrome (SVCS) after a modified multivisceral transplant in a patient with Chronic Intestinal Pseudo-Obstruction (CIPO).

Case description:   
Indication for transplantation was loss of vascular access due to occlusion of the vena cava superior resulting in a SVCS compensated by collateral formation via the azygos vein and reversed flow in esophageal varices. A modified multivisceral transplant was performed in October 2022. Postoperatively, graft function was normal, but SVCS significantly deteriorated with massive facial swelling and left pleural effusion, resulting in respiratory distress and readmission to the intensive care unit. Posttransplant exacerbation of SVCS was likely due to thoraco-abdominal collateral circulation disconnection during exenteration. A left VATS talc pleurodesis with pleural abrasion was performed but massive pleural effusion persisted.

As a last resort, interventional radiological percutaneous (re)canalization of the SVC was attempted.

Method:   
Patient was anesthetized with one arterial sheath placed in the right femoral artery and 4 venous access points (2 sheaths in the Right femoral vein, one in the left and right jugular vein).

For orientation, guidewires were placed in the pulmonary artery, the aortic arch and a snare was positioned in the innominate veins via the left jugular vein.

Angiography showed a complete obstruction of the SVC with a length of ~6cm to be bridged (fig. 1A).

Under constant dual-angled fluoroscopy, a new track was developed starting from the right atrium towards a snare placed in the innominate vein using a sharp transseptal needle (fig. 1B). A 0.014 wire was then passed through the snare and was retrieved from the left jugular vein (fig. 1C). A 10-7mm partially covered stent wasplaced to bridge the neo-SVC with bare metal stent placed proximally in the innominate vein to prevent embolization of pre-existing clots.

Angiogram showed a patent stent with flow from the innominate vein towards the right atrium (fig 2.) with significant drop in SVC pressures.

Result:   
Postoperatively, facial swelling and left pleural effusion dramatically decreased. Patient was discharged from the intensive care unit to the transplant ward within days as a result and no issues related to the stenting have been observed.

Conclusion:   
Percutaneous de novo canalisation of the SVC represents a minimally invasive treatment approach for patients with severe SVCS.

### 143\*

## Non-vascularized Abdominal Rectus Fascia for abdominal closure after transplantation, single center report and long-term follow-up

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#### Abstract

**Introduction:** Closure of the abdominal wall after intestinal (ITx), combined liver-intestine (cL-ITx), multivisceral (MVT) or liver re-transplantation (L-reTx) usually can be a major challenge because those patients usually have a history of multiple abdominal surgeries, significant scarring and loss of abdominal domain. A variety of techniques, including anatomic closure (component separation) and use of surgical mesh or even abdominal wall transplantation have been described in order to overcome this challenge. We aim to report our experience using Non-vascularized Abdominal Rectus Fascia (NVARF) for abdominal wall closure.

**Patients and Methods:** Retrospective report of a series of 24 recipients of NVARF after ITx, cL-ITx, MTV or L-reTx performed between January 2006 and December 2022 at a single transplant center.

**Results:** 772 liver transplants (including 79 L-reTx), and 52 ITx, cL-ITx or MVT were performed in our center during the cited period. In 24 of them (3%) NVARF was used (12 in adult patients) 15 (62%) being on ITx graft recipients, 4 (17%) cL-ITx, 3 (13%) were MVT and 2 (8%) were L-reTx). Seventeen patients (71%) required re-operations: 11 (65%) before the 30th post-op day: 5 (45%) required 1 exploratory laparotomy, 2 (12%) underwent 2 re-operations, 2 (12%) patients had 3, 1 (6%) patient had 4 and 1 (6%) patient had 7. The most frequent indication for exploratory laparotomy were intra-abdominal collections (5, 45%) and abdominal hematoma (4, 36%). Eight patients required late re-operations (>30 days): 4 of them (57%) underwent total enterectomy due to graft rejection. Two patients had both early and late re-operations. During re-operations, NVARF was transected and no internal adhesions were found. After the surgical procedures, we closed the NVARF using running sutures. Only in 4 cases (17%) we had to remove the NVARF, and use a different abdominal wall closer technique: in 3 cases we replaced it for a synthetic mesh (2 of them due to a ventral hernia) and in 1 case, a second NVARF was used. At a mean follow up of 48 month, 20 patients still have the original NVARF (83%), without developing chronic ventral defects, nor developing adhesions to the non-vascularized graft.

