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Long-Term Follow-up of Kidney Transplantations following Polycystic Kidney Disease

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Background: Patients with polycystic kidney disease (PKD) are candidates for kidney transplantation (KTx).

Objective: To report the results of our single-center case series of the first KTx in 250 PKD patients with autosomal dominant (64%), medullary cystic (16%), autosomal recessive (6%), and non-specified (14%) form of the disease.

Methods: The peri-transplantation data were analyzed according to the origin of the graft (deceased donor: DD, and living donor: LD). We analyzed demographic data of donors and recipients, waiting time, duration of dialysis, transfusion, nephrectomy, hospital stay, morbidities, and graft and patient survival.

Results: The DD group consisted of 79% and LD group 21% of the patients. Nephrectomy was performed on 21% of the recipients. The DD group had a significantly higher rate of hemodialysis (82% *vs.* 68%), duration of dialysis (1571 *vs.* 1002 days), waiting time (1129 *vs.* 33 days), and blood transfusions (45% *vs.* 27%) than the LD group. Surgical complications included arterial stenosis (1% in DD *vs.* nil in LD), venous thrombosis (1% in DD *vs.* nil in LD), urine leakage (0.5% in DD *vs.* 1.9% in LD), ureteral stenosis (0.5% in DD *vs.* nil in LD), reflux (nil in DD *vs.* 1.9% in LD), lymphocele (11.7% in DD *vs.* 8.1% in LD) and hernia (5.2% in DD *vs.* 8.1% in LD) with no significant difference. The graft and patient survival rates were similar in both studied groups.

Conclusion: The low rate of morbidity along with excellent survival rates makes KTx an excellent option for PKD patients. Although fear of future appearance of PKD may reduce the rate of related LD, we showed better outcome after LD in terms of graft and patient survival.

Prevalence of CMV Infection in Kidney Transplant Patients in Montaserie Hospital of Mashhad University During 2012

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Background: CMV is one of the most important pathogens in kidney transplant patients. The direct and indirect effects of CMV infection result in significant morbidity and mortality among kidney transplant recipients. 20% to 60% of all transplant recipients develop symptomatic CMV infection. Although the CMV seropositive-donor/seronegative-recipient (D^+/R^-) group is at the highest risk for symptomatic disease, analysis of registry data showed that patients belonging to the seropositive-donor/seropositive-recipient (D^+/R^+) group had the worst patient and graft survival, particularly in the setting of discordant HLA-DR match.

Objective: To determine the prevalence of CMV infection in kidney transplant recipients in Montaserie Hospital affiliated to Mashhad University of Medical Science.

Methods: 190 patients had kidney transplant during 2012. They were studied for CMV infections.

Results:13 (6.8%) of the patients had CMV infection; 5 were male and 8 were female. All of the patients with CMV infection received their grafts from cadavers. Concurrent urinary tract infection was present in 4 patients. The most common presentations of the infection were fever (77%) and rise in creatinine (46%). 7 patients were given thymoglobulin for DGF prior to transplantation. All of them had previous history of CMV exposure (IgG anti-CMV positive); all the donors (cadavers) also had been IgG anti-CMV positive. The mean±SD consumption of cyclosporine in these patients was 4.01±1.18 mg/kg; for prednisolone, it was 17.29±7.11 mg/day. None of the patients was on standard protocol of pre-emptive or prophylactic regimen except when they were receiving thymoglobulin.

Conclusion: The prevalence of CMV infection (6.8%) in our patients was low. Despite not using standard protocols, the low prevalence in our patients is important and needs to be considered more seriously in future studies.

Prevention of Lymphocele in Kidney Transplantation

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Background: Lymphocele formation is a common complication after kidney transplantation (KTx). Although it is usually asymptomatic, it can cause graft failure. Fenestration is one of the current curative therapies for lymphocele.

Objective: To evaluate the role of a preventive fenestration (PF) in reducing the lymphocele rate after KTx.

Methods: From 1967 to October 2010, 2646 KTxs have been performed at our center. The demographic data of the recipients, etiology of the KTx, intra-operative parameters and post-KTx complications were evaluated. Since after 2007 a PF was performed simultaneously with each KTx at our center, the rate of lymphocele as well as graft and patient survival rates were compared between the two groups of without PF (before 2007, n=2147) and with PF (after 2007, n=499).

