



Anesthetic Management for Hip Fracture Repair in a Patient with Severe Pulmonary Hypertension and Immune Thrombocytopenic Purpura

Dominic Pelchat, DO, Stefan Trela, MD

Cleveland Clinic, Department of General Anesthesiology, Cleveland, Ohio



Introduction

Evaluation of surgical options for patients with hematologic and pulmonary comorbidities undergoing necessary procedures requires a comprehensive review of the risks and benefits of anesthetic choice as well as the possible operative and postoperative outcomes for the patient.

One of the most concerning from a pulmonary standpoint would be severe pulmonary hypertension due to interstitial lung disease (ILD).

Medical management of these patients with severe disease often involves prostaglandin analogues as well as phosphodiesterase inhibitors and supplemental oxygen at home.

Spinal anesthesia for patients with pulmonary hypertension undergoing orthopedic surgical procedures is normally highly effective in providing adequate surgical anesthesia for patients who are at high risk for complications from general anesthesia.

Specific contraindications for spinal anesthesia related to hematologic disorders include thrombocytopenia and coagulopathy (1).

In those patients in which surgery is deemed necessary, transfusion of blood products such as platelets or coagulation factors are initiated in order to medically optimize the patient for surgery (5).

In this case, we discuss a patient in which all of these factors had to be taken into consideration to proceed with surgery.

Case description

63 year old female with past medical history significant for WHO Class I pulmonary arterial hypertension (PAH) with mean pulmonary arterial pressure of 63 mmHg secondary to ILD on 7 liters of oxygen at home, coronary artery disease with chronic total occlusion of the distal right coronary artery being medically managed, type 2 diabetes mellitus, rheumatoid arthritis, and immune thrombocytopenic purpura (ITP) who presented to a regional hospital for 3 weeks of increasing hip pain after having tripped and fallen at home.

She was treated with oral sildenafil and treprostinil subcutaneous infusions for PAH.

Given her severe medical comorbidities, she was transferred to Cleveland Clinic Main Campus for further management.

WHO Functional Classification		
History:	Class	Description
Determine Functional Classification • Exertional SOB, CP, syncope to determine FC	I	No limitation of physical activity; ordinary physical activity does not cause undue dyspnea or fatigue, chest pain, or near syncope
Physical Exam: • Look for signs of RHF • Elevated JVP, RV gallop, TR murmur, ascites, edema, cool periphery, reduced capillary refill	II	Slight limitation of physical activity; no discomfort at rest; ordinary physical activity causes undue dyspnea or fatigue, chest pain, or near syncope
Tests: • BNP, basic chemistry, CBC, coagulation panel • CXR, ECG • 6 min walk test/CPET • Echo within 2 weeks • RHC in selected patients	III	Marked limitation of physical activity; no discomfort at rest; less than ordinary activity causes undue dyspnea or fatigue, chest pain, or near syncope
	IV	Unable to carry out any physical activity without symptoms; signs of right-heart failure; dyspnea and/or fatigue may be present at rest; discomfort is increased by any physical activity

Case description

Upon evaluation, she was found to have a displaced right femoral neck fracture.

Orthopedic Surgery was consulted and recommended right hip hemiarthroplasty with a press-fit prosthesis to minimize potential cement or fat emboli stress on the patient compared to a cemented stem fixation.