**Conclusion:**The use of a NVARF has become an efficient, economic reproducible alternative to overcame defects or compromised abdominal walls after complex liver or intestinal containing transplants. The NVARF can be re-sutured after being transected, it doesn’t increase the risk of ventral defects, nor generates intra-abdominal adhesions. The potential risk for developing donor specific antibodies, remained to be studied in order to expand its use to non-transplant patients.

### 144

## In-depth multi-level analysis of the neovascularization and integration process of a non-vascularized rectus fascia following intestinal transplantation

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#### Abstract

**Introduction**

Failure to close the abdominal wall after intestinal (ITx) and multiviseral transplantation (MvTx) remains a challenge, associated with increased morbidity and mortality. An attractive method is the use of non-vascularized rectus fascia (NVRF) in which both layers of the abdominal rectus fascia are used as an inlay patch without vascular anastomosis, with excellent short-term outcomes. The aim of our study is to provide an in-depth multi-level analysis (ranging from clinical, radiological, histological, contrast-enhanced microCT (CECT) to immunological evaluation) of the neovascularization and integration process of the NVRF based on three consecutive cases following ITx.

**Methods**

Three patients underwent a NVRF transplantation in combination with an ITx between September 2019 and September 2022 at the Leuven Intestinal Failure and Transplant unit. A retrospective analysis was performed. Ethical approval for reporting was obtained (S67453).

**Results**

The first patient was a 49-year old female who received a NVRF during combined liver-ITx and had an uneventful recovery. At 1 month, ultrasound doppler confirmed neovascularization of the graft. Five months later, at the time of continuity surgery, the donor fascia was macroscopically well integrated. H&E staining on biopsy confirmed the **good integration** of the graft with **intense fibrotic reaction** around the NVRF without rejection. CD31-staining showed **neovascularisation** on the interface with the native fascia. CECT analysis revealed the presence of microvasculature enveloping the donor fascia as well as penetrating the graft at the interface with the native fascia; Fig. 1a: sagittal view of CECT image, red arrow indicating blood vessels in the NVRF (blue line).  Fig. 1b: 3-dimensial render of neovascularisation.

The second patient was a 51-year old male who received a NVRF after a MvTx. Two weeks later, during a re-operation the fascia showed macroscopic neovascularization. Since the skin could not be closed, a VAC-system was placed on top of the fascia and secondary closure was obtained. The patient died six months post-transplant from a metastasized abdominal mesothelioma.

The third patient was a 31-year old male who underwent MvTx. Eleven days post-transplant and after re-operation for intra-abdominal collections, primary closure could not be attained and a non-ABO-matched third party fascia was used to cover the defect. Six days after NVRF transplant, anti-A natural and immune antibodies were slightly increased suggesting the presence of de-novo specific antibodies against the third party fascia. Twelve days later, the patient died of an acute rupture of a mycotic aneurysm of the aorta tube. At re-intervention, the fascia looked macroscopically intact.

**Conclusion**

We showed in this case series additional evidence of the neovascularization and integration, by fibrotic reaction, of donor NVRF after intestinal transplantation

**Figure 1**

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## GASTRIC ANASTOMOTIC FISTULA TREATMENT WITH ENDOSCOPIC SPONGE VACUUM ASPIRATION SYSTEM IN A MULTIVISCERAL TRANSPLANTATION CASE

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#### Abstract

**Introduction**

The upper gastrointestinal anastomoses of a multivisceral graft may suppose a problem sometimes. The trend in recent years has been to preserve a portion of native stomach if possible. Nevertheless, the gastro-gastric anastomoses may also leak. We present one of these cases where the final treatment consisted on endoscopic sponge vacuum aspiration.

**Material and methods. Case presentation**

A 30 years old man who received a multivisceral transplant plus kidney and native spleen preservation with splenocaval venous anastomosis, due to short bowel syndrome after volvulus treatment 11 years before, with home parenteral nutrition since the n. Type I diabetes since 4 years old, badly controlled, with end-stage renal failure in dyalisis since 3 years before. Acute myocardial infarction one year before, with pharmacoactive stent. Liver hematoma after a biopsy, with embolization. Tricuspideal endocarditis with pulmonary septic embolization and pleural effusion. Cerebellar hematoma during hypertensive crisis. Cardiogenic/distributive mixed shock 2 years before without positive culture, with intubation and continuous venovenous hemodiafiltration. Moderate-severe mixed axonal demyelinating peripheral polyneuropthay.