Results: The mean±SD age of the patients was 42±19 years with male:female ratio of 1.9. The most common indications of KTx were glomerulonephritis (38%), structural disease (16%), polycystic kidney diseases (13%) and metabolic nephropathies (10%). The mean±SD cold ischemia and operation time were 1009±412 and 186±112 min, respectively. The mean±SD blood loss was 459±407 mL. Post-KTx complications included arterial stenosis (2.3%), venous thrombosis (3.2%), urological leakage (2.8%), stenosis (0.85) and reflux (3.7%). The rate of lymphocele as well as 1-year graft and patient survival are summarized in Table 1.

Conclusion: PF would be a promising method to avoid lymphocele formation after KTx.

Table: Comparison of studied parameters in the two study groups

Parameters	Without PF	With PF
Patients (n)	2147	499
Lymphocele rate (%)	20.5	6.5
1-year graft survival (%)	94.1	99.9
1-year patient survival (%)	95.3	100

Prevalence of Metabolic Syndrome in Renal Transplant Recipients

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Background: Metabolic syndrome (MS) is a risk factor for many disease conditions and its prevalence after renal transplantation has to be determined.

Objective: To determine the prevalence of MS in renal transplant recipients in the Northeast of Iran.

Methods: A cross-sectional study was conducted to determine the prevalence of MS in 106 renal transplant recipients at Montaserieh Hospital, Mashhad, northeastern Iran, using the National Cholesterol Education Program-Adult Treatment Panel III (NCEP-ATPIII) criteria. All patients were more than 60 months post-transplant and above 16 years of age. Those with pre-transplantation diabetes and who were taking immunosuppressive drugs of the target organ inhibitor group like rapamycin, were excluded from the study.

Results: A total of 31 (29.2%) of 106 patients had MS—17 (29%) of 59 men and 14 (30%) of 47 women. Among the patients with MS, 23 (21.7% of the total) had 3 inclusion criteria, 6 (5.7%) had 4, and 2 (1.9%) had 5 criteria. Among patients without the syndrome, 38 (35.8% of the total) had only 2 criteria for MS, 29 (27.4% of total) had only one criterion of the MS. 63 (59.4%) patients presented with arterial hypertension, 84 (79.2%) had hypertriglyceridemia, 17 (16%) high fasting glucose levels, 40 (37.7%) low HDL levels, and 4 (3.8%) had high BMI.

Conclusion: The prevalence of MS is a high among renal transplant recipients in our area. Because MS is a risk factor for CVD morbidity and graft failure, its early diagnosis and treatment are important.

Vascular Events during Live and Cadaveric Donor Kidney Transplantation and Salvage of Graft Experience from 2050 Recipients

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Background: Vascular events during kidney transplantation is a major cause of graft loss, but immediate surgical intervention can salvage the graft and recipient.

Objective: To present our experience of vascular interventions and their effects on the outcome of grafts in transplant patients with suspected vascular events.

Methods: From 1990 to 2012, 2050 renal transplantations (1542 live and 408 cadaveric donors) were performed by one team. We reviewed the recipient charts to find cases with vascular events like artery or vein kinking or torsion, renal artery thrombosis (RAT) and renal vein thrombosis (RVT). A vascular event was suspected when urinary output was suddenly stopped and confirmed by color Doppler ultrasonography or immediate exploration. The kind of surgical interventions for saving grafts and their outcomes were assessed.

Results: A total of 28 (1.3%) vascular accidents occurred. Arterial kinking, arterial torsion and venous torsion occurred in 9 (33%), 2 (7%) and 2 (7%) patients, respectively. RAT and RVT occurred in 12 (43%) and 3 (10%) patients, respectively. 8 of 9 arterial kinking occurred in those in whom we used internal iliac artery. The mean±SD time between anuria and surgery was 30±10, 50±10 and 65±20 min for vascular kinking, RAT, and RVT, respectively. 11 of 13 grafts with vascular kinking or torsion were saved by immediate surgical intervention, but only 4 grafts of RAT group and 1 of RVT group could be saved by surgical intervention. In RAT cases, we reopened the anastomosis and performed very small venotomy. Then we washed and perfused graft with cold heparinized ringer solution; finally, revascularization was restored. Delayed graft function occurred in all cases of saved RAT and RVT but only in 5 (40%) cases of kinking or torsion vascular cases.

Conclusion: Sudden cessation of urine after renal transplantation is a warning sign and immediate diagnosis of vascular event will help salvage graft with proper intervention.

