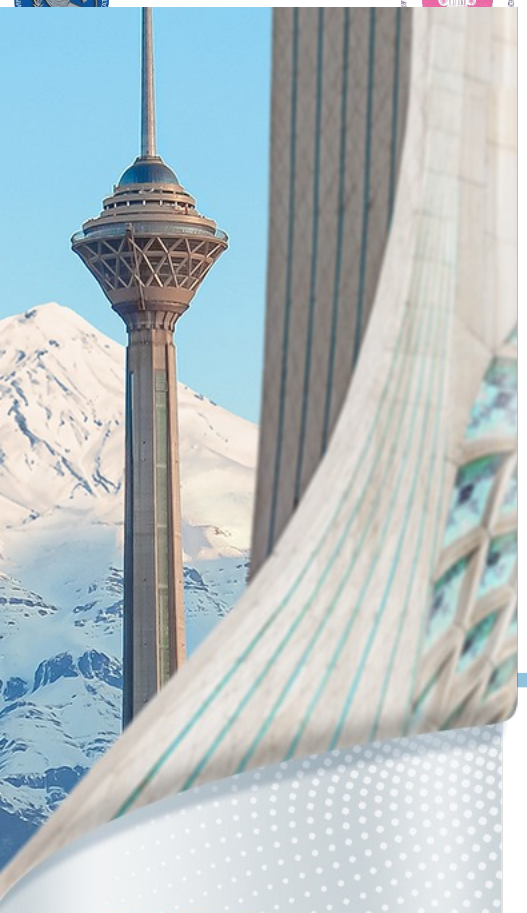

The 19th International Congress of Nephrology, Dialysis and Transplantation (ICNDT)

12-15 December 2023

Acute Kidney Injury After Liver Transplant, A Center Report

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TEHRAN 2023

Introduction

Acute kidney injury (AKI) is rapid functional or structural kidney abnormality characterized by increased serum creatinine (Scr) or decreased urine volume.

Acute kidney injury (AKI) represents a critical complication in the context of liver transplantation, contributing significantly to post-operative morbidity and mortality.

Liver transplantation (LTx), as a life-saving procedure for end-stage liver disease, often involves complex hemodynamic and metabolic changes that can predispose patients to AKI.

We present the prevalence of AKI, risk factors, and outcomes associated with liver transplant recipients (LTR) in 192 patients who were transplanted from June 2019 To July 2023 in Firoozgar Hospital.

Material & Methods

The study group was 192 LTR, 120 male (62.5%) and 72 female (37.5%) with a mean age 44.5± range 7-7.5 Yrs. AKI was defined as any change in serum creatinine 0.3 mg/dL in < 48 h for 5 days after LTx. eGFR was calculated based on CKD-Epi 2021 with the mean range of 94.9±34.3 cc/min.

We evaluated demographic data and any history of diabetes, hypertension, chronic kidney disease, nephrotoxic agents, massive bleeding, need to receive vasopressors, liver failure etiology, respiratory assistance, sepsis, any indication for readmission in the operating room, MELD score and liver function after LTx as the risk factors of AKI. The outcome was defined as death in one month after LTx. Data was analyzed with the SPSS program version 16.

Results

AKI happened in 105 (54.7%) patients, out of which 69 were male and 36 were female. The average age of patients was 50.76± 12. The mortality rate was19.3% (37 cases).

The most used drug, one month before LT, was diuretic in 44cases.
Prior to LT, 28 patients had diabetes mellitus and 15 cases had hypertension.
16 patients had Hepatorenal syndrome. Only one case of spontaneous bacterial peritonitis was seen.

Pre transplantation laboratory parameter as same as Hb, Cr, Albumin, Bilirubin and INR were checked. Also creatinine in the first, third and fifth day after transplantation were evaluated.

