Supplementary figure 1. Intention-to-treat survival of patients who survived > 3 months from listing.

Supplementary figure 2A. Intention-to-treat survival of patients with MELD >35.

Supplementary figure 2B. Intention-to-treat survival of patients with MELD >35 and HRS.

Supplementary figure 3A. Early patient survival of MELD >25 recipients.

Supplementary figure 3B. Early patient survival MELD >25 and HRS recipients.

Supplementary figure 4A. Graft survival of MELD >25 recipients after LDLT vs. DDLT.

Supplementary figure 4B. Graft survival of MELD >25 and HRS recipients after LDLT vs. DDLT.

Supplementary figure 5A. Patient survival of MELD >35 recipients after LDLT vs. DDLT.

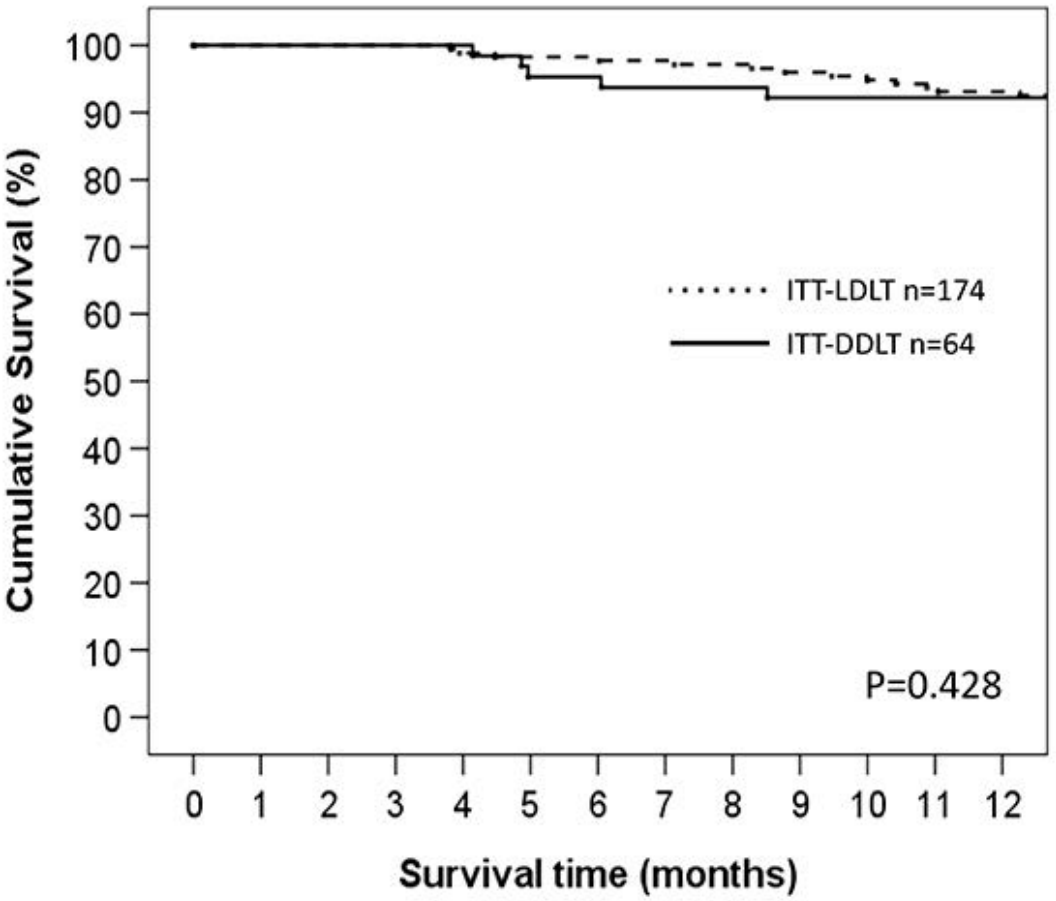
Supplementary figure 5B. Graft survival of MELD >35 recipients after LDLT vs. DDLT.

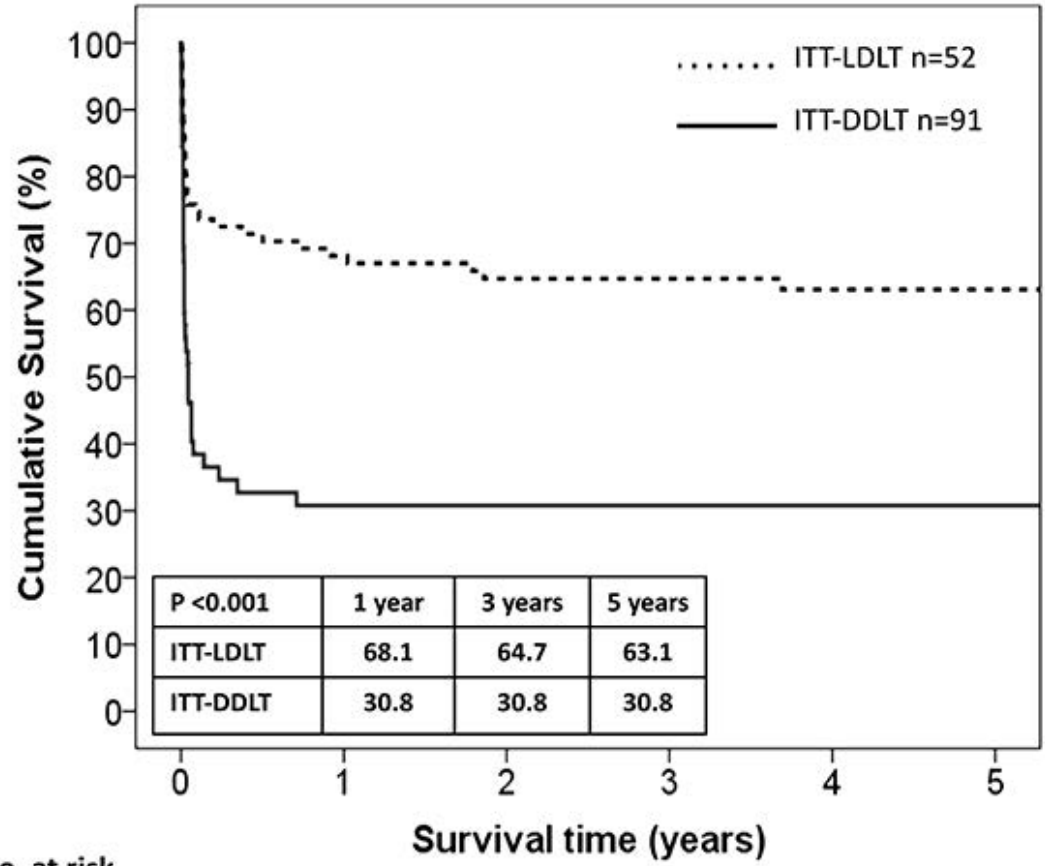
Supplementary figure 6A. eGFR of MELD >30 recipients after LDLT vs. DDLT. Data was shown as median and interquartile range.