Left Ventricular Mass Index and its Correlation with Atrial Natriuretic Peptide, Angiotensin and Blood Pressure in Kidney Transplanted Children

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Background: Children with transplanted kidney are at higher risk of developing hypertension. Ambulatory blood pressure (BP) monitoring (ABPM) is the method of choice to evaluate daily BP in this group of patients. Underdiagnosed hypertension may lead to hypertrophy of the left ventricle (LVH) and decrease kidney survival.

Objective: To evaluate and compare BP measured by both auscultatory method and ABPM in transplanted kidney children and its correlation with left ventricular mass index (LVMI), angiotensin II (AG II) and atrial natriuretic peptide (ANP).

Methods: We studied 30 kidney transplanted children and adolescent <18 years and 30 sex-matched normal population as control group. Demographic and clinical findings were recorded. BP was measured by

auscultatory and ABPM method for case group. Serum AG II and ANP were measured for all participants. Angiotensin receptor blockers and angiotensin converting enzyme inhibitors had been discontinued 3 days before blood sampling.

Results: 17 (57%) of 30 patients were male. The mean±SD age of the case and control groups were 176±41 and 143±92 months, respectively (p>0.05). 76% of patients have been receiving antihypertensive medications. The mean±SD in-office systolic BP was significantly lower than ABPM systolic BP (129±11 *vs*. 123±24 mm Hg, p=0.02). Although ABPM night-diastolic BP was significantly higher than in-office-diastolic BP, we could not observe a similar difference between ABPM day-diastolic BP and in-office-diastolic BP. The mean of AG II in the control group was significantly higher than that in case group (0.74± 0.39 *vs*. 0.54±0.27, p=0.039). Serum level of AG II was inversely correlated with diastolic BP (r = 0.312, p=0.47). The difference between night and day systolic BP was significantly correlated with AG II (r=0.579, p<0.001). Night and day diastolic BP were significantly different (p=0.001). In addition, the mean±SD of ANP was significantly higher in cases than in the control group (1532±17 *vs*. 18±16, p<0.001). The mean±SD LVMI was 167±71. LVMI had only reverse correlation with ANP level (r = 0.278, p<0.05). Both ABPM night and day systolic BPs and ABPM night and day diastolic BPs were strongly correlated with AG II level.

Conclusion: ABPM should be a part of yearly evaluation of kidney transplanted children. Furthermore, measuring ANP and AG II should be considered in kidney transplanted children.

Is Anti-Thymocyte Globulin Therapy a Risk for Post-Kidney Transplantation CMV Infection?

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Background: CMV is one of the most important pathogens in kidney transplant patients.

Objective: To uncover the role of antithymocyte globulin (ATG) therapy in the development of CMV infection after kidney transplantation.

Methods: 330 kidney transplant patients were managed in Sina Hospital Kidney Transplantation Unit affiliated to Tehran University of Medical Sciences, from September 1994 to February 2010. The demographic characteristics of the patients, causes of chronic kidney diseases, causes and type of ATG therapy, rejection episodes, CMV infection, and early- and long-term post-transplantation graft survival were recorded. Serum creatinine level of >2 mg/dL was considered as graft deterioration. The patients were classified according to the use of ATG therapy and the development of post-kidney transplantation CMV infections.

Results: 90 of 330 patients received ATG therapy, either prophylactic therapy (30%) after a deceased second kidney transplantation, or curative therapy (70%) after delayed graft function or acute rejection. 14% of the ATG-treated and 3% of the untreated patients developed borderline graft function at discharge (creatinine >2 mg/dL); 22% *vs*. 16% (p<0.05) developed late graft function deterioration; 38% *vs*. 28% (p>0.05) developed at least one episode of CMV infection. Graft deterioration after CMV infection was equal in both groups (40% *vs*. 41%).

Conclusions: Although ATG-treated patient have worse early and late graft survival, the incidence of post-kidney transplantation CMV infection is not different between ATG-treated and untreated immunosuppressed patients.

A Single-Center Experience of 1000 Liver Transplants using the Modified Piggyback Technique by Belghiti

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Background: Over the past 4 decades, the surgical techniques of liver transplantation (LTx) have evolved. Among these, the modified piggyback (MPB) technique by Belghiti provides special advantages.

Objective: To present our single-center experience with the MPB technique in 1000 patients.

Methods: Recipients' peri-operative data were prospectively collected and evaluated. Post-operative and specific complications, stay in the intensive and intermediate care unit, and the mortality rate with cause of death were analyzed.

