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Anesthetic and Multidisciplinary Management of a 2-staged Liver Transplant

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Introduction

- 12mo M born at 32wks with developmental delay presented to the ED for a cough of 5 days duration, decreased PO intake, jaundice, and vomiting x1
- Family Hx- 12yo half brother has undiagnosed pancreatic disorder
- Initial labs- transaminitis, direct hyperbilirubinemia, elevated GGT, AG metabolic acidosis, elevated TSH, hypoalbuminemia, hyponatremia, hypoglycemia, thrombocytopenia, and macrocytic anemia
- 8/10- admitted to floor, Parainfluenza +, consults to hepatology, genetics, hematology, endocrinology, nephrology, urology
- 8/12- transferred to PICU due to concern for ALF (increasing AST/ALT, hyperbilirubinemia, coagulopathy- INR 3.3, and lactate 9)
- 8/14- intubated due to decline in respiratory status, cancellation of IR liver Bx due to decompensation, now requiring maximum ventilatory support with vaso, epi, and norepi gtt
- 8/15- cannulation for VA ECMO 2/2 multisystem organ failure and respiratory failure, initiation of CRRT due to acidemia 2/2 elevated lactate >20, hyperammonemia (108), anuric AKI
- 8/17- Due to evidence of fulminant ALF and potential for a reversible process, he was listed for liver transplant status 1A by multidisciplinary team and parents

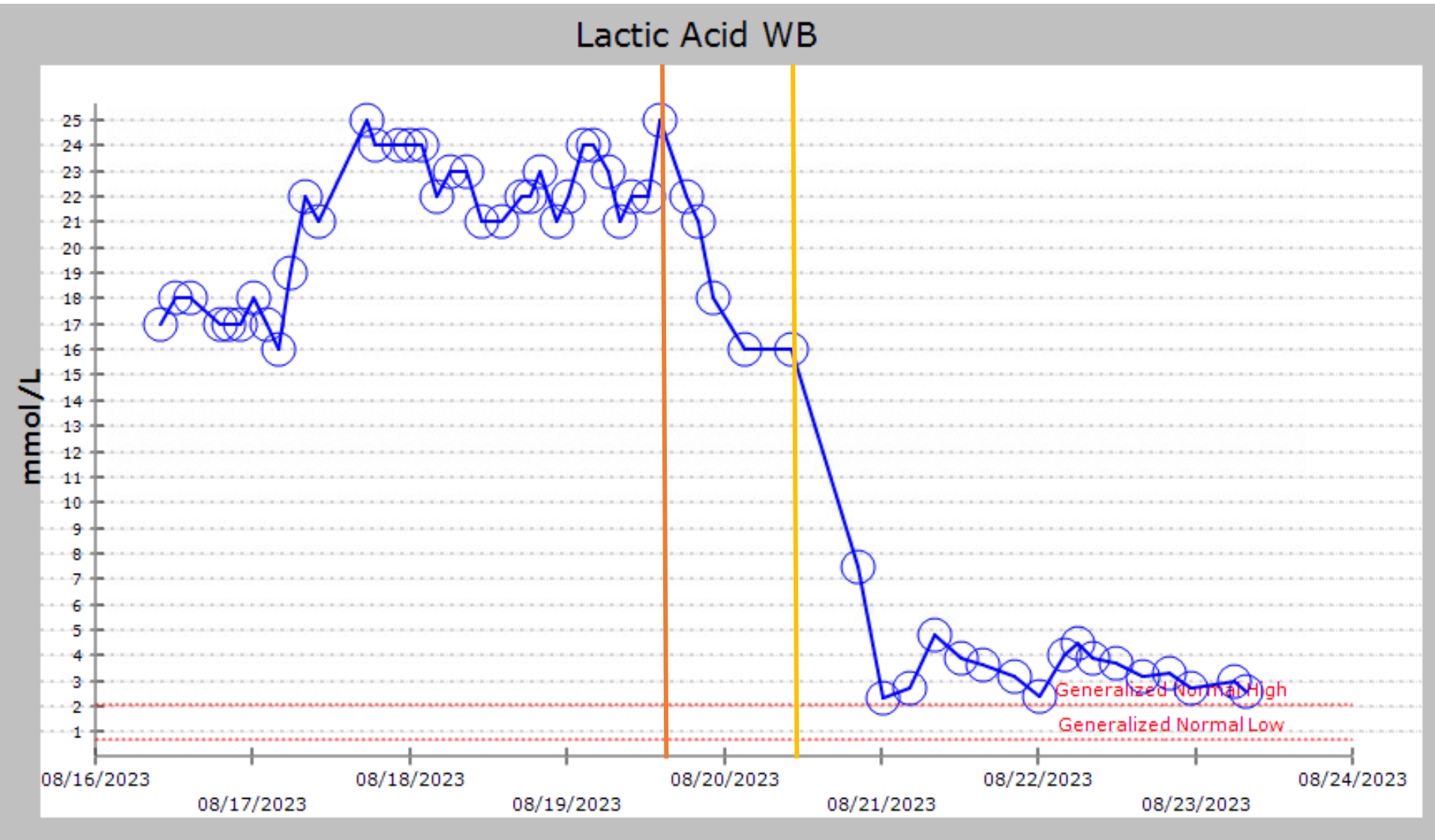


Image 1: A trend of the patient's WB lactate. Orange line indicates hepatectomy and yellow line indicates liver transplant.

