

Post operative acute kidney injury after HPB surgeries – A single centre retrospective analysis.

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Ethical clearence: obtained from hospital ethical committee.

Conflict of interest :none

Abbreviation: Acute Kidney Injury (AKI)

ABSTRACT:

AIM:

Aim of our study was to evaluate incidence and causative factors for acute kidney injury in hepatopancreaticobiliary (HPB) surgeries.

Material and methods:

All the HPB surgeries performed between April 2018 to March 2020, in our institution have been analysed for acute kidney injury. Acute kidney injury defined according to acute kidney injury network classification. Categorical variables were evaluated by chi square test and fisher t test wherever appropriate and continuous variables by Mann Whitney U test. Statistical analysis was done using SPSS version 23. $P < 0.05$ was considered significant.

RESULTS:

We performed 195 HPB surgeries between April 2018 to March 2020, Which included 114 biliary surgeries, 57 liver surgeries and 23 pancreas surgeries. 10 patients developed Acute Kidney Injuries. (AKI) On Univariate analysis AKI was associated with open surgeries, intra operative hypotension and liver surgeries, higher ASA grade, increase operative time, more blood products used, higher CDC grade of surgery and more hospital stay before diagnosis of AKI. However on multivariate analysis only higher ASA score independently predicted Acute Kidney Injury. ($p=0.003$, odds ratio 15.659, 95% confidence interval 2.54-93.36). AKI was also significantly associated with mortality. ($p < 0.0001$)

Conclusion:

Pre operative higher ASA grade independently predicted post operative acute kidney injury. Post operative AKI is significantly associated with mortality.

Background:

Post Operative Acute kidney injury is a one of the very common post-operative

complications [1]. Many studies have shown that post-operative acute kidney injury is associated with other morbidities and mortalities. [2,3,4,5].

Very few studies has evaluated risk of acute kidney injury in cohort of HPB surgeries.

Aim of the study:

Aim of this study was to evaluate incidence and risk factors of acute kidney injury retrospectively from our data of hepatopancreaticobiliary (HPB) surgery.

Material and Methods:

Inclusion criteria:

All patient who underwent gastrointestinal and hepatobiliary surgeries.

Exclusion criteria:

- Patients who had acute kidney injury pre operatively
- Patients who were on dialysis before surgery
- Patients who died on post operative day 1, before Acute Kidney Injury criteria is fulfilled.

All the gastrointestinal surgeries performed from April 2018 to March 2020 in our institution have been analysed for acute kidney injury.

Acute kidney injury definition:

Acute kidney injury defined according to acute kidney injury network classification. [6,7]. Any grade of acute kidney injury was considered significant.

Pre operative and Intra operative factors were analysed for development of acute

kidney injury.

Statistical analysis:

Analysis of means or medians were selected according to skewness and standard error of skewness and kurtosis and standard error of kurtosis analysis. Categorical variants were analysed using chi square test with or without Yates correction or Fisher's test where ever appropriate. Continuous variables were analysed using Mann-Whitney U test.

P value less than 0.05 was considered significant. Multivariate analysis was done using logistic regression method. SPSS (IBM) version 23 was used for statistical analysis.

We also prepared Kaplan-Meier survival curve with log-rank analysis to compare 90-day survival rates in patients with or without AKI.

Ethical clearance:

Ethical clearance has been obtained from Shalby hospital, Ahmedabad ethical committee. IRB no: shalby hosp, no 21. 5/1/2020

Results:

We performed 195 gastrointestinal and hepatobiliary surgeries from April 2018 to March 2020. Which included 114 biliary surgeries, 57 liver surgeries and 23 pancreas surgeries. Liver surgeries included 12 liver transplants.

1 patient had pre-operative acute kidney injury, 1 patient was on dialysis and two patients died on post-operative day 0 and hence excluded from the study.

191 patients were included in the study. 10 patients (5.2%) were defined as having acute kidney injury according to acute kidney injury network classifications. [6,7].

[Figure 1].

On univariate analysis open surgeries ($p= 0.001$), Liver surgeries ($p=0.001$), intra operative hypotension ($p= 0.003$), ASA grade ($p< 0.0001$), Blood product used ($p= 0.009$), CDC grade of wound classification ($p=0.006$) and operative time ($p< 0.0001$) were associated with AKI. Biliary surgeries, pancreatic surgeries, surgeries done for malignancies, age was not associated with Acute Kidney Injuries.

