A prospective, multicenter, three-cohort study evaluating contrast-induced acute kidney injury (CI-AKI) in patients with cirrhosis

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Introduction/Aim:

Contrast-induced acute kidney injury (AKI) is a specific concern in patients with liver cirrhosis. The European Association for the Study of the Liver recommends caution considering this perceived risk. This study aimed to determine the incidence and risk factors for AKI in patients with cirrhosis undergoing intravenous contrast-enhanced computed tomography (CECT).

Design and Methods:

Prospective, three-cohort observational study performed in hospital inpatients at two centres in Italy between 13/03/2019 and 31/07/2021.

Cohort 1 comprised adults with cirrhosis undergoing CECT. Cohort 2 comprised adults with cirrhosis not undergoing CECT. Cohort 3 comprised adults without cirrhosis undergoing CECT.

Exclusion criteria:

- Concomitant administration of vasoactive drugs (e.g. terlipressin)
- Intravascular contrast within 14 days
- Previous solid organ transplant
- Long term dialysis
- Intercurrent events which may cause AKI (e.g. diuretic modification)
    1. Incident infection was an exclusion but concomitant haemodynamically stable infection at study entry was not.

Serum creatinine was measured 1-2 days (T0) prior to as well as at 2-3 days (T1), 5 days (T2), and 7 days (T3) post imaging. Subclinical tubular kidney injury was also assessed in 50 patients each in cohorts 1 and 2 at T0 and T1 using urinary neutrophil gelatinase-associated lipocalin (U-NGAL).

Results & Conclusions:

444 patients were included in the analysis (cohort 1 n=148, cohort 2 n=133, cohort 3 n=163), exceeding the pre-planned power requirement of 408.

There were no significant differences in the AKI incidence neither between cohorts 1 and 2; 4.8% vs 1.5% p=0.240, nor between cohorts 1 and 3; 4.8% vs 2.5% p=0.430. Results

remained consistent after a propensity matched analysis to adjust for observed differences in baseline characteristics between cohorts 1 and 2; 6.7% vs 1.9% p=0.170.

U-NGAL measurements were not significantly different between cohorts nor between those who developed AKI and those who did not.

Multivariable logistic regression revealed that only the presence of concomitant infection was associated with AKI development (odds ratio 22.18; 95% CI 2.87-171.22; p=0.003).

Strengths:

- Adequately powered.
- Prospective design.
- 2 control cohorts.
- "Real life" hospital inpatients.

Limitations:

- Observational design may cause selection bias.
- High prevalence of virus-related liver disease may preclude generalisation.
- Conclusions limited to intravenous contrast.

Applicability and Future Direction:

This study challenges current guidelines and serves to allay fears regarding intravenous contrast-induced AKI in patients with cirrhosis. The risk appears to be no different than that of the general inpatient population and may be mostly unrelated given the non-statistically different incidence in unexposed controls with cirrhosis. The presence of infection was the only risk factor noted to be associated with the development of contrast induced AKI in patients with cirrhosis, suggesting that these are the only patients with cirrhosis in whom caution may be reasonable.