Operative Management

- Pre-operatively, the plan was to perform a total hepatectomy with a temporary portocaval shunt with return to the ICU followed by liver transplantation the following day given the patient's presumed necrotic liver
- Managing peri-operative teams: anesthesia, transplant surgery, PICU team, OR nursing staff, CRRT team, ECMO team, hepatology, transplant coordinator, blood bank (Image 2)
- Multiple multidisciplinary huddles occurred prior to the OR for optimal communication and planning
- 8/19- Transported to OR on VA ECMO, CRRT, intubated, double lumen femoral CVC, PIV x1, Arterial line x1
- Ex-lap revealed a necrotic liver with viable bowel therefore hepatectomy and liver transplant initiated
- 8/19 16:43- liver removed (Image 3), begin anhepatic phase (Portocaval shunt created)
- Transported to PICU in stable condition with ECMO and CRRT
- Overnight-
 - weaned off epi and norepi gtt, remained on vaso gtt
 - Weaned bicarb gtt
 - Lactate decreased from 22 on arrival to 16 prior to return to OR
- 8/20- Transported to OR on VA ECMO, CRRT, intubated, double lumen femoral CVC, PIV x2, arterial line x2
- 8/20 15:13- reperfusion
 - Total anhepatic time= 22 hours 30min
- Patient tolerated reperfusion without issue
- Patient left with open abdomen, drain placed in biliary tree with plan for biliary reconstruction at a later time, B/I chest tubes placed prior to return to PICU

References

- Amarnath Kadimella, Ravi Raya, Chandan Kedarisetty, M. Rajgopala Acharya, Srinivas Reddy Mettu. Libguides: Creating stable links to medical ebooks. ClinicalKey - Creating Stable Links to Medical Ebooks - LibGuides at Michigan State University Libraries. Accessed February 20, 2024. <https://libguides.lib.msu.edu/link2medebooks/clinicalkey>.
- B.H. Ferraz-Neto, J.M.A. Moraes-Junior. Total Hepatectomy and Liver Transplantation as a Two-Stage Procedure for Toxic Liver: Case Reports. ClinicalKey. Accessed February 20, 2024. <https://www-clinicalkey-com.ezproxy.cmh.edu/#/content/playContent/1-s2.0-S0041134508001528?returnurl=null&referrer=null>.
- Montalti, R., Busani, S., Masetti, M., Girardis, M., Di Benedetto, F., Begliomini, B., Rompianesi, G., Rinaldi, L., Ballarin, R., Pasetto, A. and Gerunda, G.E. (2010). Two-stage liver transplantation: an effective procedure in urgent conditions. Clinical Transplantation, 24: 122-126. <https://doi-org.ezproxy.cmh.edu/10.1111/j.1399-0012.2009.01118.x>
- Ringe, Burckhardt M.D., Lübke, Norbert M.D., Kuse, Ernst M.D., Frei, Ulrich M.D., Pichlmayr, Rudolf M.D. Total hepatectomy and liver transplantation as two-stage... : Annals of surgery. Annals of Surgery, July 1993. Accessed February 20, 2024. https://journals.lww.com/annalsurgery/abstract/1993/07000/total_hepatectomy_and_liver_transplantation_as2.aspx.
- Spada M, Riva S, Maggiore G, Cintonaro D, Gridelli B. Pediatric liver transplantation. World J Gastroenterol. 2009;15(6):648-674. doi:10.3748/wjg.15.648

Post-operative

- 8/21- decannulated from ECMO support (ECMO access replaced with HD catheter placement)
- 8/23- seizure activity, head CT noting R frontal intraparenchymal hemorrhage
- 8/25- Partial abdominal closure, biliary reconstruction
- 9/1- patient diagnosed with mitochondrial deletion syndrome comprised of 3 overlapping phenotypes: Pearson syndrome, Kearns-Sayre syndrome (KSS), and progressive external ophthalmoplegia (PEO)
- 9/2- extubated in stable condition
- 9/3 & 9/4- acute respiratory decompensation requiring reintubation, pericardial effusion (drain placed) and pulmonary hemorrhage, cardiac arrest, 90min of CPR, re-cannulation of ECMO, CT head shows global cerebral and cerebellar edema and evidence of impending herniation
- 10/1- transition to comfort care, patient demise



Image 2: An image taken of the multidisciplinary teams in the operating room

Discussion

Total hepatectomy with temporary portocaval shunt was employed as a bridging procedure before liver transplantation in the setting of fulminant hepatic failure (Annals of surgery). Two- staged liver transplants involve the removal of the primary liver and the placement of the donor liver to be performed at two separate times. This procedure has typically been reserved for emergent cases and carries a high rate of morbidity and mortality. Two-stage total hepatectomy with temporary portocaval shunt, and subsequent liver transplantation can be a life-saving approach in patients most likely to die of the sequelae of advanced liver or graft necrosis or exsanguination that cannot be controlled by conventional treatment or immediate liver transplantation. For this patient who presented in acute liver failure of unknown etiology, a 2-staged liver transplant was proposed due to the pathophysiology of his acute liver failure secondary to his 2/2 his mitochondrial disease and concurrent viral URI.

Performing the hepatectomy and the transplant at separate times highlighted the need for multidisciplinary teamwork for the overall success of the patient. To successfully perform this transplant, the anesthesia team carefully planned their management around a prolonged anhepatic phase and the increased risk and lability it would have on the patient. The total anhepatic phase for this patient was 22 hours and 30 minutes. Given that the patient was already on VA ECMO, CRRT, and receiving PLEX therapy, he tolerated this period relatively well and was able to return to the OR for liver transplantation.

This feat could not have been accomplished without the multidisciplinary efforts by all the perioperative teams. We encourage closed-loop and frequent preoperative discussions with anesthesiology, surgery, intensive care and ECMO practitioners to ensure adequate planning.



Image 3: Liver s/p resection and biopsy