He had a prolonged transplant, 15 hours, with 12 packed red cells and 6 fresh frozen plasma units transfusion and 5 fibrinogen grams. Postoperative dyalisis. Extubated after 24 hours. Immunosuppression with thymoglobulin, tacrolimus and steroids. Discharged 8 days after from the ICU. Three days after he presented an acute abdomen due to gastric anastomotic leak, with shock and aspiration, with multiorgan failure. Surgically treated, he was transferred to the ICU. Four days later reoperated for splenic infarction. Fifteen days after gastric leak he showed a new leak. An endoscopic sponge vacuum treatment was decided.

**Results**

Treatment started 2 days after the diagnosis of reperforation. The perforation measured around 1 cm in diameter. A Hanaro type TTS 8 cm prosthesis was placed. But it did not control the situation, with ongoing bile leak shown by the neighbouring abdominal drain, and 56 days after the prosthesis was removed, and a sponge vacuum procedure was initiated. The device was changed every 3 days. The drainage decreased with time and the perforation progressively healed, with the device being removed after 15 days, and nasojejunal tube installed for nutrition. A trophic nutrition was initiated and progressively the flow increased, combined with parenteral nutrition. Discharge from the ICU was on 131st day, due to the severely complicated general condition and the COVID-19 pandemic that affected the hospital management.

**Conclusion**

A sponge vacuum endoscopic device may be an effective treatment in cases of gastro-gastric anastomoses leakage in multivisceral transplantation

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## Climbing the learning curve of the rat intestinal transplant model: roadmap from base camp to summit.

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#### Abstract

Introduction:

Intestinal transplantation (ITx) is a life-saving procedure for patients suffering from intestinal failure and parenteral nutrition complications. Unfortunately, outcome remains inferior compared to other solid organs, hampered by the complex immunobiology of the intestine, requiring the need for further experimental basic research.

The rat ITx model was developed in 1971 and although the procedure and endpoints have been standardized, real-life learning steps and experience are missing. We aim to describe our training process, from acquiring microsurgical skills until rat survival after ITx.

Methods:

This work reports a single surgeon´s experience (AD) who, after basic microsurgery training, initially developed the model on rat cadavers before translating it to living rats. To identify improvement over time, his training was chronologically divided in group 1 (April 2022 – July 2022) and group 2 (August 2022 – January 2023) with 19 ITx per group. Time to perform vascular anastomosis (artery and vein), donor operating time and recipient survival rate at 48h were analyzed. Based on literature, a warm ischemia time of 40 min was defined as maximum to allow survival after transplantation (survival limit). Experimental Ethical approvals were obtained at KU Leuven; (KULP025/2022) and at UC Louvain (2022/UCLMD013).

Results:

The ITx model was developed over a 16 months period. Introduction to microsurgery techniques and ITx procedure was done by attending a Scandinavian Microsurgery Academy course (University of Gothenburg, Sweden) led by a microsurgeon (MO) with expertise in the ITx model. After that, the model was developed in the CHEX laboratory (UCLouvain – Brussels) on rat cadavers previously used in other procedures under the supervision of a senior microsurgeon (EBR). It was then translated to living rats when the critical warm ischemia time of 40 min had been reached (**Fig. 1**) and some survivals were observed. In order to make the final adjustments on his technique, AD spent 6 weeks following an experienced ITx microsurgeon (FH) at Hospital Universitario La Paz, Madrid. Back to KU Leuven, AD completed his series of 38 surviving ITx (29 orthotopic, 9 heterotopic) with a further 4 procedures. The mean vascular anastomosis times for group 1 and group 2 were 44±15 and 37±4 min, respectively. Donor procedure durations were 78±9 and 71±9 min. Forty-eight hours survival rate was 22% (4/19) in group 1 and 32% (6/19) in group 2, with 75% survival in the 4 last ITx.

Conclusion:

Herein we describe our learning process to develop the rat ITx model. Collaboration between experienced centers and initial practice under experienced mentorship are essential to overcome the critical steps reported here and achieve acceptable survival.

