Use of intracranial pressure monitoring and risk factors for the development of intracranial hypertension in acute liver failure

J Hepatol 2026 May;84(5):898-905
Nick Murphy, Philip El-Dalil, Sameer Patel Jennifer Ryan, Mansoor Bangash, Banwari Agarwal, Rajiv Jalan, Julia Wendon, William Bernal

Purpose/Hypothesis
The aim of this study was to assess how the incidence of intracranial hypertension (ICH) and the use of invasive intracranial pressure monitoring in acute liver failure changed over time

Approach/Methods/ Analysis (Study Design)

This study[1] is a retrospective analysis of prospectively collected data from three UK transplant centers between 2009 and 2018. It included 793 patients with ALF (defined by European Association for the Study of the Liver guidelines[2]) of various etiologies with majority due to paracetamol overdose (51.7%). Management was not standardized between and left to the centers. ICH was defined as either an ICP > 20 mmHg measured using invasive ICP monitoring, radiological evidence of cerebral edema or cerebral ischemia or cerebral death.

Findings
Out of 972 possible patients, 793 patients were included in the analysis (and 179 excluded for missing data). 576 (73%) patients in total survived to hospital to discharge. 73% of patients were treated medically with a hospital mortality of 33%. 280 patients (35%) were listed for transplant and 213 (27% of total) received a transplant. Hospital survival for transplant patients was 89% compared to 45% of patients who were listed but did not receive a transplant. 89% of all patients required mechanical ventilation and 79% renal replacement therapy.

Surprisingly, over the ten years observation period, survival, transplant rate and transplant-free survival did not change. However, the incidence of ICH decreased from 13% in 2009 to 3% in 2018 ($p < 0.001$) and consequently invasive ICP monitoring use decreased during that same time from 20.6% 1.4% ($p < 0.001$).
Only 35% of patients with ICH survived to discharge, 17 patients with ICH (25%) were transplanted and 13 of these patients (79%) survived.
Patients with peak ammonia levels > 200 µmol/L were eight times more likely to develop ICH compared to patients with peak ammonia levels <100 µmol/L

Conclusion/Lessons and shortcomings
This study demonstrates that the incidence of ICH and consequently the use of invasive ICP monitoring greatly decreased over 10 years in the UK. The benefit of invasive ICP monitoring is

controversial and associated with serious bleeding complications in the presence of coagulopathy.

Despite the decrease of incidence in ICH, the overall outcome of acute liver failure remains poor reflecting the severity if this disease and did not improve over ten years. Patients with ICH who did not receive a transplant had the worst outcome. The required critical care resources are immense, and almost all patients required mechanical ventilation and the majority renal replacement therapy. Peak ammonia levels were closely associated with developing ICH and may be used to identify patients at risk.

Survival and transplant-free survival in this cohort is better than previously reported by other groups[3]. This is not surprising, considering that the three transplant centers included in this study are often considered the best and most experienced center for acute liver failure.

References

1. Murphy, N. *et al.* Use of intracranial pressure monitoring and risk factors for the development of intracranial hypertension in acute liver failure. *J. Hepatol.* **84**, 898–905 (2026).
2. European Association for the Study of the Liver. Electronic address: easloffice@easloffice.eu *et al.* EASL Clinical Practical Guidelines on the management of acute (fulminant) liver failure. *J. Hepatol.* **66**, 1047–1081 (2017).
3. Reuben, A. *et al.* Outcomes in Adults With Acute Liver Failure Between 1998 and 2013: An Observational Cohort Study. *Ann. Intern. Med.* **164**, 724–732 (2016).