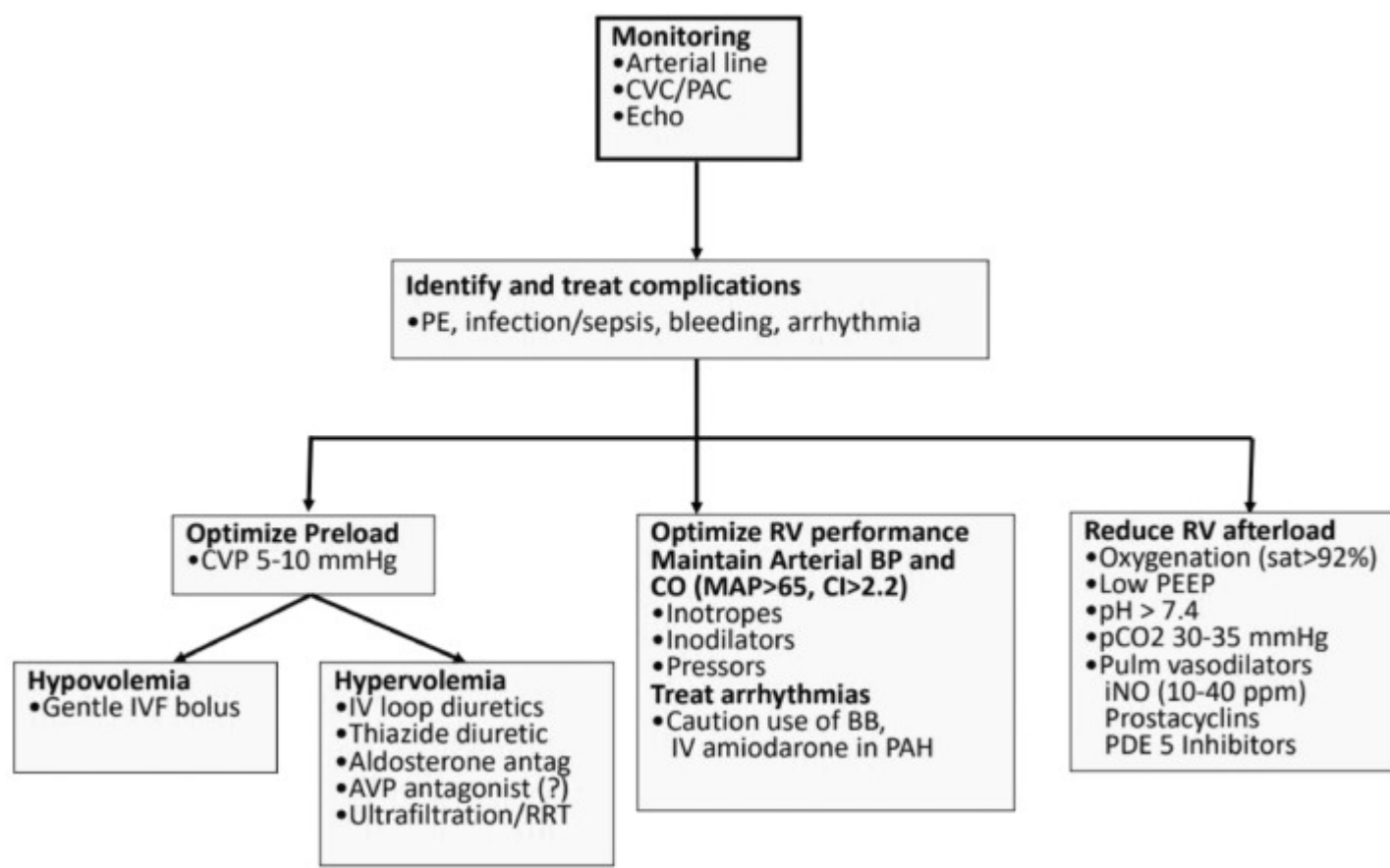
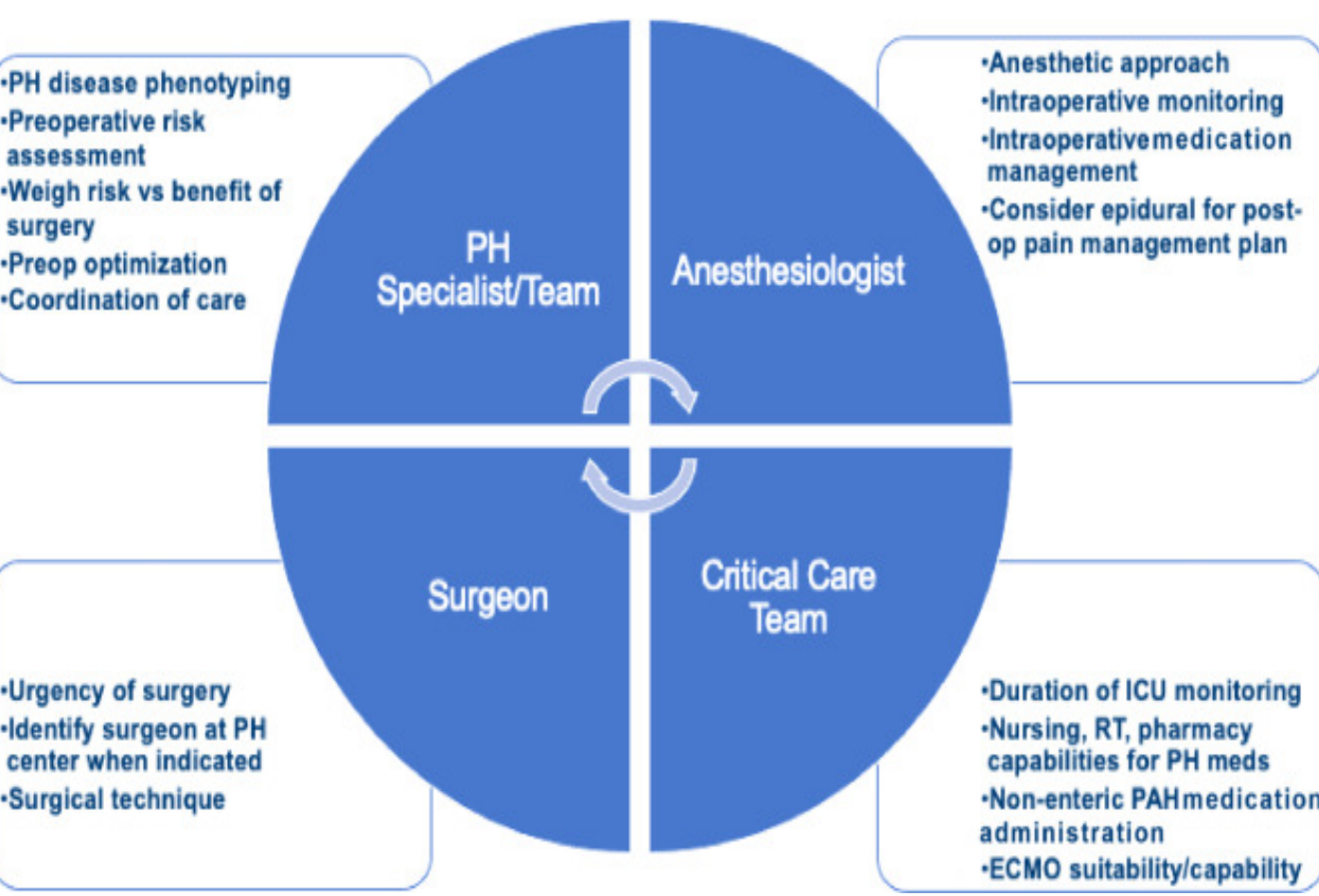
Given her severe respiratory disease, it was discussed that the patient potentially may not be able to be extubated if she received a general anesthetic and would not be a candidate for extra corporeal membrane oxygenation. Therefore, spinal anesthesia was the best anesthetic option.

