

Navigating Multifaceted Maternal Comorbidities: A Complex Case of Cesarean Delivery in a Patient with Pulmonary and Cardiovascular Challenges

Sounak Roy MD, Hiram Acevedo, MD

Department of Anesthesiology UF-Jacksonville

Introduction

- Learning Objective: Understand the comprehensive management of cesarean delivery in a patient with severe pulmonary hypertension, right-to-left shunt, and pulmonary hemosiderosis.
- Pulmonary hemosiderosis is a rare condition of recurrent alveolar hemorrhage causing iron deposition, fibrosis, and severe anemia [1].
- Pregnancy exacerbates pulmonary conditions due to increased cardiovascular and respiratory demands, posing significant maternal-fetal risks.
- Pulmonary hypertension with a patent foramen ovale (PFO) right-to-left shunt heightens perioperative risks of hypoxemia and right ventricular failure.
- Managing these patients is challenging, requiring a balance of systemic and pulmonary vascular resistances and necessitating multidisciplinary coordination among specialists.

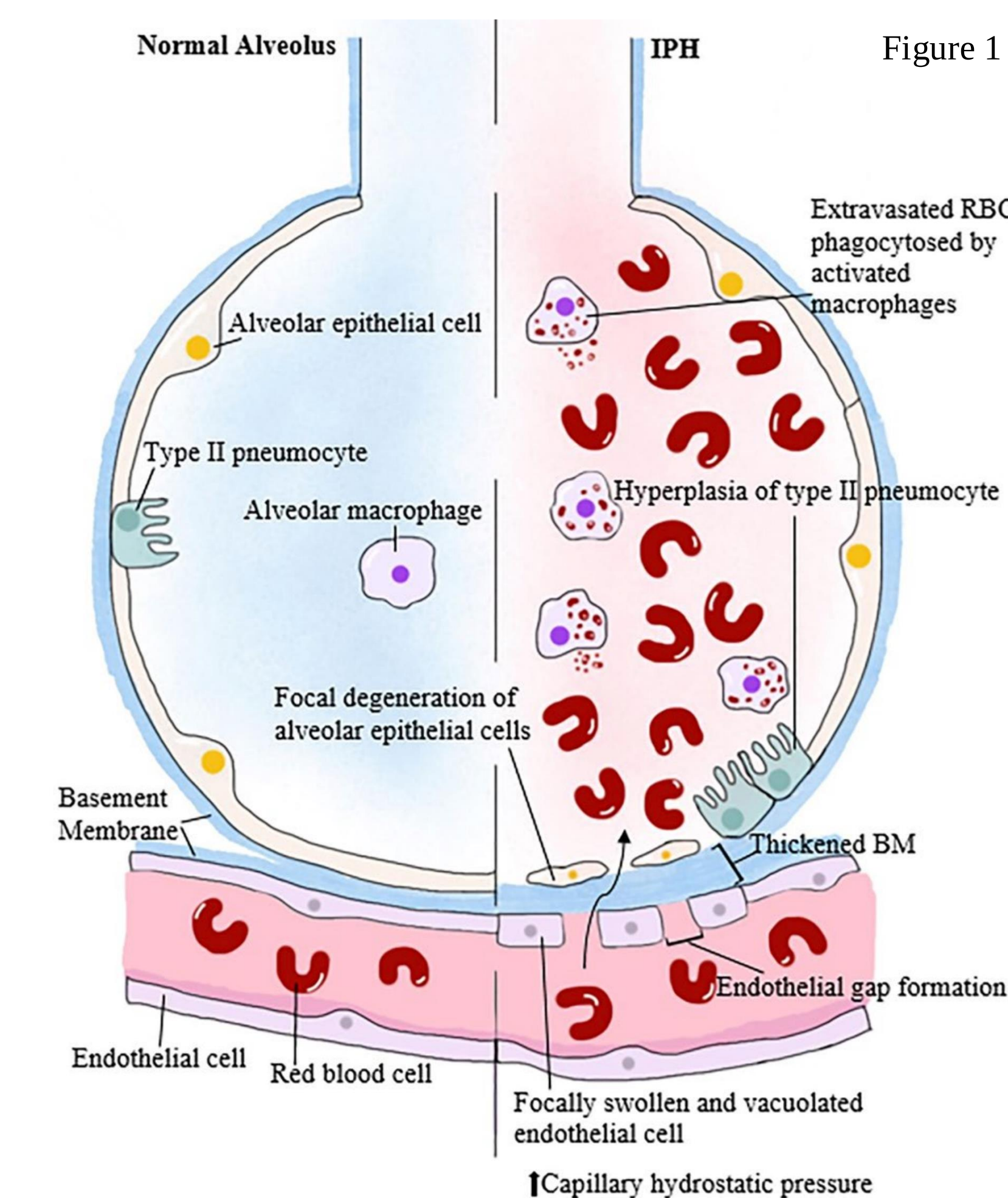


Figure 1

Figure 1. Proposed pictorial representation of the pathobiology of idiopathic pulmonary hemosiderosis causing diffuse alveolar hemorrhage.

Saha BK, Chong WH, Saha S, et al. "Proposed Pathogenesis of Diffuse Alveolar Hemorrhage in Idiopathic Pulmonary Hemosiderosis." *Lung*, 2022.