Supplementary figure 6B. eGFR of MELD >30 and HRS recipients after LDLT vs. DDLT. Data was shown as median and interquartile range.

Supplementary figure 6C. eGFR of MELD >35 recipients after LDLT vs. DDLT. Data was shown as median and interquartile range.

Supplementary figure 6D. eGFR of MELD >35 and HRS recipients after LDLT vs. DDLT. Data was shown as median and interquartile range.

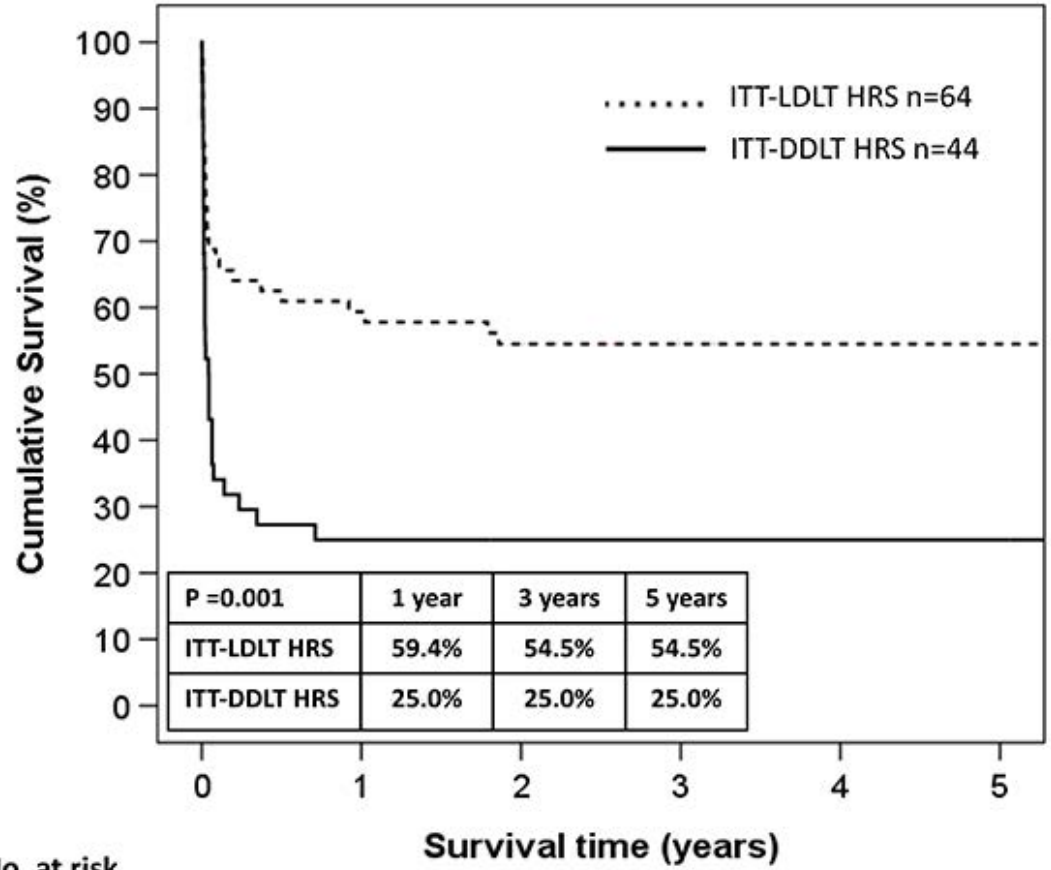

Cumulative Survival (%)
100
90
80
70
60
50
40
30
20
10
0
ITT-LDLT n=174
ITT-DDLT n=64
P=0.428
0
1
2
3
4
5
6
7
8
9
10
11
12
Survival time (months)



P <0.001	1 year	3 years	5 years
ITT-LDLT	68.1	64.7	63.1
ITT-DDLT	30.8	30.8	30.8

No. at risk

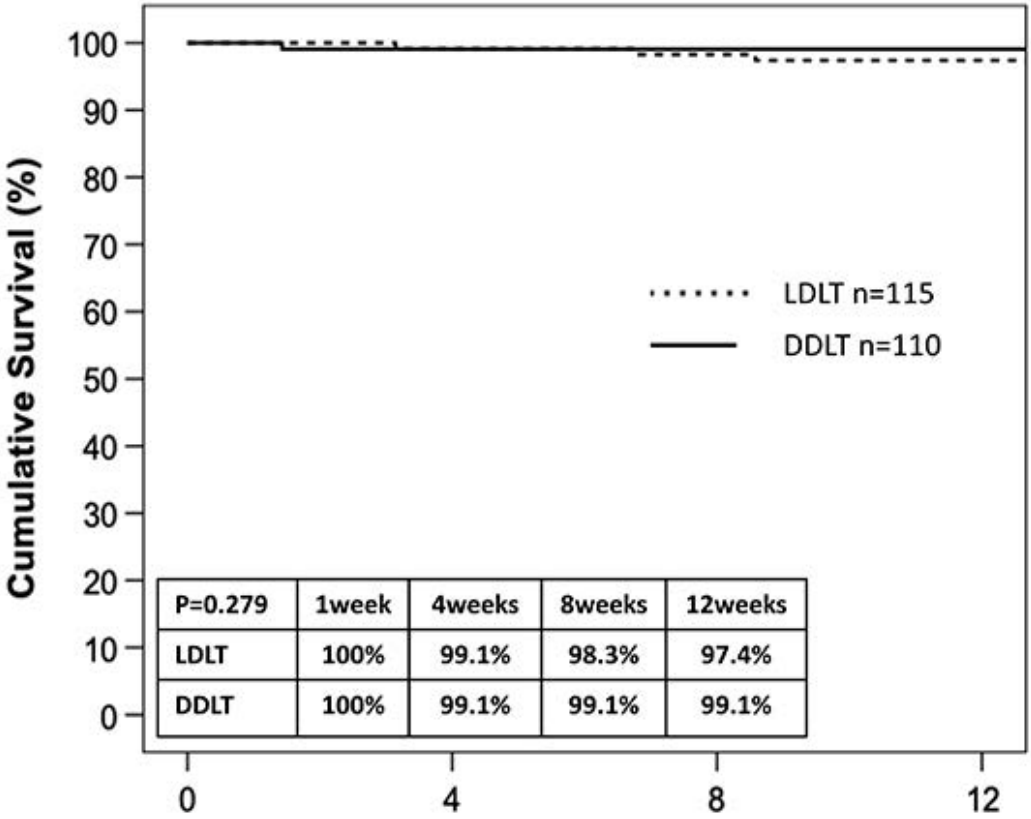
ITT-LDLT	52	15.5	15	15	15	13.5
ITT-DDLT	91	60.5	51	42.5	37.5	35.5



