

Aggressive Intravenous Hydration in Patients with Acute Pancreatitis is Beneficial Only During the First 24 Hours: A Meta-Analysis

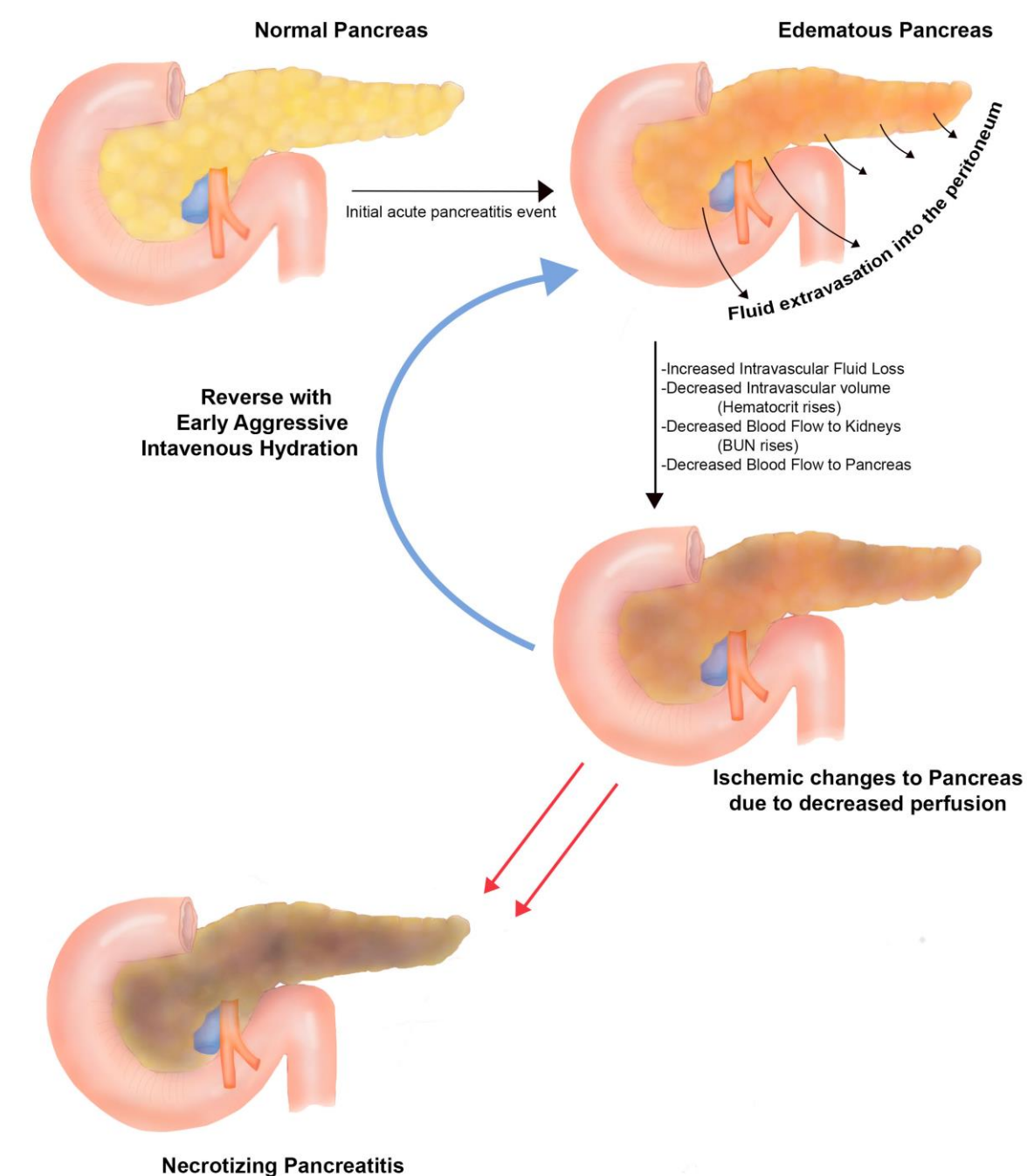
Daniel Marino MD, MBA, Mouhand Mohamed MD, Jasmine Saini MD, and Scott Tenner MD, MPH, JD, FACG

1. Department of Internal Medicine, Brown University Warren Alpert Medical School, Providence, RI
2. Division of Gastroenterology, Maimonides Medical Center, SUNY Health Sciences Center, Brooklyn, NY

Introduction

Early aggressive intravenous hydration (EAIH) remains the only initial treatment specifically for patients with acute pancreatitis. The timing, type, and amount of fluid remains the subject of study, debate, and controversy. In order to define our current state of knowledge of the clinical evidence behind the recommendation for EAIH, we performed a meta-analysis of the published literature.