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## Potential of Confocal Laser Endomicroscopy in Detecting Small Bowel Transplant Rejection Based on Current Application in Real-Time Diagnosis of GVHD

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#### Abstract

**Introduction**: Graft versus host disease (GVHD) is a multi-system complication of allogeneic bone marrow transplant in which donor T cells falsely identify host’s tissue as a foreign body due to the presence of histo-incompatible antigens. In acute cases, the GI tract, liver, and skin are most commonly affected. Traditionally, histological features of GVHD affecting the small bowel and colon have been identified through forceps biopsy via esophagogastroduodenoscopy (EGD) and colonoscopy. The known small bowel histological features of GVHD closely mirror those of small bowel transplant rejection, such as crypt apoptosis and apoptotic body accumulation in the lamina propria. Confocal laser endomicroscopy (CLE) is a novel endoscopic method used to visualize the mucosal layer of the GI tract via magnification fluoroscopy for purposes of real time diagnosis. The present case study uses CLE to detect histomorphological colonic mucosal features of GVHD in the small bowel, accelerating the ability to diagnose GVHD intra-procedurally and initiate treatment. Due to the striking histological similarities between GVHD and small bowel transplant rejection, CLE is a potential modality for early diagnosis and treatment of small bowel transplant rejection. **Methods**: This is a case of a 67 year old male with past medical history of HIV, AML status post-stem cell transplant, and CMV colitis who presents with abdominal pain and multiple loose bowel movements per day over the last one week. **Results**: A 67 year old male presented with a one week history of abdominal pain and loose bowel movements. The patient had undergone stem cell transplant after an AML diagnosis two months prior to admission. He experienced a similar episode of abdominal pain one month prior, at which time a colonoscopy with biopsy demonstrated CMV colitis. Subsequently, he completed a course of valacyclovir and his symptoms had improved. Due to this history, CT-Abdomen and Pelvis with contrast was ordered upon admission, demonstrating persistent residual thickening of the right colon, and an area of mucosal enhancement and bowel wall thickening within the small bowel. Subsequently, EGD utilizing CLE visualized erythematous mucosa in the small bowel and intracryptal apoptosis, which is pathognomonic for GVHD. The patient was immediately initiated on Prednisone 60mg with symptom resolution and discharge within two days. Biopsies resulted a week after the procedure, confirming GVHD diagnosis. Notably, the patient was discharged four days before pathology results were available. **Conclusion**: Our case demonstrates the effective use of CLE in rapid diagnosis and staging of GVHD, minimizing time between symptom onset and treatment initiation. Moreover, this case demonstrates a strong indication for future use of CLE in early detection and diagnosis of small bowel transplant rejection, as the histological similarities can be captured on CLE and with the potential of initiating earlier treatment.

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## Intestinal Transplant in patients with multiple FAP complicated by intraabdominal desmoid tumor: A Case Series

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#### Abstract

**Introduction:** Intra-abdominal desmoid tumors are a rare and complex clinical problem. These tumors are locally invasive and often recurring after surgical resection. When the tumor is located at the root of the mesentery, usually it could infiltrate major vessels such as superior mesenteric artery and/or vein. Intestinal transplantation, either auto transplantation, or when it is not possible, allotransplantation has been used as a viable option to treat this group of patients. Herein, we describe a series of 4 patients who underwent cadaveric isolated intestinal transplantation due to unresectable intra-abdominal desmoid tumor.

**Methods:** We performed a retrospective chart review between 2018 and 2021 and identified four patients who underwent intestinal transplantation at our institution due to intra-abdominal desmoid tumor. In all cases the tumor was associated with Familiar Adenomatous Polyposis (Gardner syndrome), and the patients underwent different type of surgical procedures before the intestinal transplantation. All patients received isolated intestinal transplantation with en-bloc ascending colon.

**Results:** All 4 patients are alive with functional graft and have full nutritional autonomy. Any recurrence of desmoid tumor was not noted in the transplanted mesentery. In three other cases end distal colostomy was performed, two of them due to complete absence of recipient’s colon, and one due to preference of the patient. Patient 1 had sufficient length of colon before the small bowel transplant, therefore we proceeded with a distal colocolonic anastomosis. All 4 recipients are continent. Two of the patients had mild acute cellular rejection 4 and 6 weeks after the transplant, which was resolved with treatment.  No other complications were noted at follow-up 10 to 55 months after surgery.

**Conclusion:** Unresectable intestinal/mesenteric desmoid tumors can be treated with isolated intestinal transplantation.  Restoration of colon continuity depends on both donor and recipient colon anatomy.  A donor–recipient colocolostomy could be performed when the recipient still has functioning transverse or descending colon. However, if no anal continence or continuity cannot be accomplished at the time of transplant, an end colostomy should be constructed.