Result: Most recipients were classified as Child C (46%). For the patients who underwent LTx for the first time, alcoholic (22%) and viral (21%) cirrhosis and hepatocellular carcinoma (15%) were the prevalent indications. The overall median warm ischemia time, anastomosis duration, and operative time were 47, 108, and 325 min, respectively. The median intra-operative blood loss was 2000 mL. A veno-venous bypass was never needed to maintain hemodynamic stability. Only in a few cases, temporary inferior vena cava clamping was necessary. The most prominent surgical complications were hemorrhage, hematoma, and wound dehiscence. Renal failure occurred in 8.1% of patients. The overall median stay in the intensive and intermediate care unit was 16 days. The mortality rates within 30 and 90 days were 6% and 14%, respectively. Only one technique-related death occurred.

Conclusion: The MPB technique by Belghiti is a feasible and simple technique for LTx. The caval flow is preserved during the anhepatic phase that minimizes the need for veno-venous bypass or porto-caval shunt. This technique requires only 1 caval anastomosis, which is easy to perform with a short anhepatic phase. To minimize the risk of outflow obstruction, attention should be paid by doing a wide cavocavostomy cranially to the donor inferior vena cava in a door-lock manner. This technique can be applied in almost all patients undergoing LTx for the first time and liver retransplantation as well.

Do We Need an Animal Hands-On Course for Transplantation Surgery?

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Background: Transplantation surgery is an advanced field of surgery, which requires many years for the surgeons and fellows to become trained. In recent years, animal hands-on courses have played an important role in this training.

Objective: To evaluate and present the results of our animal hands-on courses of transplantation surgery during the last 4 years

Methods: Since 2008, a total of five 2-day hands-on courses of transplantation surgery on big animal models was performed at our Department. 61 trainees participated in these courses. The participants were asked to answer three questionnaires (pre-course, immediate post-course and delayed post-course). The questions pertained to their education and its deficits, their needs and expectations, their evaluation of our hands-on courses in areas of learning, mentoring and organization as well as the effect of this course on their surgical abilities. The questionnaires were analyzed, compared and presented herein.

Results: Each participant could perform on an average of 1.8 multi-organ procurements, 2.3 kidney, 1.5 liver and 0.7 pancreas transplantations. 41.7% of the participants considered their previous practical training only satisfactory. 85% of the trainees hoped to have more opportunities to practice through animal hands-on courses. 73.3% of the participants evaluated our courses as very good and 95.8% of them believed that our courses had fulfilled their expectations. All of the participants indicated that they would like to participate again in our courses and that they would recommend them to other fellows and surgeons. 66% of the attendees found the effect of the course on their surgical abilities very good, 30% good and 4% satisfactory

Conclusion: Practical training is one of the most challenging aspects of the process of education for transplant fellows and surgeons. Animal hands-on courses of transplantation surgery are one of the best options for them to learn and practice different operations and techniques in a near to clinical simulated model. Regular participation in such courses with a focus on practical issues can provide optimal opportunities for trainees with the option of direct mentoring and feedback.

Hepatic Inflow Modulation after Small-for-Size Syndrome via Shunt Surgery

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Background: One of the most challenging issues after extended liver resection is decreased hepatic artery flow and increased portal vein flow and pressure in the remnant liver with the risk of small-for-size syndrome (SFSS).

Objective: To evaluate the role of shunt surgery in hepatic inflow modulation after SFSS.

Methods: 24 pigs were divided into three groups; group A: 75% liver resection without shunt (n=8), group B) 75% liver resection with side-to-side portocaval shunt (PCS S-S), and group C: 75% liver resection with end-to-side portocaval shunt (PCS E-S). The flow of the hepatic artery (HAF) and portal vein (PVF) in relation to the 100 g remnant liver as well as the pressure of the portal vein (PVP) were measured and compared between the groups.

Results: In group A, extended liver resection (75%) decreased the HAF (20%) and increased the PVF (119%) and PVP (306%). In group B, the PCS S-S following extended liver resection (75%) could increase the HAF (12%) and decrease the PVF (78%) and PVP (48%) in comparison to group A. In group C, the PCS E-S following extended liver resection (75%) could increase the HAF (44%) and decrease the PVP (38%) in comparison to group A.

Conclusion: After extended liver resection, portocaval shunt can increase the dropped HAF and reduce the increased PVF and PVP. In increasing the HAF after extended liver resection, the PCS E-S seems to be more effective than PCS S-S. In case of the risk of SFSS, the hepatic inflow modulation after extended liver resection through portocaval shunt might prevent the consequent postoperative complications.