P =0.001	1 year	3 years	5 years
ITT-LDLT HRS	59.4%	54.5%	54.5%
ITT-DDLT HRS	25.0%	25.0%	25.0%

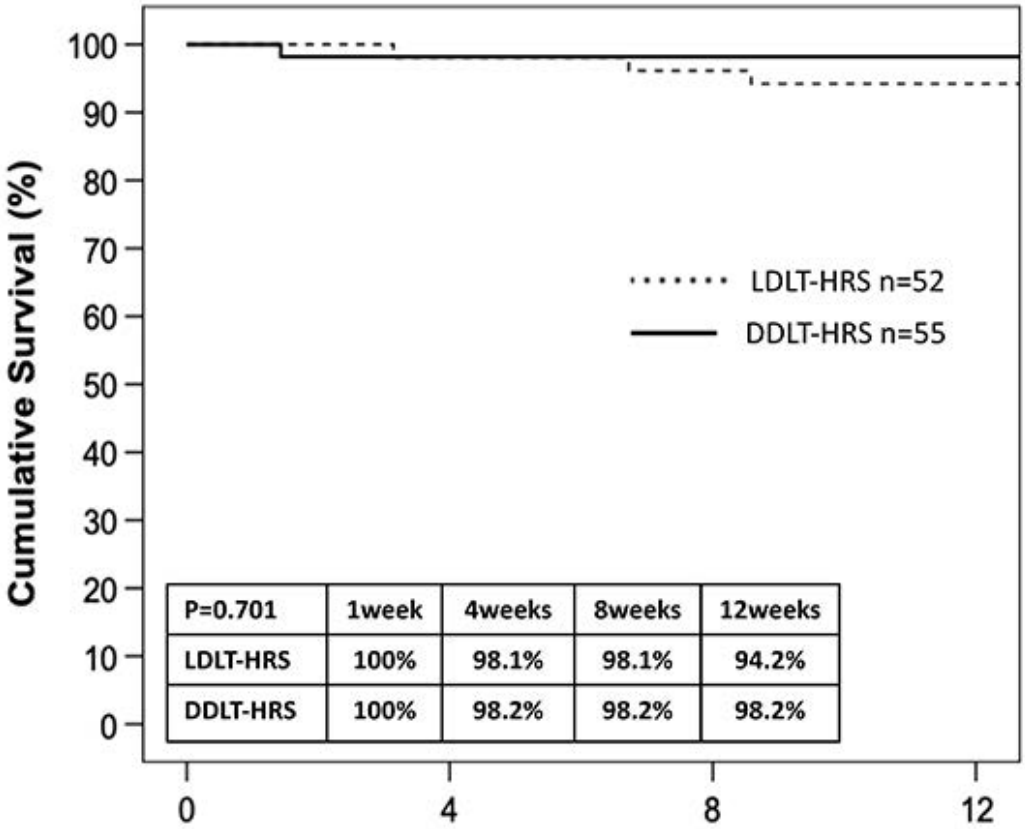
No. at risk

ITT-LDLT HRS	44	10.5	10	10	10	9
ITT-DDLT HRS	64	37	29	23	21	20



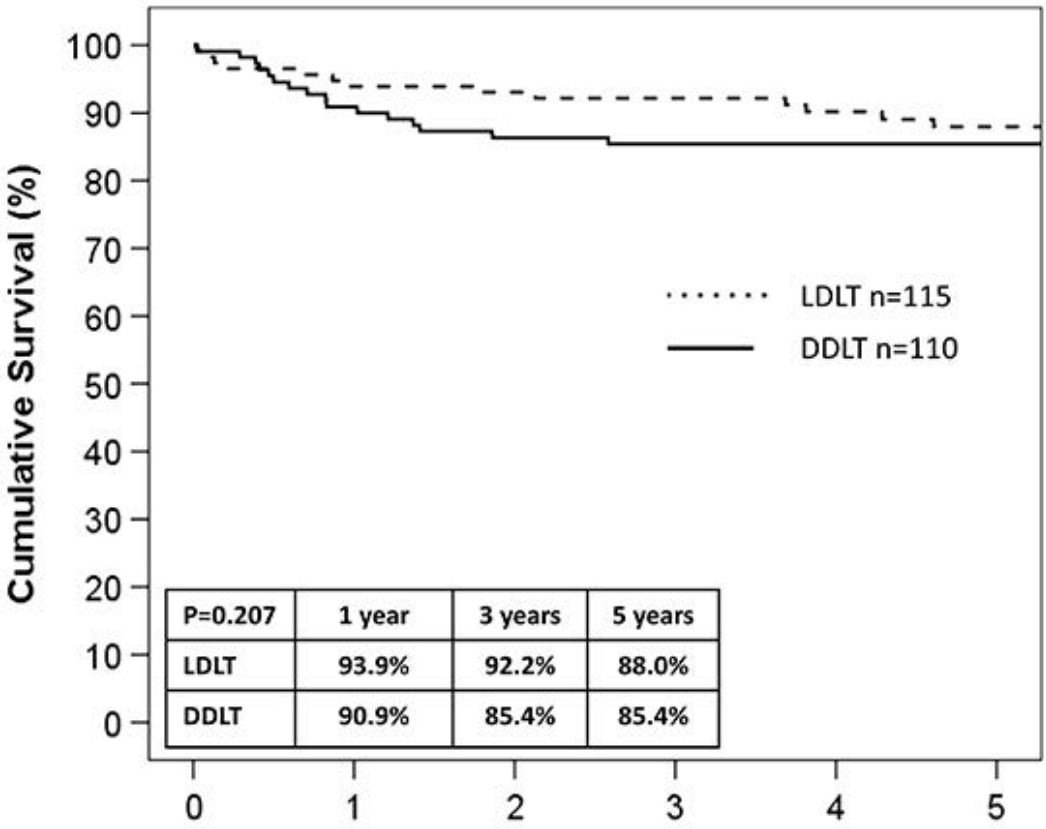
P=0.279	1week	4weeks	8weeks	12weeks
LDLT	100%	99.1%	98.3%	97.4%
DDLT	100%	99.1%	99.1%	99.1%