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## Treatment of complex Desmoid tumours by Intestinal Transplantation

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#### Abstract

**Introduction**

Desmoid tumours are rare, locally aggressive tumours which often have an unpredictable and variable clinical course. Although most desmoids (80%) are sporadic, 20% are associated with Familial Adenomatous Polyposis (FAP) which tend to be multi-focal and more aggressive. While the majority of desmoids can be managed by watchful waiting, systemic therapy or radiotherapy, some will require surgical excision. It is recommended in these cases to perform a total resection to reduce the chance of recurrence. In the most extreme cases (multiple segments of bowel, complex fistulating disease, invasion into the abdominal wall, ureteric encasement), the most radical option is to perform a total enterectomy and Intestinal Transplant (ITx).

The decision if and when to refer a desmoid patient for ITx can be challenging, particularly the timing and sequence of treatment (simultaneous vs sequential exenteration + delayed listing for ITx). In this study, we present our centre’s experience of managing complex, desmoid tumours with ITx.

**Methods**

We performed a retrospective case review of our prospectively collected database between 2007 and 2022. All patients receiving an ITx for desmoids were identified.

**Results**

Between 10/2007 and 12/2022, 134 ITx in 127 patients were performed at our centre. Of these, 16 patients (13%) were for desmoid disease (7 Modified Multivisceral Transplants (MMVT), 6 Isolated ITx and 3 Liver-Small bowel Transplant. Median follow was 50 months (1-104). 11 out of 16 patients are alive (68%) without GI recurrence. None of the patients died from desmoid recurrence.

The management of this cohort presented us with several complex technical issues that needed to be overcome such as loss of abdominal domain (7/16), retroperitoneal involvement (6/16), pouch related issues (2/16) and the need for a gastrectomy/duodenectomy due to dysplastic disease (7/16).

Loss of abdominal domain and invasion/destruction by the desmoid disease was addressed by using non-vascularised rectus fascia (NVRF), either on its own (9/16) or in combination of vascularized muscle flaps or a biological mesh (2/16).

Retroperitoneal involvement of the vena cava/iliac vessels and the ureters. Two of these patients required a renal auto-transplantation into the iliac fossa while one patient had a ureteric re-implantation from right to left.

The decision to also remove stomach and/or duodenum at the time of ITx depends on the risk of polyp malignancy. Pre-operative polyp surveillance, histology and the Spiegleman score help us to determine the need for a MMVT.

**Conclusion**

Intestinal Transplantation is a viable treatment option in selected patients with extensive desmoid disease. Deciding which patients would benefit from ITx is important to ensure timely referral.  Delays in this process can result in additional disease burden such as secondary liver disease or invasion of adjacent structures, requiring further reconstructions.

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## Combined Small Bowel and Pancreas transplant: A Case Report

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#### Abstract

**Backgrounds**: In multiorgan transplant procedure, liver, pancreas and intestine are usually transplanted as a unique segment, avoiding dissection. In the following case-report, we illustrate our unique experience in combined transplantation of pancreas and small intestine grafts only.

**Case Summary**:  We present the case of an 18-year-old African American woman diagnosed with solid pseudopapillary tumor of the pancreas. A laparoscopic radical pancreaticoduodenectomy was performed in another institution, with total enterectomy and right colectomy due to inability to reconstruct the venous mesenteric roots and consequent non-viable bowel. The post-operative course was characterized by small bowel syndrome and type 3C diabetes, requiring a chronic total parenteral nutrition for all daily nutritional requirements and insulin replacement regimen. The following complications represented the indications for transplantation. The infrarenal aorta and inferior vena cava were used as inflow and outflow for the graft. First, the arterial reconstruction was performed using a Y-graft of cadaver donor common iliac bifurcating in internal and external iliac artery. The internal iliac artery was anastomosed end-to-end to the splenic artery while the external iliac artery was anastomosed end-to-end to the superior mesenteric artery. Secondly, the portal vein was engaged with a segment of external iliac vein and was sutured to the graft end-to-end. The proximal anastomosis of the graft was performed side-to-side between the stomach pouch and the jejunum.  The hepaticojejunostomy in end-to-side fashion was accomplished on the same loop closely to the duodenum. The distal colo-colonic anastomosis was performed, and the procedure ended with ileostomy. In the early postoperative period, no complications occurred, and the ileostomy was closed four months after the transplant. After one year of follow-up, the patient has not had any episodes of rejection, achieved and maintained nutritional autonomy, currently insulin independent (last HbA1c: 4.6) and with stable intestinal graft function.

