



Impact of graft size matching on the early post-transplant complications and patients survival in children after living donor liver transplantations

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INTRODUCTION

Size match disparity between liver graft and recipient might result in complications after LDLT. Graft-to-recipient weight ratio (GRWR) is a commonly used index to predict size mismatching. Patients with too small grafts may develop encephalopathy, coagulopathy, cholestasis, acute renal failure with poor graft survival. In pediatric LDLT setting liver grafts more often are too large for the recipient resulting in "large for size" syndrome with poor graft perfusion, increased risk of vascular thrombosis and graft dysfunction, difficulty with abdominal wound closure among other complications.

The aim of our study was to assess the impact of GRWR on the early post-transplant complications, patients and graft survival in children after LDLT.

MATERIAL AND METHODS 2004-2019

- Retrospective analysis of 321 children after primary living donor liver transplantation.
- To assess the impact of graft size on recipient outcome patients were categorized into four Groups: patients with a GRWR $\leq 1.5\%$ (Group A), patients with a GRWR $>1.5\%$ and $\leq 3.5\%$ (Group B), patients with a GRWR $>3.5\%$ and $<5\%$ (Group C) and patients with a GRWR $\geq 5\%$ (Group D).
- Variables related to recipient, donor and surgery were analyzed. Early postoperative surgical complications (<30 days), were evaluated, including hepatic artery thrombosis (HAT), portal vein thrombosis (PVT), biliary leakage from biliary anastomosis or cut surface of the liver, postoperative bleeding and gastrointestinal perforation. Need for delayed abdominal wound closure and time of closure, early and late graft and patient survival were assessed and compared between study groups.

RESULTS

- Follow-up time ranges from 3 days to 17.4 years, median 7.2 years; in 240 patients (74.8%) follow-up time is longer than 5 years and in 139 patients (43.3%) longer than 10 years.
- Group A consisted of 37 patients with GRWR $\leq 1.5\%$; Group B included 196 patients with GRWR $>1.5\%$ and $\leq 3.5\%$; Group C included 73 patients with GRWR $>3.5\%$ and $<5\%$ and 15 patients with GRWR $\geq 5\%$ were in Group D.
- The most common indication for LDLT in all Groups was cholestatic disease 203 pts (63.2%) including 184 patients (57.3%) with biliary atresia after Kasai portoenterostomy before LDLT. Primary liver tumor and acute liver failure were the second and third most common indications for LDLT, in 44 (13.7%) and 27 (8.4%) respectively.
- The grafts consisted of monosegment in 10 patients, left lateral segments (segment II + III) in 277 patients, the left lobe (segments II+III+IV) in 32 patients and the right lobe (V+VI+VII+VIII) in two patients. For biliary tract reconstruction the Roux-en-Y hepaticojejunostomy was performed in 276 patients (86%) and duct to duct anastomosis in 45 cases (14%).

Recipients posttransplant outcome following LDLT according to GRWR (n, %)

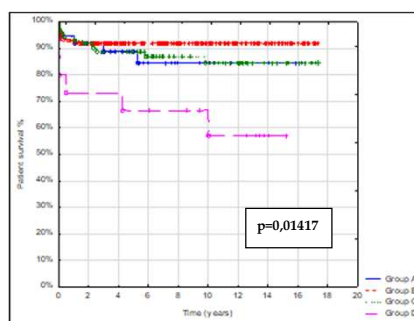
	Group A (37) GRWR $\leq 1.5\%$	Group B (196) $> 1.5\%$ GRWR $\leq 3.5\%$	Group C (73) $> 3.5\%$ GRWR $< 5\%$	Group D (15) GRWR $\geq 5\%$	Total	p-value
Early hepatic artery thrombosis (%)	1 (2.7%)	13 (6.6%)	2 (2.7%)	0	16 (5.0%)	p=0.338
Early portal vein thrombosis (%)	4 (10.8%)	12 (6.1%)	10 (13.7%)	1 (6.7%)	27 (8.4%)	p=0.229
Biliary leaks						
Biliary anastomosis	6 (16.2%)	19 (9.7%)	8 (11%)	0	33 (10.3%)	p=0.502
Cut surface of liver	1 (2.7%)	5 (2.6%)	3 (4.1%)	2 (13.3%)	11 (3.4%)	p=0.167
Postoperative bleeding	6 (16.2%)	34 (17.3%)	14 (19.2%)	1 (6.7%)	55 (17.1%)	p=0.705
Gastrointestinal perforations	0	6 (3.1%)	5 (6.8%)	0	11 (3.4%)	p=0.163
Abdominal wound closure						
Primary	20 (58.8%)	86 (48.0%)	22 (30.6%)	2 (15.4%)	130 (43.6%)	
Delayed	14 (41.2%)	93 (52.0%)	50 (69.4%)	11 (84.6%)	168 (56.4%)	p<0.005
Time to closure (days)	6 (2-9)	5 (2-65)	7 (1 - 63)	5 (4 - 123)		
Retransplantation (%)	2 (5.4%)	9 (4.6%)	2 (2.7%)	2 (13.3%)	15 (4.7%)	p=0.364

Causes and time of patient death

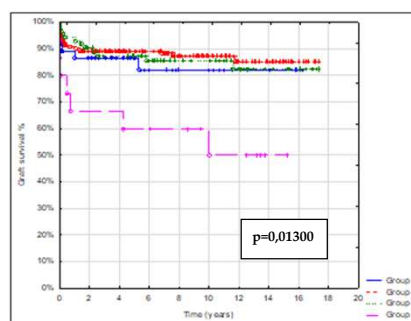
Cause of death	Group A (37) GRWR $\leq 1.5\%$	Group B (196) $> 1.5\%$ GRWR $\leq 3.5\%$	Group C (73) $> 3.5\%$ GRWR $< 5\%$	Group D (15) GRWR $\geq 5\%$
Infections	0	2 (10, 15 d)	7 (8, 30 d, 3, 9, 13, 28, 31, 70 mo)	2 (22 d, 6 mo)
MODS	1 (13 mo)	5 (4, 11* d, 2, 2*, 8 mo)	0	3 (3, 4 d, 51* mo)
Malignancy/tumor recurrence	0	4 (30 d, 2, 4, 17 months)	1 (5 months)	0
Central nervous system complications	2 (30 d, 36 mo)	2 (4, 7 d)	0	0
Others	1	3	2	1
Total (%)	4 (10.8)	16 (8.2)	10 (13.7)	6 (40.0)

MODS multiple organ dysfunction syndrome, * patient died after retransplantation

Kaplan-Meier patient survival curve



Kaplan-Meier graft survival curve



- Incidence of early surgical complications including vascular complications, biliary complications, postoperative bleedings, gastrointestinal perforations, graft loss were comparable among groups with different GRWR. Delayed abdominal wound closure was more common in patients with GRWR $> 3.5\%$.
- Patient and graft survivals were significantly worse in recipients with GRWR $\geq 5\%$.

CONCLUSIONS

- Recipients of LDLT with GRWR $< 5\%$ had significantly better prognosis concerning patients and graft survival. Using grafts with GRWR $< 5\%$ allows to expand donor pool, decrease risk of mortality on waiting list, while patients at the time of transplantation have less advanced liver disease, thus incidence of complications in posttransplant period is reduced.
- LDLT with GRWR $\geq 5\%$ is related with higher risk of poor outcome, thus should be an option for treating selected patients, when the risk of delaying transplantation is very high and access to deceased donor is limited.