On multivariate logistic regression analysis only Higher ASA score predicted post operative Acute Kidney Injury. [$p=0.003$, Odds ratio 15.41, 95% confidence interval 2.98-92.20]

AKI was associated with increased risk of mortality and decreased 90 days survival ($p<0.0001$). (Figure 2)

AKI was also associated with prolonged hospital stay. ($p<0.0001$)

DISCUSSION:

Acute kidney injury (AKI) is a common complication in patients undergoing major Gastrointestinal and hepatobiliary surgery. Various studies stated, incidence of AKI after major abdominal surgery may go up to 35%. Several patient-related, procedure-related factors for AKI. were associated with increase incidence of morbidity and mortality in various studies. [8,9]

Aim of our study was to evaluate incidence and various factors associated with Acute kidney injury. Two criteria for diagnosing acute kidney injury is widely used one is RIFLE criteria and other is Acute Kidney Injury Network criteria. [6,10]. We used Acute Kidney Injury Network criteria to diagnose acute kidney injury network and we included all the grades of acute kidney injury network classification in our analysis. [Figure 1].

Overall incidence of acute kidney injury in our cohort was 5.2%. Cho et al. reported 7.6 percent acute kidney injury after HPB surgeries. [9] Meersch et al. [11] reported

high incidence of acute kidney injury.

Acute kidney injury in our study was significantly associated with mortality. Literature also shows that acute kidney injury is associated with high mortality. [9,10,11,12,13].

On univariate analysis in our study open surgeries, intraoperative hypotension, higher ASA (American society of anaesthesiology) grade, higher CDC wound grade, increase blood product requirement, increased operative time and liver surgeries were associated with development of acute kidney injury. Hobson et al. studied various risk factors associated with peri operative risk factors, and showed previous history of chronic kidney disease and haemoglobin level was associated with post operative acute kidney injury. [14] In our study increase blood product required was associated with acute kidney injury. Lim et al. suggested that hepatectomy was associated with high incidence of acute kidney injury, they suggested major hepatectomy, increase meld score, advanced age and prolonged operative duration were associated with acute kidney injury. In our study hepatectomy or liver surgeries was associated with aki in univariate analysis but not on multivariate analysis. In our study age were not associated with acute kidney injury however prolonged operative duration was associated with acute kidney injury in our study also.[15]

Various studies showed that intra operative hypotension was associated with post operative acute kidney injury.[16,17,18] In our study also intraoperative hypotension was associated with acute kidney injury in univariate analysis however it did not independently predicted acute kidney injury on multivariate analysis.

In multivariate analysis in our study higher American society of anaesthesiology score (p +0.003 were associated with acute kidney injury Literature also supports these findings. [19,20]

In our study acute kidney injury was associated with increased hospital stay, which is

also supported by literature. [21,22]

Being a retrospective analysis our study has inherent limitations associated with retrospective studies. Number of patients who developed acute kidney injury were low in our studies. More studies with higher number of patients is required to confirm our findings.

In conclusion, post-operative acute kidney injury was associated with significant mortality in hepatobiliary surgery. Open surgery, higher CDC grade surgery, more blood products, higher ASA grades, increase operative time and liver surgeries predicted acute kidney injury in post operative periods. Higher ASA grades independently predicted acute kidney injury.

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FACTORS	NO ACUTE KIDNEY INJURY (N=181)	ACUTE KIDNEY INJURY (AKI)	P VALUE

		(N=10)	
AGE (Median/range)	54/(25-83)	60(39-80)	0.093
SEX (M/F) (111/80)	(6/4)	105/76	0.837
Intra Operative hypotension (n=14)	10	4	0.003
Emergency Surgeries (n=21)	19	2	0.302
LIVER surgeries (54)	46	8	0.001
Pancreas surgeries (22)	20	2	0.323
OPERATIVE TIME (minutes)(Median/range)	90 (15-800)	240 (120-600)	<0.0001
ASA (Mean/range)	2 (2-4)	3.00/(1-4)	<0.0001
BLOOD PRODUCT (Mean/sd) (0.00/3.821)	0(0-40)	1(0-15)	0.009
GRADE OF SURGERY (median/range)	2(2-4)	3.0(2-3)	0.006
Hospital stay before Diagnosis of AKI (median/range)	2 (1-13)	4.5 (1-30)	0.03
Open Surgeries. (n= 75)	66	9	0.001
Surgery for malignant disease (n=36)	32	4	0.096

TABLE: 1 UNIVARIATE ANALYSIS OF ACUTE KIDNEY INJURY.

Factor	P value	Odds ratio	95% confidence interval
Blood products	0.113	0.628	0.353-1.116
ASA	0.003	15.40	2.58-92.20
Operative time	0.111	1.01	0.998-1.023
Open Surgery	0.344	4.31	0.209-89.88
Grade of surgery	0.722	0.710	0.108-4.69
Intra operative Hypotension	0.294	2.877	0.399-20.71
LIVER Surgeries	0.434	2.093	0.33-13.30
Hospital stay before diagnosis of AKI	0.326	0.856	0.63-1.17

Table 2: Multivariate Logistic regression analysis with p value, Odds ratio and 95% Confidence interval.