**Conclusions**: To our knowledge, this is the only report in the literature describing a patient with an exclusive combined small bowel and pancreas grafts. This option could be a feasible and safe alternative for a modified multivisceral transplant.

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## THE EFFECT OF LUMINAL PRESERVATION ON AUTOPHAGY AND APOPTOSIS DURING THE STATIC COLD STORAGE OF RAT INTESTINES

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#### Abstract

**Introduction**: Intestinal transplantation still faces difficulties due to cold ischemia and reperfusion injury. Luminal preservation with PEG-solution has been shown to alleviate ischemic injury compared to cold storage in standard solutions. Autophagy is a cellular mechanism that removes dysfunctional cellular components to maintain homeostasis. Autophagy selectively removes damaged, potentially apoptosis-inducing mitochondria or other organelles and ultimately increases the threshold of stress required for the induction of cell death. Incomplete or failed autophagy may result in apoptosis or necrosis. Studying the activity of autophagy and apoptosis during the ischemic process helps us understand how to minimize the ischemic injury occurring during intestinal preservation.

**Materials and Methods**: Sprague-Dawley rats were used as donors. Intestines were perfused and stored in IGL-1, with and without luminal PEG-3350 solution. Intestinal samples were obtained before preservation and after 8h and 14h of storage. Graft histology (Chiu score, morphometric analysis), immunohistology, and western blot were performed. Autophagy activity was studied by anti-p65 and anti-LC3AB antibodies and apoptosis by studying caspase 3, caspase 9 and Beclin-1.

**Results**: Apoptotic activity seemed to increase at 8h and peak at 14h, although no clear significance was seen on intestines undergoing luminal preservation. Autophagy activity showed a similar pattern, but the intestines receiving additional luminal preservation appeared to have less activity compared to the control intestines (only vascular perfusion).

**Conclusion**: These results confirm apoptosis as one of the ongoing mechanisms during cold intestinal preservation. Apoptotic activity increases during the cold ischemia time, but luminal preservation with PEG seems to decrease it. Autophagy also increases during cold ischemia but the effect of luminal preservation is less clearly delineated.

**Figure 1.** Graphs show apoptotic and autophagy markers studied with western blot from 0 hours of cold ischemia to 8 and 14 hours with and without luminal preservation with PEG-3350 solution. Y-axis show optical density.

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## Prevention of a leaky gut by luminal preservation following Brain Death, may reduce Innate Immune Activation.

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#### Abstract

Background

Organs obtained from brain dead (BD) donors often have worse outcomes. Activation of the complement system and translocation of intestinal bacteria could be causative. We aimed to examine activation of the complement system following BD and evaluate the systemic and local effect of adding luminal intestinal preservation to classical vascular preservation.

Methods and material

BD was induced in 30 pigs (four groups: control (n=7), BD alone (n=8), BD + luminal intestinal polyethylene glycol (PEG, n=7) and BD + luminal intestinal University of Wisconsin solution (UW, n=8) using a previously validated method and all animals were observed for 6 hours before organ retrieval. In the PEG and UW groups, 2000 ml of the selected solution was instilled into the duodenum during the organ procurement surgery. Repeated measurements of C3a, Terminal Complement Complex (TCC), IL-8 and TNF were performed in plasma at baseline, BD, 30, 60, 120, 240 and 360 minutes after BD, and following the intestinal intervention (480). Plasma lipopolysaccharide binding protein (LPS-BP) was measured at baseline, BD, and 480 minutes after BD. All were normalised to albumin concentration. Biopsies were taken from jejunum and ileum at time of removal and following 8, 14 and 24 hours of static cold storage (SCS) using UW. Preliminary analysis has been performed at 24 hours of SCS for the BD groups, full histology will be available soon.

Results

All animals were kept circulatory- and respiratory stable until organ procurement. At 480 minutes, C3a was significantly higher in BD, BD+PEG, and BD+UW groups compared to control group (all p<0.05) (fig. 1A). TCC was significantly higher in the combined BD group compared to control at 360 minutes, at 480 minutes, the BD and BD+UW groups were significantly higher compared to the control group (all p<0.05) (fig. 1B). IL-8 and TNF were significantly higher in the BD group compared to all other groups at 480 minutes (p=0,003 and p=0.001) (fig. 1C and D). LPS-BP increased following induction of BD in all groups except BD+PEG, which at 480 minutes were significantly lower (p=0.002) (fig. 1E and F) compared with all other groups. Preliminary biopsies from the Jejunum after 24 hours of SCS show a reduced median Chiu/Park score in the BD+PEG (2.5) and BD+UW (2.0) groups compared to the BD group (fig. 2).