Role of Early (First 12-24 hours) Aggressive Intravenous Hydration in Acute Pancreatitis



Methods

A Pubmed, Embase, and Web of Science search to identify all clinical trials evaluating the role of EAIH in patients with acute pancreatitis resulted in 22 studies, 3 prospective, 11 retrospective, and 8 randomized controlled clinical trials (RCT). Studies that evaluated NS to LR were not included. In order to be included in the final analysis, the study needed to have two or more groups defined by different rates of hydration. One group must have included EAIH and define the outcome(s) studied. Outcomes used in our analysis included SIRS, pancreatic necrosis, persistent organ failure, length of stay, ICU admission, and mortality. Any decrease in these outcomes compared to the “control” groups was considered a “benefit”. The weighted mean for each study was defined by the sample size.

Results

In a pooled analysis of all studies (n=5349), there was no difference in morbidity or mortality between EAIH and the “control group” (RR 1.1, 95% CI 0.66-1.8). When including only RCT (n=887), there was also no difference in morbidity or mortality (RR 0.88, 95% CI 0.78-1.4). **However, when including studies and RCT that focused only on EAIH within the first 24 hours, excluding all studies that defined EAIH as the amount of fluid provided at 48 hours, there was a “benefit” to EAIH (RR 0.62, 95% CI 0.44-0.84).**

Table 1: All Studies Comparing the Rates of Hydration for Treatment of Acute Pancreatitis

Study Included	# of Patients	Study Type	Summary
Brown et al. 2002	24	Retrospective	Not Beneficial
Eckerwell et al. 2008	99	Retrospective	Harmful
Gardener et al. 2009	45	Retrospective	Beneficial
Mao et al. 2009	76	Prospective	Harmful
Mudana et al. 2009	129	RCT	Not Beneficial
Mao et al. 2010	116	RCT	Harmful
De-madaria et al. 2011	247	Prospective	Harmful
Wall et al. 2011	288	Retrospective	Beneficial
Warndorf et al. 2011	484	Retrospective	Beneficial
Wu et al. 2011	40	RCT	Not Beneficial
Weitz et al. 2014	346	Retrospective	Harmful
Singh et al. 2017	1010	Retrospective	Beneficial
Lee et al. 2017	179	Retrospective	Not Beneficial
Buxbaum et al. 2017	60	RCT	Beneficial
Sobant et al. 2018	161	RCT	Beneficial
Yamashita et al. 2019	1097	Retrospective	Beneficial
Ye et al. 2019	179	Retrospective	Beneficial
Li et al. 2020	78	Prospective	Harmful
Cuellar-Monterrubio et al. 2020	88	RCT	Not Beneficial
Angsubhakorn et al. 2021	44	RCT	Beneficial
Messalam et al. 2021	310	Retrospective	Not Beneficial
De-madaria et al. 2022	249	RCT	Harmful

Table 2: Studies that Focused on Aggressive Hydration Rates Within the First 24 Hours

Study Included	# of Patients	Study Type	Summary
Brown et al. 2002	24	Retrospective	Not Beneficial
Gardener et al. 2009	45	Retrospective	Beneficial
De-madaria et al. 2011	247	Prospective	Harmful
Wall et al. 2011	288	Retrospective	Beneficial
Warndorf et al. 2011	484	Retrospective	Beneficial
Wu et al. 2011	40	RCT	Not Beneficial
Weitz et al. 2014	346	Retrospective	Harmful
Singh et al. 2017	1010	Retrospective	Beneficial
Lee et al. 2017	179	Retrospective	Not Beneficial
Yamashita et al. 2019	1097	Retrospective	Beneficial
Ye et al. 2019	179	Retrospective	Beneficial
Li et al. 2020	78	Prospective	Harmful
Cuellar-Monterrubio et al. 2020	88	RCT	Not Beneficial
Angsubhakorn et al. 2021	44	RCT	Beneficial
Messalam et al. 2021	310	Retrospective	Not Beneficial

Conclusion

Our results show that the benefit observed in EAIH occurs only within 24 hours of enrollment. While guidelines on the management of acute pancreatitis have generally recommended EAIH, some have suggested that “goal directed therapy” is preferred due to complications. Our study demonstrates that it is important for clinicians caring for patients with acute pancreatitis not miss the “goal” within the first day of managing patients with acute pancreatitis. Our meta-analysis shows aggressive intravenous hydration after the first 24 hours is not beneficial and may be harmful. Based on this analysis, we suggest EAIH be considered for patients during the first 24 hours and “goal directed” hydration after the first 24 hours.

Take Home Points

- Early aggressive hydration should only be considered within the first 24 hours of enrollment
- Aggressive hydration after the first 24 hours is not associated with any benefit and may be harmful