	AKI	Mean	Standard deviation	P value
Bilirubin	yes	13.24	12.31	0.56
	No	12	12.77	
INR	Yes	2.18	1.02	0.68
	No	2.26	1.2	
Hb (pre LTX)	Yes	10.77	2.08	0.22
	No	11.13	2.05	
Albumin	Yes	2.9	0.49	0.12
	No	3.03	0.67	
Cr(pre Ltx)	Yes	0.8	0.36	0.008
	No	1.09	0.69	
Cr(first day)	Yes	1.32	0.602	0.001
	No	0.9	0.38	
Cr(Third day)	Yes	1.58	0.75	0.001
	NO	1.009	0.42	
Cr(fifth day)	Yes	1.61	2.1	0.002
	No	0.89	0.31	

We divided patients according to MELD score to 3 subgroups:10-19,20-29,30 -39. the mean MELD score in AKI group was 23. 28 ± 3. the most incidents of AKI were in subgroup 20-29 (68 cases).

Patients were divided based on the need for ventilation support to 3 subgroups:
0-2 days, 2-5 days, more than 5 days.
The most incidents of AKI were in patients who needed to remain under ventilator For 0-2 days(62 out of 130).

ventilatory support duration in AKI patients

AKI	Duration of ventilationsupport			total	P value
yes	0-2days	2-5days	>5days		0.001
Yes	62	17	14	74	
NO	68	4	2	93	
	130	21	16	167	

Most of the patients received vasopressors during liver transplantation. We divided Patients based on dose of vasopressor to 3 subgroups:
0-5microgram,5-10,more than 10. In this study, we noticed that 24 out of 33 patients (72%) who had taken high dose of vasopressor and 39 out of 59 patients(66%) faced AKI with medium dose of vasopressor.

Hepatic function was evaluated with liver function tests. 39 patients had impaired liver Function tests. 30 out of 39 cases faced AKI.

bleeding was one of the complications of LT. The mean bleeding in AKI group was 1136.4 ± 523.2 cc.

In our study ,52 cases needed re surgery. AKI was occurred in 35 out of 52 patients who needed re surgery.

The mean of hospitalization period in AKI group was 12.9± 3.9 days.
14 patients expired in AKI group.

Discussion

In our study, AKI happened in 105 patients(54.6%).there were no significant correlation between age, sex and incidence of AKI.

The most cause of hepatic failure was primary sclerosing cholangitis. it was against Rahman et al, study that NASH was the main cause of hepatic failure.

We found no relation between diabetes, HTN and establishment of AKI. Zongi et al studied 5074 patients from 2010 to 2015 and they found positive relation between Diabetes and AKI but on relation between HTN and AKI.

There was no correlation between using of diuretic, NSAIDs, contrast and AKI. This finding was against the Zhou et al study.

Significant correlation between pre and post transplant creatinine elevation and incidence of AKI were found. This result agree with Red camp et al study in 2020. They noticed that pre transplant elevated creatinine is the most important prognostic factor for severe AKI but It cant predict low grade AKI.

We didn’t find any relation between MELD SCORE and AKI. this result agreed with Rahman et al study and was against to Durand et al, study .

Significant correlation between blood volume loss and AKI was found(p:<0.005) this result matched with the report of Zhou et al. in this study massive bleeding was one of the most important risk factor.

We found significant correlation between dose of required vasopressor and AKI (p: 0.001). this result agrees with that in Jou et al, study.

Also, Our study showed positive correlation between duration of ventilation support and AKI (p:0.001). this result matched with the report of Rahman et al.

We couldn’t find any correlation between pre transplant Hemoglobin and albumin level with AKI. it was against Jou and Durand studies.

There was significant relation between post transplant hepatic impairment and AKI (p:0.002), as same as Jou study.

We found positive relevance between re surgery and AKI(P:0.03) and also between AKI and mortality (p:0.022).

LTx mortality was associated with female gender, AKI, patient's age, bleeding volume, MELD score, and duration of hospital admission (P<0.05).

Univariate analysis showed that massive bleeding and need for blood transfusion, receiving vasopressors, readmission in the operating room, duration on ventilatory support, baseline eGFR and impaired liver function tests were risk factor for developing AKI(P<0.05).

Multivariate analysis proved that the baseline eGFR, duration on ventilatory support, need for vasopressors and bleeding volume were the main risk factors for AKI after Liver Tx in this study (P<0.05).

Conclusion

This study supports that the main risk factors for AKI after LTx are hemodynamic factors. A deeper understanding of the complex interplay between liver transplantation and kidney injury improves our outcomes in this high-risk population.

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Thanks for your attention