No. at risk					
LDLT	115	115	114	113	112
DDLT	110	110	109	109	109



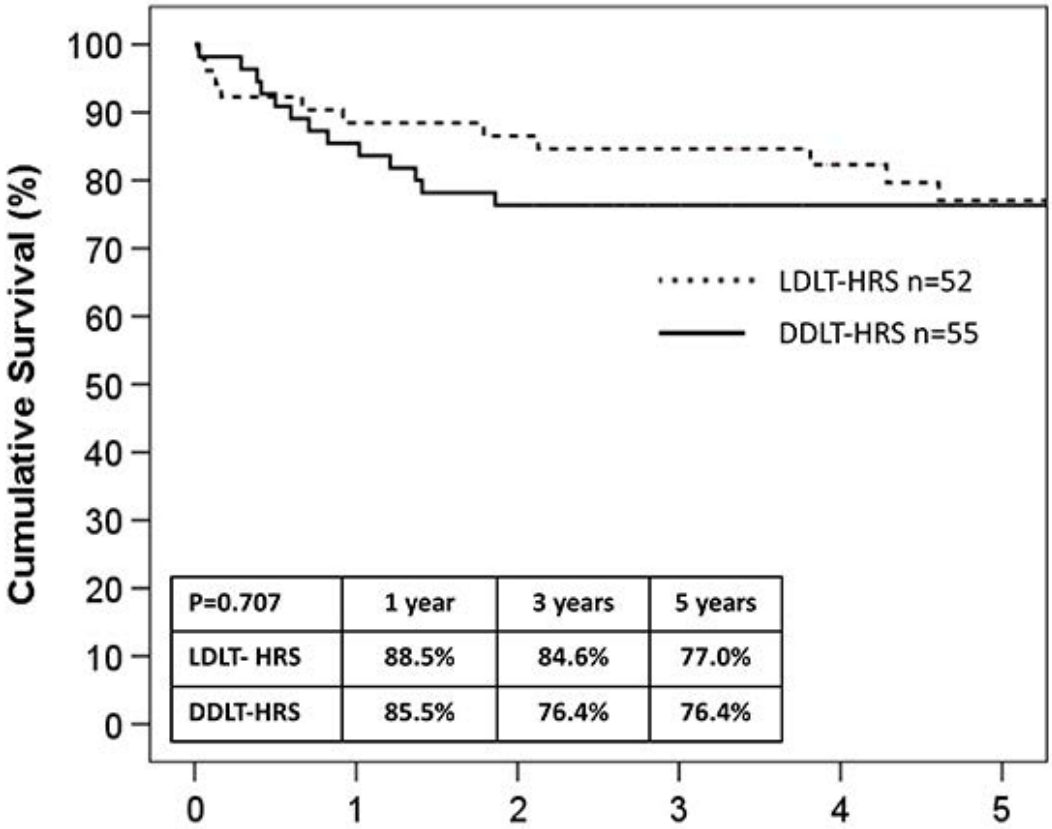
P=0.701	1week	4weeks	8weeks	12weeks
LDLT-HRS	100%	98.1%	98.1%	94.2%
DDLT-HRS	100%	98.2%	98.2%	98.2%

No. at risk					
LDLT-HRS	52	52	51	50	49
DDLT-HRS	55	55	54	54	54



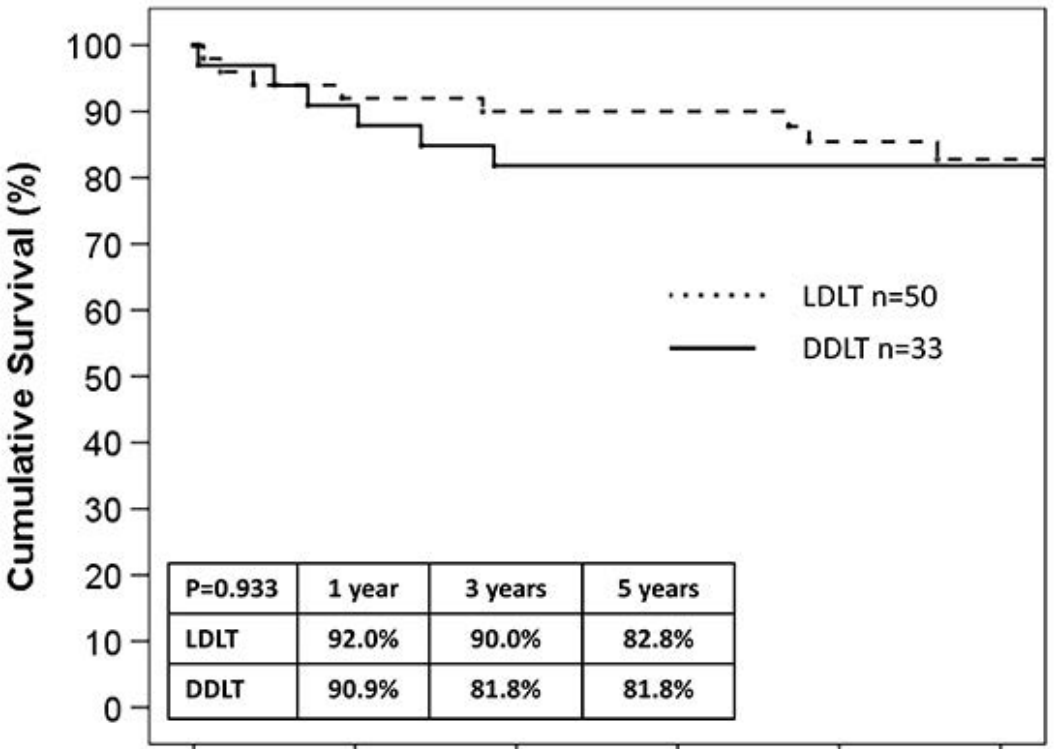
P=0.207	1 year	3 years	5 years
LDLT	93.9%	92.2%	88.0%
DDLT	90.9%	85.4%	85.4%