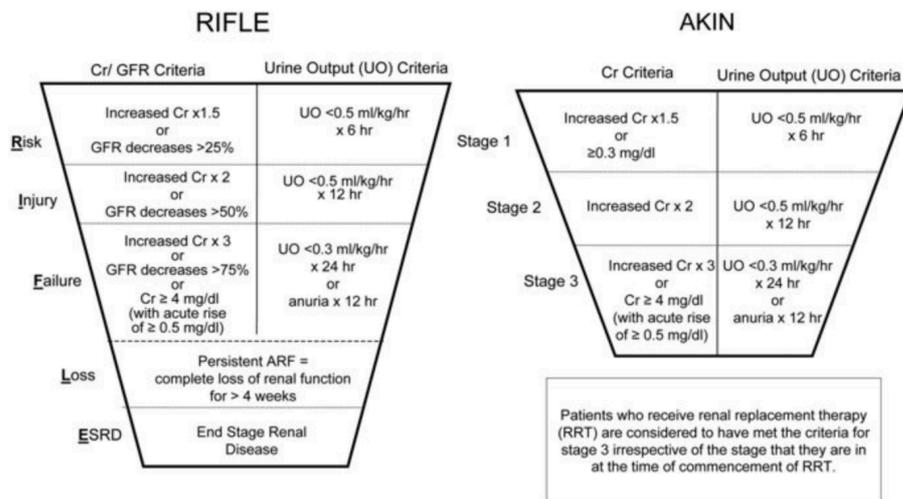


Figure 1. RIFLE and AKIN classifications for acute kidney injury. Risk–Injury–Failure–Loss–Endstage renal disease (RIFLE) and Acute Kidney Injury Network (AKIN) classifications for acute kidney injury (adapted from [6,10])

Overall Comparisons

	Chi-Square	df	Sig.
Log Rank (Mantel–Cox)	126.886	1	.000

Test of equality of survival distributions for the different levels of AKI.

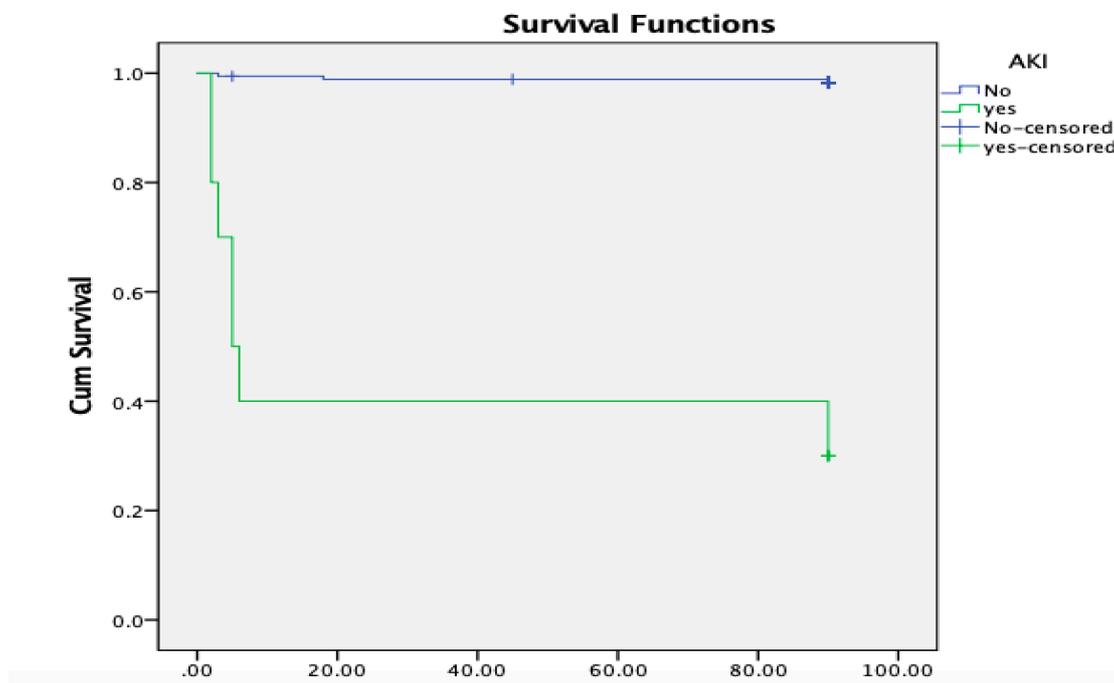


Figure 2: Kaplan Meier 90 survival analysis of patients who developed Acute Kidney Injury vs Patients who did not developed Acute Kidney Injury.