

INTRODUCTION

- Intentional acetaminophen (APAP) overdose is one of the most common causes of acute liver failure (ALF) in adolescents and adults.
- Although N-acetyl cysteine (NAC) significantly reduces mortality, liver transplantation remains the only definitive therapy for those with fulminant hepatic failure; however, some don't qualify or survive to receive a graft.
- Molecular Adsorbent Recirculating System (MARS) therapy is a unique extracorporeal hepatic support system that eliminates protein-bound and water-soluble toxins from the blood (figure 1).
- Studies have shown significant improvements in the clinical features of liver failure with MARS therapy, especially hepatic encephalopathy.
- This case illustrates the use of MARS therapy as a means of definitive treatment for acute liver failure when liver transplantation is not an option.

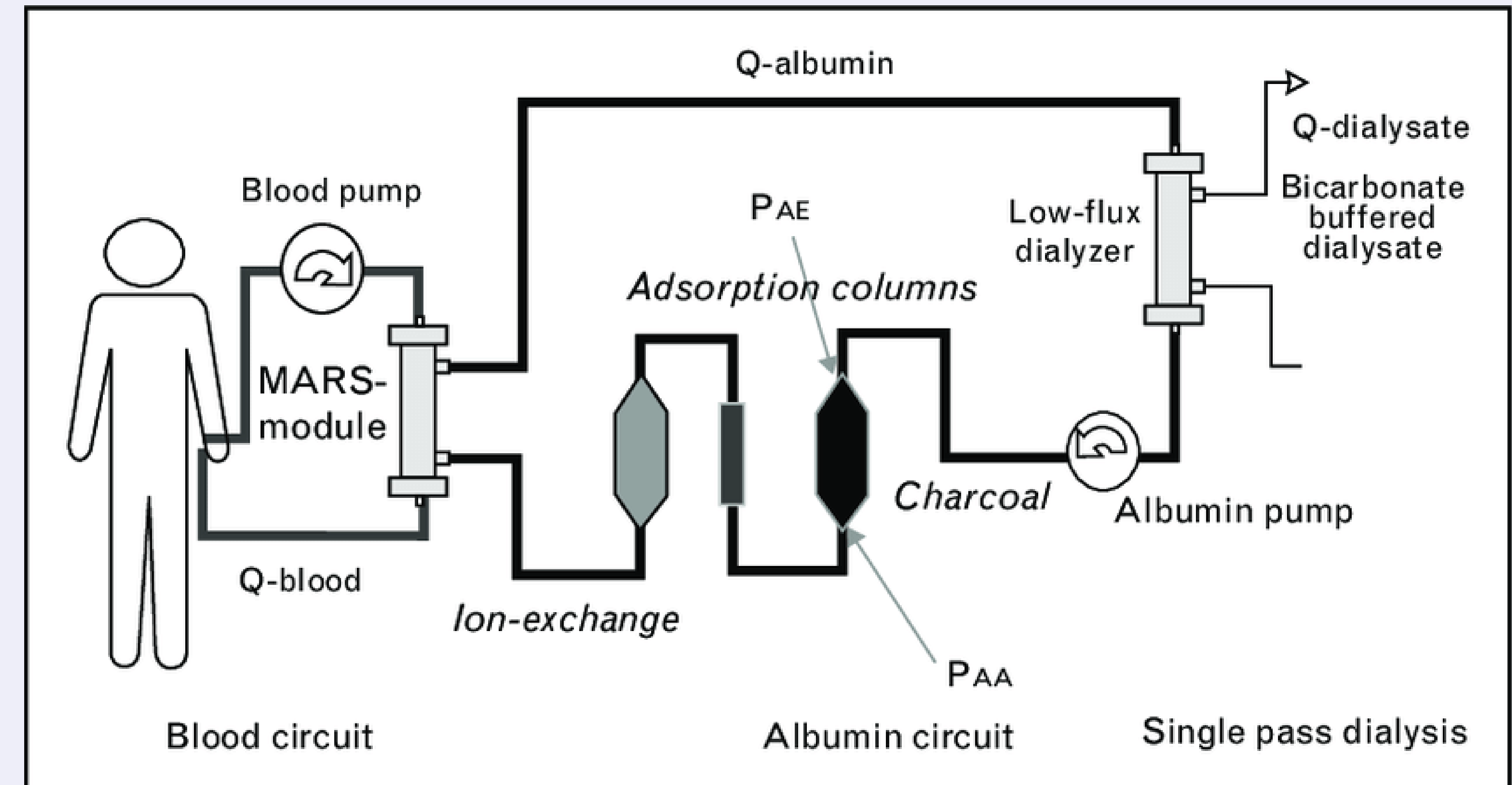


Figure 1 Molecular Adsorbent Recirculating System (MARS) circuit
From Covic et al. 2003

CASE DESCRIPTION

- A 13-year-old female with a history of type I diabetes mellitus, anxiety, depression, and previous suicide attempts presented to the ED after ingesting 25g of APAP.
- Her initial APAP level was 424.6 ug/mL, 3 hours post-ingestion, and she was found to be concomitantly in DKA. She was started on NAC and insulin infusion, and 24-hour APAP levels decreased to <1.0 ug/dL.
- By day 2, she developed acute liver failure, which continued to worsen with significant coagulopathy and hepatic encephalopathy. At peak of ALF, her labs were AST 37,699 IU/L, ALT 12,902 IU/L, Total bilirubin 24.2 mg/dL, Direct bilirubin 13.8 mg/dL, INR 7.9 and Ammonia 221 umol/L. She also developed oliguric renal failure requiring CRRT.
- She was transferred to Duke University, where the liver transplant was denied due to her psychiatric history, medical comorbidities such as renal failure and uncontrolled type 1 diabetes, and complex social situation. She was then transferred to Cincinnati Children's Hospital for the initiation of MARS therapy.
- She received 3 days of MARS with a daily net goal between negative 500 ml to 1L. NAC infusion, Lactulose, and Rifaximin were also continued.
- After day 3 of MARS, her labs improved significantly with AST 342 IU/L, ALT 1601 IU/L, Total Bilirubin 13.1mg/dL, INR 1.3, and Ammonia 39 umol/L.
- Additionally, she was placed on TPN for nutrition, management of elevated blood pressure, subcutaneous insulin for her diabetes, and hemodialysis for anuria.
- She was eventually transferred back to our facility and continued hemodialysis until renal function recovery. Her feeding intolerance improved, and she was eventually discharged 2 months after her initial presentation.

DISCUSSION

- MARS is the most frequently used nonbiological system for supporting the failing liver based on dialysis, filtration, and adsorption, which helps spontaneous liver regeneration.
- Protein-bound toxins are picked up on the dialysate, creating a continuous concentration gradient, and then cleaned through charcoal and anion exchange columns, creating a more efficient APAP removal than conventional dialysis, addressing the metabolic, synthesis, and detoxification of the decompensated liver.
- It has shown positive results, with efficient large-volume filtration, especially in toxin-induced liver failure and allowing the patient's native liver to recover, avoiding liver transplantation.