No. at risk						
LDLT	115	108	107	99	86	75
DDLT	110	100	95	83.5	70	66.5



P=0.707	1 year	3 years	5 years
LDLT- HRS	88.5%	84.6%	77.0%
DDLT-HRS	85.5%	76.4%	76.4%

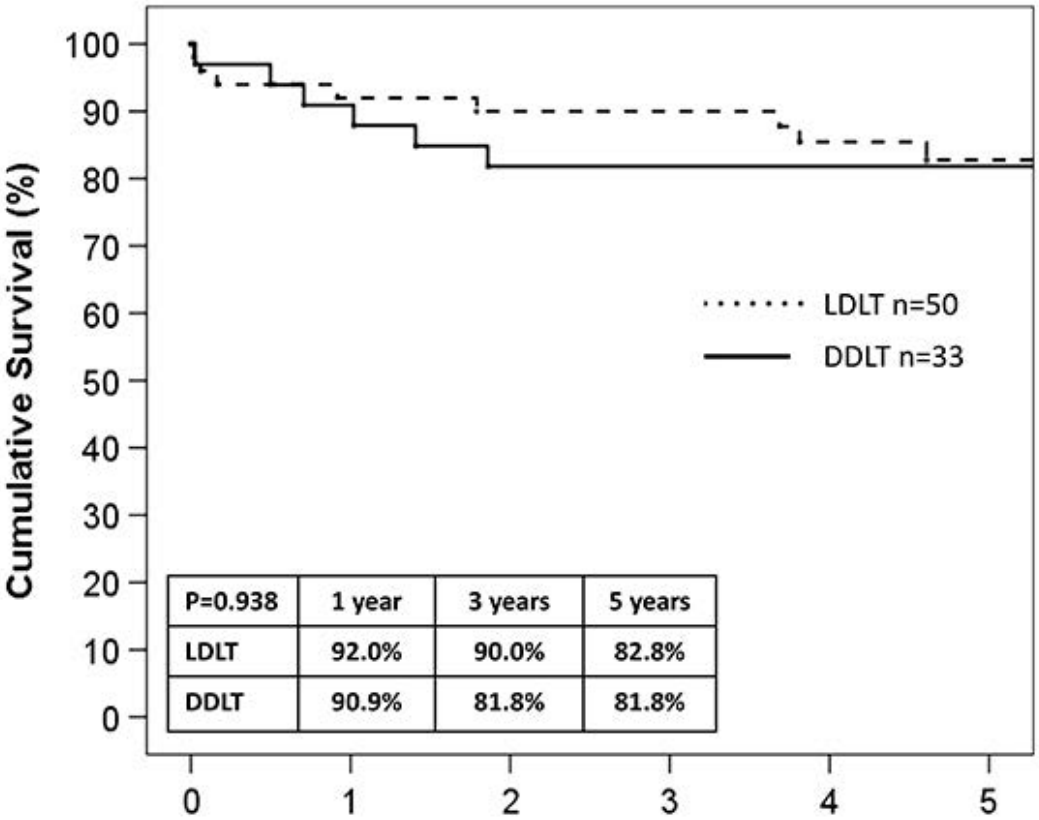
No. at risk						
LDLT-HRS	52	46	45	42	33	29
DDLT-HRS	55	47	42	36.5	34	33