Conclusion

The complement system is activated following BD independently of intestinal and luminal preservation and may lead to inflammation. Luminal intestinal preservation during organ procurement led to lower Chiu/Park scores, and reduced cytokine and LPS-BP expression, which may be due to reduced bacterial translocation occurring during surgery independent of BD. Luminal PEG intervention may be combined with early innate immune system inhibition in BD donors to prevent systemic inflammation, which hampers organ function.

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## Use of a split liver graft to facilitate adult mutlivisceral transplantation in a small adult recipient

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#### Abstract

One of the major challenges in intestinal transplantation is the reduction of abdominal domain in  potential recipients. This is of particular concern in patients with liver failure where limited time is available to access  appropriate grafts from a size and immunological perspective.

A 37-year old female patient was referred to our unit in Feb 2021 for urgent transplant assessment. She had ischaemic small bowel due to early onset atheroscelerosis on a background of 10 years of abdominal angina. In 2018 she had an iliac to SMA bypass. In 2020, she had acute occlusion of her SMA graft, interventions were unsuccessful and she had her small bowel and right colon removed.  
  
At the time of listing in April 2021 the patient was 41.6Kg, blood group B and had a cRF (calculated reaction frequency) of 89% (HLA Class I antibodies).  
On the waiting list she developed worsening abdominal sepsis with a pancreatic fistula and after 11 months an appropriate donor had not been identified (both from an immunological and size perspective). She remained an in patient throughout this time with pancreatic fistulation and sepsis  
  
In April 2022 a suitable donor was identified (15 year old female, 45Kg), but had been allocated to a super urgent recipient for whom a segmental graft would be required. Under normal circumstances this would have precluded the use of the bowel and right lobe as a multivisceral block (MVT) as a consequence of the prolonged cold ischaemic time (CIT).  
Discussions with the paediatric centre resulted in the ability to transplant both recipients. The paediatric liver transplant surgeon travelled to the donor hospital and joined the retrieval team from our centre. The hilar anatomy was confirmed during the warm phase of the retrieval but the liver was split on the back table with the left lateral segment being split from the block. The multivisceral block left the donor hospital in under two hours from cross clamp and the total cold ischaemia time was (5 hours 24 minutes). We successfully performed an MVT with a right lobe split liver.  
  
The adult recipient had no biliary complications but did develop a proximal GI anastomotic leak that resolved completely. Both recipients are alive and well.This is the first case that we are aware of utilising a cadaveric split liver graft for an adult MVT and paediatric lobe graft from a single paediatric donor.  
Conclusion  
This case demonstrates the feasibility of this approach to increase access to small donors for small adult mutivisceral recipients without compromise to the paediatric liver transplant population.

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## Longterm outcomes of using avascular rectus fascia at an adult intestinal transplant centre.

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#### Abstract

Introduction

Primary abdominal closure after intestinal transplant can be challenging due to the loss of abdominal domain in the potential recipients. Various techniques have been used to facilitate closure from using small donors, reduced sized graft to meshes and abdominal wall transplants. Our unit has used avascular rectus fascia (ARF) to facilitate abdominal wall closure since 2013.

Over that time, we have observed a number of complications associated with this technique and these together with outcomes are described.

 Methods

A retrospective analysis of our prospectively collected database was performed between 2007 and 2022.

Results

Between Dec 2007 and Dec 2022, 40 intestine-containing grafts in 133 recipients were undertaken. In 40 recipients (29%) (13 small bowel alone, 8 modified multivisceral, 11 liver small bowel, 8 multivisceral) ARF was used to close the abdomen primarily. Third-party ARF was used in 7 patients.

The complications encountered with primary ARF were stretching (3), eschar formation (4 and fascia removal (2). Of note in these 40 recipients, there were 41 relook laparotomies performed, (four in a particular individual patient).

Conclusion

Whilst there are complications associated with this technique, it does facilitate a wider range of donor to recipient weight ratios. It has to be recognised that primary closure is also associated with complication rates.

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Pictures showing eschar and slough formation.