Table: Comparison of measured parametrs in the studied groups

Parameters	Baseline	Group A 75% Resection	Group B 75% Resection + PCS S-S	Group C 75% Resection + PCS E-S
HAF (mL/min/100 g)	30	24	27	34
PVF (mL/min/100 g)	127	279	60	—
PVP (mm Hg)	9.5	16	8.3	9.9

Comparison of Graft Survival, Proteinuria and Kidney Growth between Pediatric and Adult Deceased Kidney Donation

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Background: There is widening discrepancy between supply and demand of donor and recipient in the field of renal transplantation.

Objective: To compare the graft and patient survivals, post-transplantation complications rate, severity of proteinuria secondary to hyperfiltration injury, and the kidney growth of recipients who underwent transplantation from pediatric (group 1) and adult deceased donors (group 2).

Methods: Each study groups contains 36 patients. Outcome measured included patient and graft survivals, quality of graft function as assessed by serum creatinine (SCr) and estimated GFR (eGFR), surgical complications, proteinuria that was detected by routine urinalysis confirmed by 24-h urine protein >250 mg, and kidney length that measured by early and follow-up ultrasonography.

Results: The mean donor age in groups 1 and 2 were 8.5 (range: 2.5–15) and 36 (range: 15–65) years, respectively. The 9 (25%) kidneys from pediatric donors (group 1) were offered en-block. The mean follow-up was 21 (range: 6–72) months. There were no statistical differences in the incidence of DGF between the two groups (21% *vs*. 19%, p=0.62). Group 1 had a slightly higher incidence of acute rejection than group 2 (12% *vs*. 8%, p=0.57). One-year graft survival was similar in the two groups (86% *vs*. 88%). SCr and eGFR were not statistically different between the two groups (1.28 *vs*. 1.31 mg/dL and 87 *vs*. 88 mL/min, respectively, p=0.20). The incidences of surgical complications that required surgical intervention (urinary leakage, ureteral stenosis, lymphocele, vascular thrombosis) were similar in both groups (16% *vs*. 14%, p=0.42). The rate of proteinuria was not different between the two groups (11% *vs*. 9%, p=0.12). Early mean±SD kidney length within one week was significantly lower in group 1 than in group 2 (75±12 *vs*. 112±14 mm, p<0.001), but the rate of increase in kidney length in group 1 was significantly greater than that in group 2 (92±15 *vs*. 118±16 mm, p<0.001) during the follow up.

Conclusion: Although in this study, the median-term outcomes and complications of single and en-block kidney transplantation from pediatric donors are acceptable, similar to those from older donors, assessment of functional and hemodynamic adaptation of small pediatric kidneys in adult recipients and subsequent hyperfiltration effects are important and requires more studies with longer follow up.

The Effect of Autologous Bone Marrow Stem Cell Transplantation on Graft Function in Cadaver Kidney Recipients

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Background: Renal transplantation is the treatment of choice for those with end-stage renal disease (ESRD). However, acute rejection and graft dysfunction remain major challenges worldwide. The novel cell-based anti-rejection treatments have been studied by using different stem cell sources.

Objective: In this study, transplantation of autologous bone-marrow-derived total nucleated-cells is used to improve the cadaver kidney graft function.

Methods: 18 ESRD patients, candidates for cadaver kidney transplantation, were divided into two groups (group A and B). There was no significant difference in terms of gender, age, weight, and type of dialysis between the two groups. The two kidney of one cadaver were transplanted to two recipients. Before transplantation, autologous bone-marrow aspiration was done for one recipient selected at random; then, the transplantation was done for both recipients. The total nucleated-cells were separated and infused intravenously during and after the transplantation, respectively. In post-transplantation, 6 hours diuresis, delay graft function (DGF), creatinine (1 week, 2 weeks and 3 months), cyclosporine (2 weeks) and cold ischemia time were measured in bone-marrow-treated group (A: n=9) and non-bone-marrow-treated group (B: n=9).

Results: A significant increase in diuresis, decrease in DGF, decrease in 1- and 2-week creatinine and marginally significant decrease in 3-month creatinine was observed. No significant difference in cyclosporine blood level (2 weeks), operation time and cold ischemia time were observed between group A and B. 2 patients in group B and none in group A had CMV infection.

Conclusion: The transplantation of autologous bone-marrow-cells in cadaver kidney recipient is safe and significantly decreases early graft dysfunction. More clinical trials are needed to confirm these promising results.