Prediction Model for delayed extubation following Pediatric Liver Transplant

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Introduction
Liver transplant is a well-established curative therapy for end-stage liver disease frequently requiring postoperative mechanical ventilation as the standard of care after pediatric liver transplants (pLT) 1. With improved surgical techniques and perioperative management, early or even immediate extubation is now considered feasible1-3. However, the timing of extubation following pLT is multifactorial and debatable1,3.

Aim
In this retrospective study, we aimed to evaluate independent risk factors for delayed extubation among patients undergoing pLT.

Materials and Methods
- **Inclusion Criteria:** All patients who had pLT at Children’s Hospital Los Angeles from June 2003 to June 2015.
- **Exclusion Criteria:** Concurrent kidney or small bowel transplant.
- **Demographics:** Preoperative, intraoperative and postoperative variables, short term outcomes as well as any complications were retrospectively collected.
- **Delayed extubation** was defined as extubation longer than 48 hours.
- A continuous univariate regression with Mann Whitney, t or chi-square tests was performed as appropriate.
- A multivariate logistic regression outcome model for delayed extubation was built using Statistica ® and Stata ®

Results
- A total of 156 pLTs were performed in the 12 year study period including concurrent small bowel and kidney transplants.
- One hundred forty-two (142) cases were included for data analysis.
- Complete data was available for 112 cases.
- The commonest indication were Cholestatic (n 58, 37%), Metabolic (14.5%), Idiopathic (14.5%), Liver tumors (n 17, 12%), Hepatitis (n 5, 3.5%) & Others (2, 1.5%).

- The average time to extubation was 93 hours (range 0-680).
- Twelve (11 %) were extubated post-operatively in the operating room.
- Eight patients (7%) required reintubation in PICU.

- The average ICU length of stay was 170 hours (range 12-635 hours).
- There were 2 postoperative deaths (1 within 30 days).
- Postoperative renal failure as defined by Kidney Disease Improving Global Outcomes staging criteria was noted in 14 cases (12%).
- This included 8 cases with Stage 1 (1.5–1.9 x baseline S. Cr or ≥ 0.3 mg/dL increase in S. Cr within 48 hrs) and 6 cases with Stage 2 renal failure (2.0–2.9 x baseline S. Cr).

- **Univariate risk factors for delayed extubation:**
  - Younger age (<3y O.R. 2.5)
  - Preoperative Hb <11 (O.R. 2.0)
  - Lower intraoperative pH (<7.2 O.R. 4.8)
  - Transfusion of blood products more than 30 ml/kg (O.R. 0.03)
  - Lower pH (p 0.08).

- Independent risk factors for delayed extubation (Multivariate Regression):
  - Younger age (p 0.002)
  - Preoperative Hb (p 0.04)
  - Transfusion of blood products more than 30 ml/kg (p 0.03)
  - Lower pH (p 0.08).

- We did not find any correlation between primary diagnosis, PELD scores, duration of surgery, postoperative renal failure or type of anesthetic agent used with delayed extubation.

Discussion and conclusion
- Children are considered to be better candidates for early extubation after LT as they do not have age-related comorbidities.
- Recent studies have reported immediate extubation in up to 76% in elective and 33% in urgent transplants with ¼ delayed reintubation1,2.
- At our center, immediate extubation rate was 11% and reintubation rate was 7%.
- Lower renal failure in this age group is probably due to lack of Hepatorenal syndrome as well as improved perioperative management.

- We also found that a multivariate logistic regression model based on younger age, lower preoperative Hb, transfusion of blood products more than 30 ml/kg and lower intra or immediate postoperative pH was a significant predictor of delayed extubation following pediatric liver transplant.
- In addition to being retrospective, this study was limited with some missing data points.

References