P=0.933	1 year	3 years	5 years
LDLT	92.0%	90.0%	82.8%
DDLT	90.9%	81.8%	81.8%

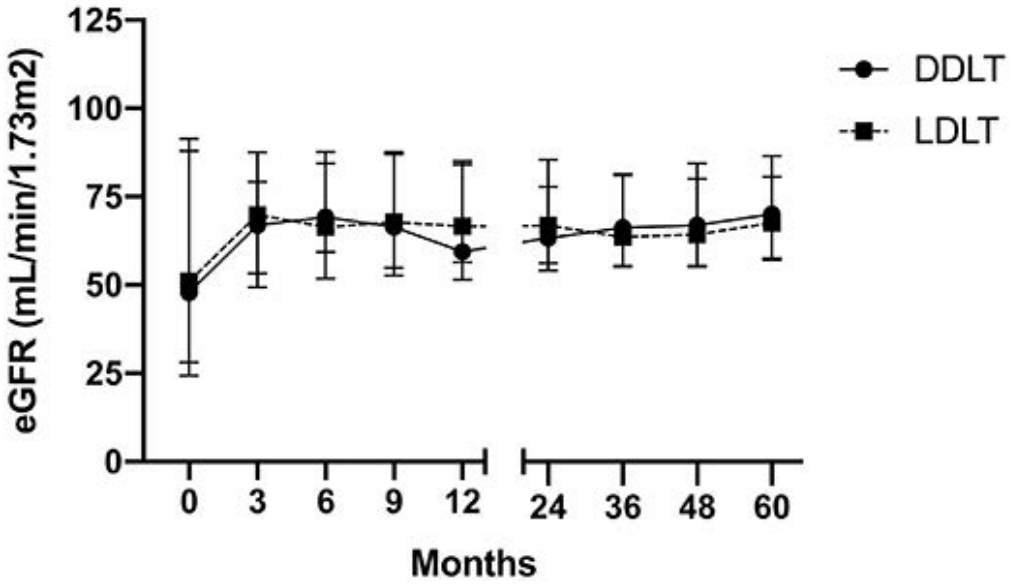
No. at risk

LDLT	50	46	45	44	35	31
DDLT	33	30	27	22.5	18	17

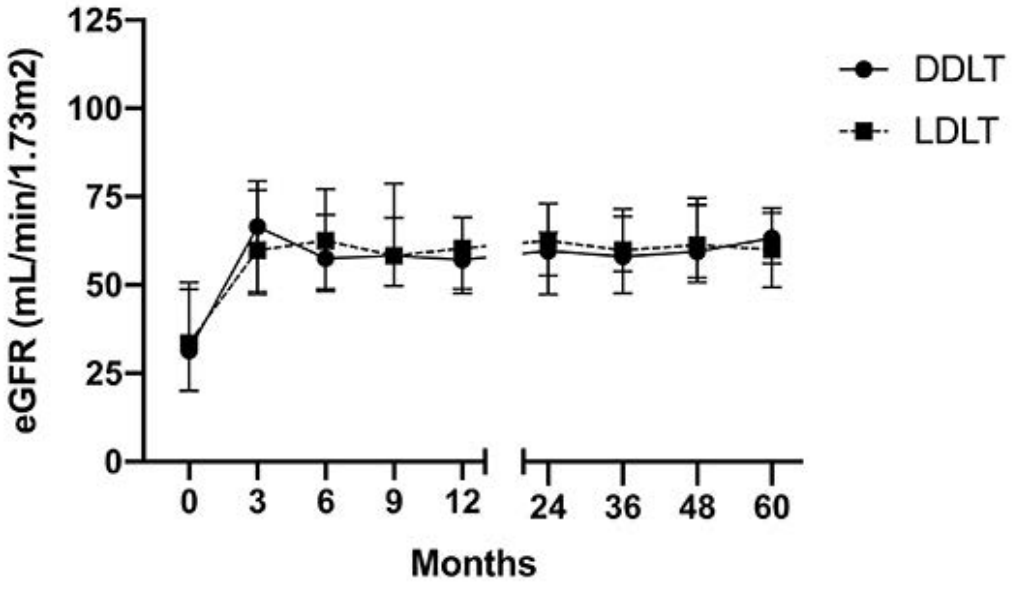


P=0.938	1 year	3 years	5 years
LDLT	92.0%	90.0%	82.8%
DDLT	90.9%	81.8%	81.8%

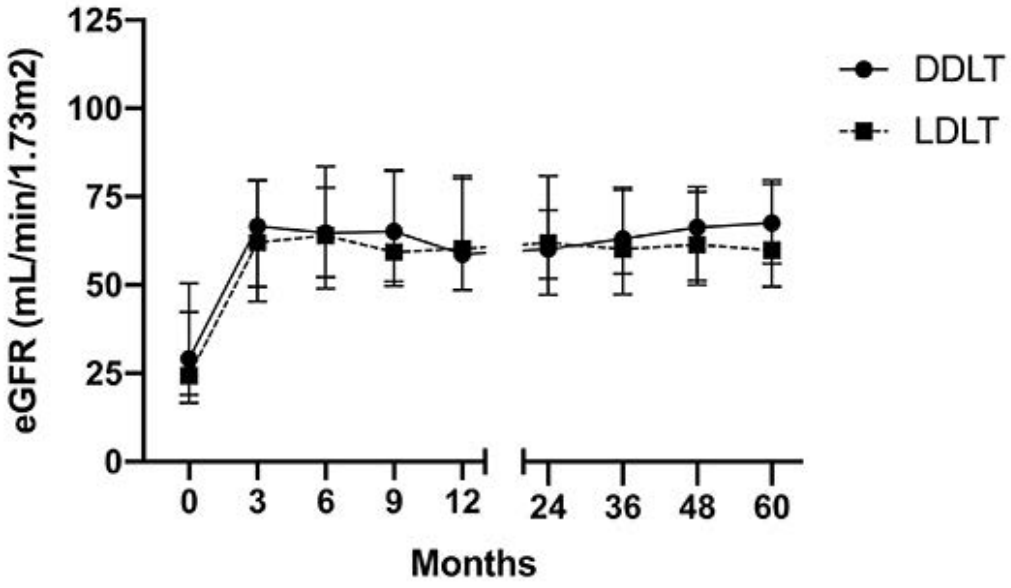
No. at risk						
LDLT	50	46	45	44	35	31
DDLT	33	30	27	22.5	18	17



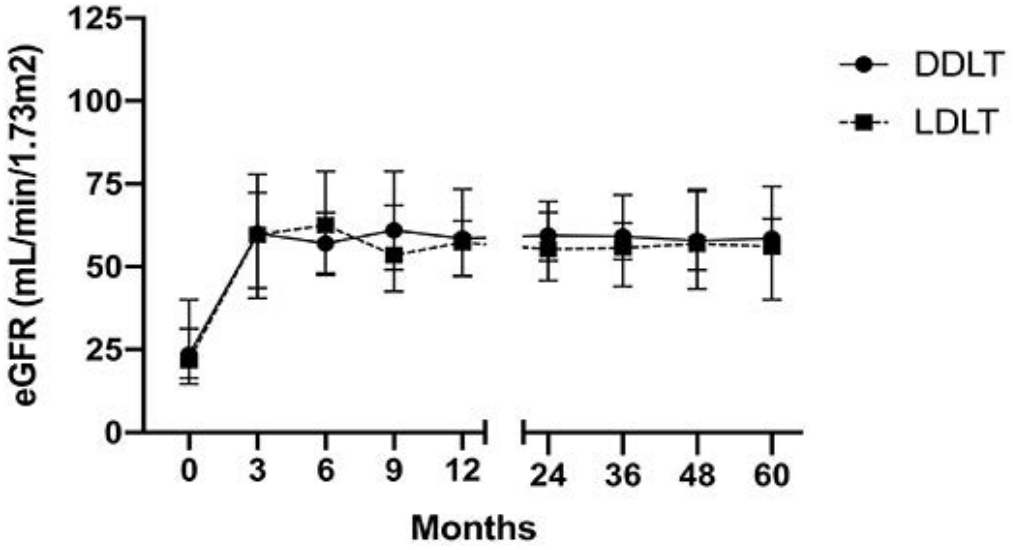
DDLT	47.9	66.9	69.2	66.4	59.4	63.3	66.2	66.9	70.0
LDLT	51.0	69.8	66.4	67.8	66.6	66.8	63.6	64.3	67.6
P value	0.891	0.617	0.538	0.984	0.449	0.200	0.976	0.949	0.446



DDLT	31.4	66.5	57.5	58.3	57.1	59.6	58.1	59.4	63.3
LDLT	33.6	59.8	62.5	58.3	60.4	62.5	59.8	61.3	60.0
P value	0.920	0.680	0.723	0.478	0.566	0.597	0.924	0.733	0.726



DDLT	29.1	66.6	64.7	65.2	58.7	60.2	63.1	66.3	67.5
LDLT	24.3	62.0	64.0	59.3	60.3	61.9	60.2	61.4	59.8
P value	0.318	0.292	0.363	0.14	0.199	0.437	0.309	0.373	0.507



DDLT	23.5	60.1	57.0	61.0	58.5	59.4	59.1	57.9	58.5
LDLT	21.7	59.6	62.5	53.5	57.3	55.3	55.7	56.9	56.1
P value	0.517	0.257	0.159	0.054	0.085	0.406	0.239	0.389	0.147

Supplementary Table 1. Subgroup analysis of clinical characteristics of MELD >30 and MELD >35 at the time of listing for ITT-LDLT vs. ITT DDLT groups