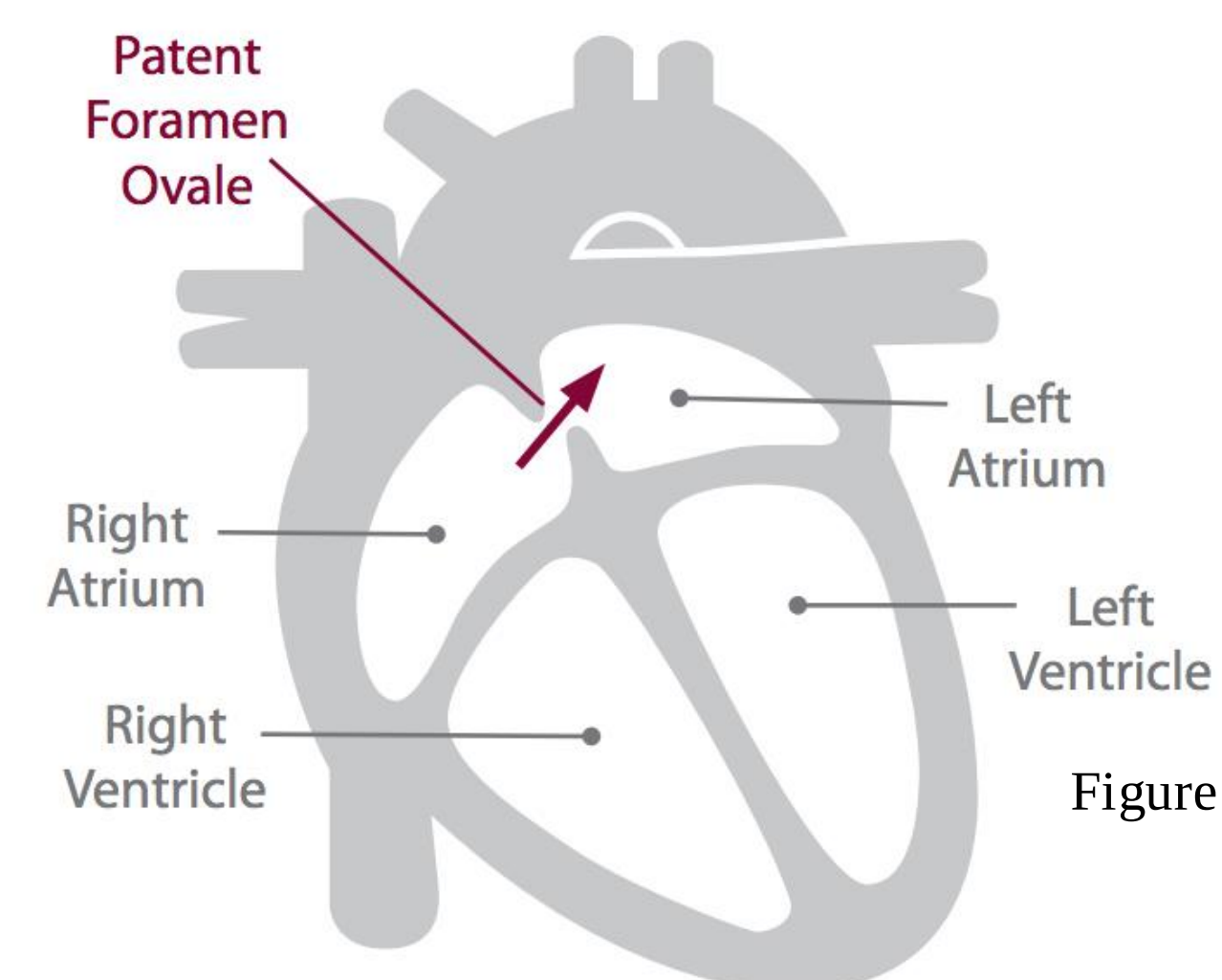


Figure 2

Figure 2. Diagram illustrating how chronic pulmonary hypertension leads to increased right-sided heart pressures, causing reversal of shunt flow through a patent foramen ovale from left-to-right to right-to-left. Kent & Thaler, *Stroke*, 2010.

Case Description

Patient Profile:

- 34-year-old G2P1 woman at 36 weeks gestation with history of chronic hypoxemic respiratory failure on 6 L oxygen, severe pulmonary hypertension (Groups 1-3) managed with sildenafil and torsemide, pulmonary hemosiderosis, heart failure with recovered ejection fraction (55-60%), and PFO with right-to-left shunt.
- Additional comorbidities: rheumatoid arthritis, idiopathic intracranial hypertension, obstructive sleep apnea, tobacco use.

Management and Outcome:

- Preoperative arterial line placement for continuous monitoring. Multidisciplinary team planning, including standby ECMO team.
- Epidural anesthesia with 18 mL of 2% lidocaine with epinephrine and 100 mcg fentanyl.
- Initiation of epinephrine infusion and vasopressin boluses to maintain systemic vascular resistance.
- Supplemental oxygen via facemask with nebulized epoprostenol intraoperatively.
- Postoperative admission to surgical ICU. Postoperative continuation of nebulized epoprostenol for 24 hours.