However, one of the confounding factors was that her platelet count was 65k/uL due to her underlying ITP, so Hematology was consulted on the morning of surgery and intravenous immunoglobulin was given as well as 2 units of platelets with appropriate rise in platelet count.

Patient then underwent spinal anesthesia without any significant complications.

She was given no other sedation agents and started on a norepinephrine infusion intraoperatively to treat hypotension.
The procedure was completed without complications and patient was transferred to the MICU postoperatively.

Ultimately after one month, the patient was transferred to hospice and deceased related to worsening respiratory failure.



References

1. Carpenter RL, Caplan RA, Brown DL, Stephenson C, Wu R. Incidence and risk factors for side effects of spinal anesthesia. Anesthesiology. 1992 Jun;76(6):906-16. doi: 10.1097/0000542-199206000-00006. PMID: 1599111.
2. McGlothlin DP, Granton J, Klepetko W, Beghetti M, Rosenzweig EB, Corris PA, Horn E, Kanwar MK, McKrae K, Roman A, Tedford R, Badagliacca R, Bartolome S, Benza R, Caccamo M, Cogswell R, Dewachter C, Donahoe L, Fadel E, Farber HW, Feinstein J, Franco V, Frantz R, Gatzoulis M, Hwa Anne Goh C, Guazzi M, Hansmann G, Hastings S, Heerd PM, Hemnes A, Herpain A, Hsu CH, Kerr K, Kolaitis NA, Kukreja J, Madani M, McCluskey S, McCulloch M, Moser B, Navaratnam M, Rådegran G, Reimer C, Savale L, Shlobin OA, Svetlichnaya J, Swetz K, Tashjian J, Thenappan T, Vizza CD, West S, Zuckerman W, Zuckermann A, De Marco T. ISHLT consensus statement: Perioperative management of patients with pulmonary hypertension and right heart failure undergoing surgery. J Heart Lung Transplant. 2022 Sep;41(9):1135-1194. doi: 10.1016/j.healun.2022.06.013. Epub 2022 Jun 23. PMID: 36123001.
3. Ramakrishna G, Sprung J, Ravi BS, Chandrasekaran K, McGoan MD. Impact of pulmonary hypertension on the outcomes of noncardiac surgery: predictors of perioperative morbidity and mortality. J Am Coll Cardiol. 2005 May 17;45(10):1691-9. doi: 10.1016/j.jacc.2005.02.055. PMID: 15893189.
4. Yamakage M, Namiki A, Tsuchida H, Iwasaki H. Changes in ventilatory pattern and arterial oxygen saturation during spinal anaesthesia in man. Acta Anaesthesiol Scand. 1992 Aug;36(6):569-71. doi: 10.1111/j.1399-6576.1992.tb03520.x. PMID: 1514344.
5. Yuan S, Otrcock ZK. Platelet Transfusion: An Update on Indications and Guidelines. Clin Lab Med. 2021 Dec;41(4):621-634. doi: 10.1016/j.clm.2021.07.005. Epub 2021 Sep 30. PMID: 34689969.

Discussion

In this case, the patient had multiple medical comorbidities that presented an anesthetic challenge.

One of the most concerning of these diseases is severe pulmonary hypertension due to interstitial lung disease, compromising the alveolar interface due to the sequential thickening and inflammation of the lung parenchyma as well as increased resistance in the pulmonary circulation (2).

This presents an anesthetic challenge due to the necessity of balancing blood pressure, fluid management, oxygenation, and acid-base physiology throughout the procedure.

Even with best efforts to control these factors, the stress of the surgery can exacerbate pulmonary hypertension and lead to potential complications, including arrhythmias, congestive heart failure, myocardial ischemia, postoperative respiratory failure, hemodynamic instability, delayed extubation, and longer length of stay in the ICU and overall hospital admission (3).

A factor to consider was that her PAH was being managed medically through the use of sildenafil and treprostinil subcutaneous infusion due to their pulmonary vasodilatory activity.

Another important consideration in this case was this patient's ITP which involved coordination with Hematology.

This was due to the risk of spinal hematoma in patients with thrombocytopenia which can lead to paraplegia (1).

Platelet counts of greater than 80k/uL are normally considered safe for spinal anesthesia to be performed.

However, in some circumstances, platelet counts between 50 to 80 k/uL may still allow for neuraxial blockade (5).

IVIG and platelet transfusions were administered immediately before surgery in this case to minimize risk of spinal hematoma formation.

In conclusion, when evaluating patients compromised by multiple severe medical comorbidities such as severe PAH from interstitial lung disease and hematologic disorders such as ITP, it is important to review the risks and benefits of anesthetic choices.

This must be done while taking into account the goals of caring for these patients as well as the potential complications with the surgical team.