	MELD >30 at listing			MELD >35 at listing		
	ITT DDLT (n=81)	ITT-LDLT (n=168)	P value	ITT DDLT (n=52)	ITT-LDLT (n=91)	P value
Age (years)	55.6(34.6-72.5)	56.8(24.9-75.8)	0.645	54.8(34.7-71.9)	56.7(24.9-75.8)	0.854
Male: Female (n,%)	70(86.4)	125(74.4)	0.031	44(84.6)	67(73.6)	0.129
Recipient BMI (kg/m^2)	24(17-33.4)	24.5(16.4-42.9)	0.927	24.3(17-31.8)	24.5(16.8-38.6)	0.829
Hepatitis B viral infection (n,%)	66(81.5)	136(81)	0.920	43(82.7)	71(78)	0.504
Disease indication (n, %)			0.302			0.712
• Acute liver failure	9(11.1)	19(11.3)		6(11.5)	12(13.2)	
• Acute on chronic liver failure	29(35.8)	82(48.8)		19(36.5)	42(46.2)	
• Decompensated cirrhosis	35(43.2)	54(32.1)		23(44.2)	28(30.8)	
• With concomitant HCC	6(7.4)	4(2.4)		3(5.8)	3(3.3)	
• Others	2(2.5)	9(5.4)		1(1.9)	6(6.6)	
Biochemical data						
• Bilirubin (umol/L)	495(80-1044)	444(61-949)	0.056	519.5(80-1044)	474(84-949)	0.176

• INR	3.1(1.7-8)	3.3(1.6-10)	0.486	3.8(1.7-8)	3.6(1.6-10)	0.945
• Creatinine (umol/L)	182 (47-766)	145.5(39-1022)	0.015	225(47-766)	212(43-1022)	0.210
• eGFR (ml/min/1.73m^2)*	33.8(5.8-138)	43.1(4.3-136.2)	0.030	26.9(5.8-138)	28.2(4.3-136.2)	0.243
MELD at listing	37(30-51.2)	35.3(30-55)	0.149	39.8(35.2-51.2)	39.7(35-55)	0.591
HRS (n,%)	61(75.3)	95(56.5)	0.040	44(84.6)	64(70.3)	0.056
Waiting list outcome (n, %)			<0.001			<0.001
• Death/ Delist	42(51.9)	36(21.4)		34(65.4)	24(26.4)	
• Transplant	37(45.7)	129(76.8)		16(30.8)	67(73.6)	
• Active waiting	0(0)	0(0)		0(0)	0(0)	
• Recovery	2(2.5)	3(1.8)		2(3.8)	0(0)	

BMI, body mass index; HCC, eGFR, estimated glomerular filtration rate; hepatocellular carcinoma; HRS, hepatorenal syndrome; ITT-LDLT, intention-to-treat living donor liver transplantation; ITT-DDLT, intention-to-treat deceased donor liver transplantation; MELD, Model of End-Stage Liver Disease.

*eGFR was based on the Modification of Diet and Renal Disease (MDRD) equation.

Continuous variable is expressed as median (range).
Categorical variable is expressed as number of patients (percentage).

Supplementary Table 2. Subgroup analysis of clinical characteristics and perioperative outcomes MELD >30 and MELD >35 at the time of transplant between DDLT vs. LDLT groups.

	MELD >30 at transplant			MELD >35 at transplant		
	DDLT (n=67)	LDLT (n=81)	P value	DDLT (n=37)	LDLT (n=40)	P value
At transplant						
Age (years)	56.9(24.9-72.5)	58.4(25.5-75.8)	0.247	57(24.9-69.8)	57.1(41.8-75.8)	0.721
Male: Female (n,%)	56(83.6)	62(76.5)	0.289	31(83.8)	30(75)	0.343
Recipient BMI (kg/m^2)	24.5(18.4-36.6)	24.7(16.8-42.9)	0.768	25.4(18.4-36.6)	25.5(16.8-36)	0.984
Hepatitis B viral infection (n,%)	55(82.1)	64(79)	0.639	32(86.5)	33(82.5)	0.630
Biochemical data						
• Bilirubin (umol/L)	530(139-1017)	466(112-1022)	0.083	561(215-1017)	540(112-1022)	0.882
• INR	2.8(1.7-10.1)	3.1(1.6-5.3)	0.347	3.1(1.7-10.1)	3.1(1.7-5.3)	0.540
• Creatinine (umol/L)	138(37-841)	129(46-512)	0.052	195(37-841)	234.5(46-512)	0.704
• eGFR (ml/min/1.73m^2)*	47.9(5.6-138)	51(9.5-142.3)	0.076	29.1(5.6-138)	24.3(9.5-115.7)	0.828
MELD	35.5(30.2-49.8)	34.8(30.1-51.9)	0.699	39.5(35.1-49.8)	40.3(35.1-51.9)	0.691
HRS (n,%)	39(58.2)	44(54.3)	0.635	27(73)	27(67.5)	0.600

HRS and required perioperative renal replacement therapy (n, %)	7(10.4)	13(16)	0.218	7(18.9)	14(35)	0.113
Duration of HRS (days)	6(1-92)	6(1-80)	0.931	5(1-92)	5(1-80)	0.760
Pretransplant status (n, %)			0.583			0.773
Home	1(1.5)	1(1.2)		0(0)	0(0)	
Hospitalized	37(55.2)	38(46.9)		16(43.2)	16(40)	
ICU	29(43.3)	42(51.9)		21(56.8)	24(60)	
• Liver failure only	11(37.9)	15(35.7)	0.792	6(28.6)	6(25)	0.934
• Liver failure + 1 organ failure[‡]	17(58.6)	25(59.5)		14(66.7)	18(75)	
• Liver failure + 2 organs failure[‡]	1(3.4)	2(4.8)		1(4.8)	0(0)	
Waiting time (days)	3(0-71)	2(0-60)	0.241	1(0-71)	2.5(0-60)	0.350
Perioperative outcomes						
Graft weight (g)	1180(365-2180)	605(340-970)	<0.001	1215(365-2180)	645(455-915)	<0.001
GRWR (%)	1.67(0.57-3.37)	0.87(0.48-1.57)	<0.001	1.7(0.57-3.11)	0.89(0.55-1.57)	<0.001
Right lobe graft (n,%)	-	79(97.5)	-	-	40(100)	-
Cold ischemic time (mins)	359(101-583)	102(55-183)	<0.001	353(101-583)	104(59-154)	<0.001