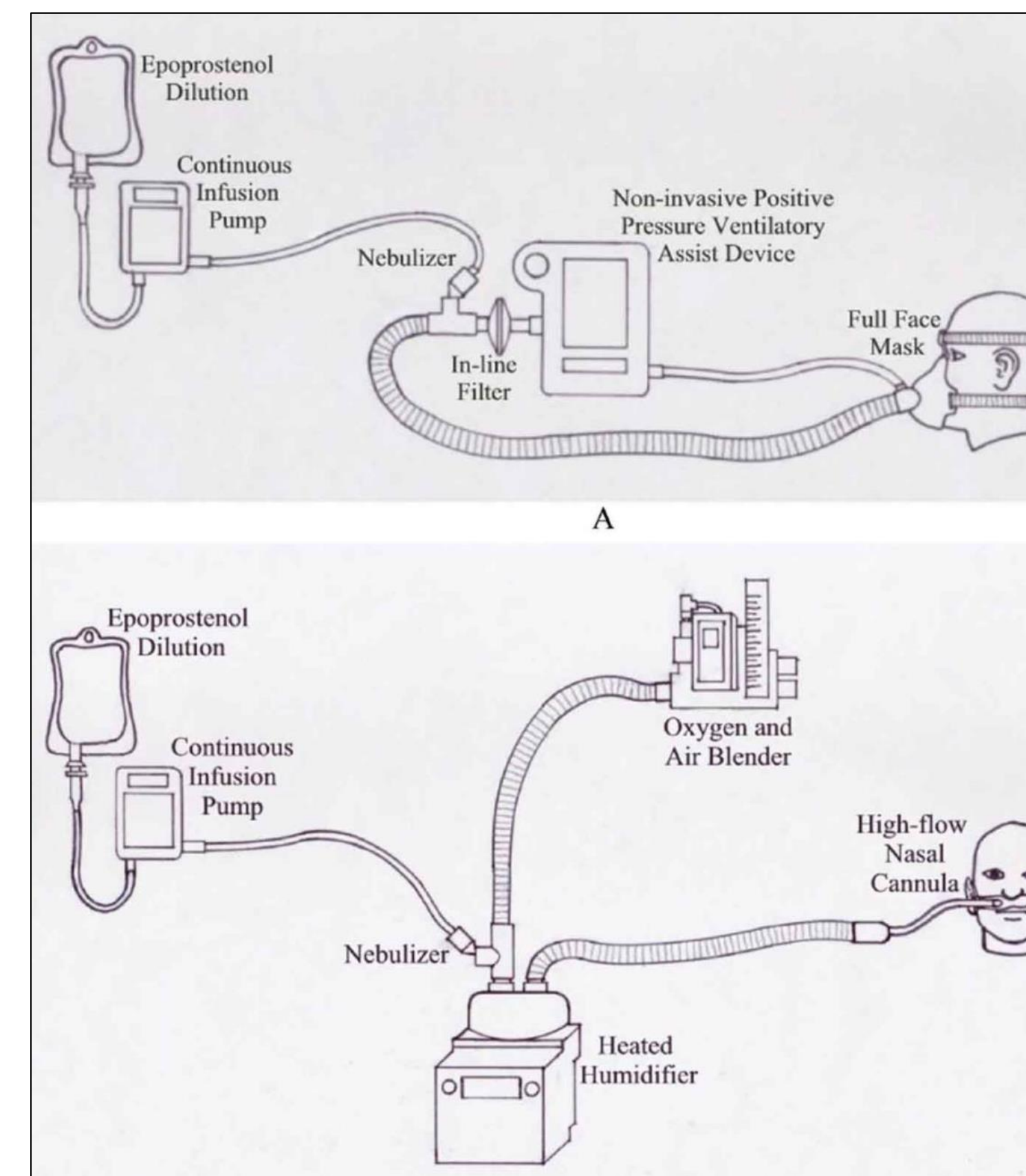


Figure 3. Illustration of inhaled epoprostenol setup and administration through (A) noninvasive positive pressure ventilation and (B) high-flow nasal cannula oxygen therapy. Epoprostenol is typically started at a maximal dose of 50 ng/kg/min and subsequently weaned down. *Critical Care Medicine*, 2018.

Discussion

- Pulmonary hemosiderosis increases anesthetic risks due to potential acute pulmonary exacerbations and severe anemia [1].
- Pregnancy exacerbates pulmonary hypertension, heightening maternal morbidity and mortality [2].
- A PFO with right-to-left shunt further amplifies perioperative risks of hypoxemia and right ventricular failure.
- Medications like inhaled epoprostenol and sildenafil reduce pulmonary vascular resistance (PVR), improving oxygenation and cardiac output, while vasopressin maintains systemic vascular resistance without worsening pulmonary hypertension [3].
- Intraoperative epidural anesthesia allows controlled sympathectomy, minimizing hemodynamic fluctuations and balancing vascular resistances.
- Epidural analgesia provides superior pain control with minimal respiratory depression compared to systemic opioids, which is crucial in patients with compromised pulmonary function [4].
- Selective vasodilation of paravertebral vasculature from epidural analgesia reduces preload and afterload, improving cardiac performance in patients with heart failure [4].
- This case underscores the critical importance of a multidisciplinary approach in managing complex obstetric patients with significant cardiopulmonary comorbidities.

References

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3. Humbert M, Kovacs G, Hoeper MM, et al. 2022 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension. *Eur Heart J*. 2022;43 (38):3618-3731. doi: 10.1093/eurheartj/ehac237.
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