Operative time (mins)	497(270-1111)	685(435-1160)	<0.001	489(357-1111)	706.5(455-1160)	<0.001
Portal flow modulation (n,%)	-	3(3.8)	-	-	1(2.5)	-
• Splenic artery ligation		1			0	
• Splenic artery embolization		1			1	
• Ligation of shunt/ varices		1			0	
ICU stay (days)	4.5(2-20)	4(2-142)	0.808	5(2-20)	8(2-142)	0.103
Hospital stay (days)	21(9-325)	22(9-354)	0.516	24(10-325)	26.5(9-354)	0.330
Overall complication (n,%)	53(79.1)	47(58)	0.006	29(78.4)	25(62.5)	0.128
Severe postop complication† (n,%)			0.261			0.133
• 3a	12(42.9)	11(50)		7(43.8)	8(47.1)	
• 3b	10(35.7)	9(40.9)		4(25)	8(47.1)	
• 4a	6(21.4)	1(4.5)		5(31.3)	1(5.9)	
• 4b	0(0)	1(4.5)		0(0)	0(0)	
Specific complications (n,%)						
• Hepatic artery thrombosis	1(1.5)	0(0)	0.270	1(2.7)	0(0)	0.295
• Portal vein thrombosis	2(3.0)	0(0)	0.294	1(2.7)	0(0)	0.295

• Hepatic vein/ IVC thrombosis • Biliary complications	2(3.0) 4(6.0)	1(1.2) 7(8.6)	0.538 0.537	1(2.7) 2(5.4)	1(2.5) 4(10)	0.367 0.452
Hospital mortality (n,%)	1(1.5)	4(4.9)	0.248	1(2.7)	3(7.5)	0.343
Need for long-term renal replacement therapy (n, %)	2(3.0)	5(6.2)	0.363	2(5.4)	3(7.5)	0.709
Listed or had renal transplant (n, %)	-	-	-	-	-	-

DDLT, deceased donor liver transplantation; eGFR, estimated glomerular filtration ratee; GRWR, graft-to-recipient weight ratio; ICU, intensive care unit; IVC, inferior vena cava; LDLT, living donor liver transplantation.
† Clavien-Dindo classification

*eGFR was based on the Modification of Diet and Renal Disease (MDRD) equation.

Continuous variable is expressed as median (range).
Categorical variable is expressed as number of patients (percentage).

Supplementary table 3. Univariate and multivariable analyses of prognostic factors on patient mortality and graft failure.

	Patient mortality				Graft failure			
	Univariate	P	Multivariable	P	Univariate	P	Multivariable	P
Variables	HR 95% CI	value	HR 95% CI	value	HR 95% CI	value	HR 95% CI	value
Recipient age (n=225)	1.061 (1.018-1.106)	0.005	1.055 (1.013-1.098)	0.008	1.061 (1.018-1.106)	0.005	1.054 (1.012-1.108)	0.011
Recipient gender (n=225)		0.587				0.581		
Female (n=49)	Ref				Ref			
Male (n=179)	1.248 (0.561-2.779)				1.253 (0.563-2.789)			
Recipient BMI (n=225)	0.921 (0.83-1.013)	0.092			0.921 (0.837-1.041)	0.093		
Disease etiology (n=225)		0.211				0.622		
No HBV (n=53)	Ref				Ref			
HBV infection (n=172)	0.621 (0.294-1.312)				0.622 (0.294-1.315)			
MELD at LT (n=225)	1.064 (1.016-1.115)	0.009	1.056 (1.007-1.107)	0.025	1.065 (1.016-1.116)	0.009	1.057 (1.008-1.108)	0.023
HCC (n=225)						0.006		
No (n=212)	Ref				Ref			
Yes (n=13)	3.845 (1.473-10.038)	0.006	3.830(1.422-10.315)	0.008	3.834 (1.468-10.008)		3.718 (1.376-10.046)	0.010

Pre-LT at ICU (n=225) No (n=135) Yes (n=90)	 Ref 1.436 (0.717-2.876)	 0.307			 Ref 1.438 (0.718-2.879)	0.305		
Donor age (n=225)	1.018 (0.995-1.043)	0.131			1.018 (0.994-1.043)	0.133		
Donor gender (n=225) Female (n=106) Male (n=119)	 Ref 1.760 (0.848-3.650)	 0.129			 Ref 1.762 (0.849-3.655)	0.128		
Donor BMI (n=225)	1.131 (1.002-1.276)	0.046	1.145 (1.009-1.299)	0.036	1.131 (1.002-1.277)	0.046	1.146 (1.010-1.300)	0.035
Transplant type (n=225) DDLT (n=110) LDLT (n=115)	 Ref 0.603 (0.297-1.222)	 0.161			 Ref 0.604 (0.298-1.224)	0.161		
Cold ischaemic time (n=225)	1.002 (0.999-1.004)	0.178			1.002 (0.999-1.004)	0.179		
Postoperative severe complication (n=225)	1.349 (1.102-1.652)	0.004	1.286 (1.048-1.578)	0.016	1.349 (1.102-1.652)	0.004	1.285 (1.047-1.577)	0.016

BMI, body mass index; HBV, hepatitis B virus; DDLT, deceased donor liver transplantation; HCC, hepatocellular carcinoma; ICU, intensive care unit; LDLT, living donor liver transplantation; MELD, Model of End-Stage Liver Disease.

Transplant operation

In DDLT, total hepatectomy was followed by conventional implantation with end-to-end inferior vena cava (IVC) reconstruction. Piggy-back technique was not used. In LDLT, total hepatectomy was performed and recipient's IVC was preserved. For right lobe living donor graft in our center, it almost always included the middle hepatic vein (MHV). A venoplasty between the right hepatic vein and MHV was performed at bench to create a triangular venous orifice, that would be directly anastomosed to the recipient's IVC. In left lobe living donor graft, the common cuff between MHV and left hepatic vein was directly anastomosed to the recipient's IVC in a triangular manner.

Post-operative and immunosuppression protocol

All patients would be cared in the ICU and transferred to general ward after stabilization and without the need for organ support. The immunosuppression protocol was identical after LDLT and DDLT. All patients received an induction agent(anti-interleukin 2 receptor antibody, Basiliximab) and calcineurin inhibitors(CNI)(tacrolimus/cyclosporine) and mycophenolate mofetil as maintenance. The latter would be discontinued 3 months after transplant. Mammalian target of rapamycin inhibitors(sirolimus/everolimus) were available since 2006 as CNI sparing agents and for HCC patients. Maintenance steroid was prescribed to patients who had autoimmune liver disease, history of rejection, or as a CNI sparing agent.

All living donors were followed-up weekly after discharge, until normalization of liver function and INR, and then seen every 3 months for the first year and every 6 months thereafter.