Perianesthesia management of chylothorax and severe obserity with sternotomy under general aneshesia and anemia: a case report

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Abstract. Surgery with Chylothorax cases is increasingly common. Chylothorax can result in high morbidity and mortality. Effective perianesthesia measures are crucial for managing hemodynamic instability, including hypertension and anemia, and for selecting suitable anesthetic agents to ensure successful surgery. This case focuses on perianesthesia management in Chylothorax surgery involving Sternotomy, addressing issues of hypertension and anemia. The study results indicate that the patient experienced oxygen saturation decline and hemodynamic instability, necessitating adjustments in anesthetic administration. During the recovery phase, the patient required continued ventilatory support and ongoing monitoring due to prolonged effects of anesthetic drugs. In conclusion, anesthesia management in patients with chylothorax and severe obesity requires careful planning and coordination between the surgical and anesthesia teams to ensure respiratory and hemodynamic stability throughout the surgery.

1 Introduction

Chylothorax is a rare cause of pleural effusion resulting from thoracic duct damage with leakage of chylous fluid from the lymphatic system into the pleural cavity. The prevalence of Chylothorax is estimated to be 1: per 15000 live births, and the postoperative risk in pediatric surgery is 0.2-2%, making it a major challenge worldwide, especially in the treatment of critically ill children. The mortality and morbidity is about 10% [1-3].

Chylothorax, in spite of the fact that bookkeeping for as it were a little parcel of pleural emission cases, can lead to critical dismalness and mortality. This condition happens due to break or disturbance of the thoracic channel, a structure 35–46 cm in length that starts from the cisterna chyli within the guts. The thoracic conduit is shaped by the combining of intestinal lymphatic vessels known as lacteals and enters the thorax through the aortic break of the diaphragm, running along the correct side of the midline between the aorta and the

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azygos vein, back to the esophagus. At the thoracic level (T4–T6), it crosses to the cleared out of the midline, proceeds superiorly, at that point curves and ends at the intersection between the cleared out jugular vein and the subclavian vein. The foremost common end point of the thoracic channel is the inside jugular vein (46% of cases), taken after by the jugulosubclavian point (32% of cases) [4].

Clinically, dyspnea, chest pain, and cough are the most common symptoms of Chylothorax. Malnutrition due to protein loss and immunosuppression due to the loss of immunoglobulins to the chest cavity can lead to weight loss and infection. Thoracic duct ligage is the most commonly performed surgical technique in cases of chylothorax [5] [6].

The authority of anesthesiologists is closely related to the key variables in cases of patients with chylothorax and obesity undergoing sternotomy under general anesthesia. As anesthesiologists, their role includes the safe management of anesthesia and the selection of appropriate anesthetic agents for patients with complex comorbidities, such as hypertension, anemia, and compromised lung conditions [7].

Supporting examinations to determine the presence of Chylothorax can be done with an Anterior-Posteroir Thorax X-ray, MRI, and Thorax CT Scan to see Chylothorax abnormalities, based on traumatic, non-traumatic, and or cancer [8]. The Thorax X-ray has limitations in identifying the specific cause of chylothorax, except in cases of trauma. CT scans of the chest, abdomen, and pelvis can help narrow the diagnosis by identifying injuries to the lymphatic system, compressive mediastinal or abdominal lymphadenopathy, ascites, or malignant lesions. Other imaging techniques used to visualize the lymphatic system include lymphangiography, lymphoscintigraphy, and MRI. The choice of imaging modality depends on the patient's condition [9].

2 Method

This investigate utilized a graphic observational strategy through a single case consider of a 30-year-old lady with chylothorax and overweight experiencing sternotomy. This strategy is bolstered by moral endorsement from Harapan Bangsa College No. B.LPPM-UHB-233/02/2024. Information collection was conducted comprehensively in three stages: preoperative, intraoperative, and postoperative. Collected information included the patient's history, physical examination, crucial signs, Body Mass Record (BMI), ASA appraisal, and research facility comes about. Within the preoperative stage, the persistent was inspected and arranged. The intraoperative stage included anesthesia acceptance, intubation, anesthesia upkeep, and persistent observing. Postoperatively, the quiet was exchanged to the ICU for seriously monitoring. This investigate points to supply a comprehensive diagram of the patient's physiological reactions to her essential condition and the surgical method performed beneath common anesthesia.

3 Result and Discussion

3.1 Results

3.1.1 Case History

A 30-year-old woman weighing 90 kg and 160 cm tall with a Body Mass Index (BMI) of 35.2 (severe obesity) came to the hospital with complaints of shortness of breath and chest pain. The patient was given nasal cannula therapy to maintain the patient's airway. The patient felt short of breath when not wearing a breathing apparatus. Subsequently, the patient

underwent a hemodynamic assessment, revealing a blood pressure of 153/77 mmHg, a respiration rate of 28/min, and a SpO2 of 95%, along with an American Society of Anesthesiologists (ASA) grade IV assessment.

During the physical examination, ronchial breath sounds were heard bilaterally, along and wheezing. Asymmetrical chest development, irregular breathing patterns, and dullness on lung percussion were noted. Pain was elicited upon palpating the lungs, and the heart was non-palpable. Auscultation revealed reduced vesicular breathing. Abdominal distension was observed. Laboratory tests indicated anemia, thrombocytosis, low erythrocyte count, elevated red cell distribution width, reduced mean platelet volume, decreased rods, lymphocytopenia, neutrophilia, granulocytosis, low total lymphocytes, and a high neutrophil-to-lymphocyte ratio (refers to table 1). The patient had a blood transfusion before the surgery program because he had a low Hemoglobin, and was preparing blood for intra-operation.

Table 1. Laboratory Results

Hematology Screening	Results	Normal Value
Hemoglobin	9.0 g/dl	10.9-14.9 g/dl
Thrombocyte	690.000/mm3	216000-451000/mm3
Erythrocyte	3.74 10?/pL	4.11-5.55?/pL
RDW	17.9%	11.3-14.6%
MPV	6.7 fl	9.4-12.3%
Segment	84.5%	50.0-70.0%
Lymphocyte	4.5%	20.4-44.6%
Neutrophil	85.0%	42.5-71%
Granulocyte	10080/pl	1500-8500/pl
Total Lymphocyte Count	530/pl	1000-10000/pl
Rods	0.5%	3.0-5.0%
Neutrophil Lymphocyte Ratio	18.78 Ratio	0.78-3.53 Ratio

RDW: Red Blood Cell Distribution Width; MPV: Mean Platelet Volume

The patient's preoperative assessment was conducted in the IBS room (Central Surgical Installation). A large bore venous catheter (18G) was in place in the right hand, connected to a Central Venous Catheter (CVC) inserted in the jugular vein for the administration of Ringer Lactate at a rate of 20 drops per minute. Preoperative medications administered included intravenous Dexamethasone (5 mg), Ondansetron (4 mg), and Vitamin K (10 mg).

In the Intraoperative stage, the patient used General Anesthesia Endotracheal Tube (ETT) number 7.0 (Non-Kinking) and was connected to the anesthesia machine circuit properly. Induction included intravenous Sufentanil (100 mcg), Propofol (100 mg), and Rocuronium (40 mg) for muscle relaxation. An additional 30 mg of Propofol was administered during anesthesia due to the patient's severe obesity. SpO2 decreased due to narrowing due to fluid in the form of blood in the airway.

For maintenance, the patient received a mixture of 2 liters per minute of N2O and 2 liters per minute of oxygen (50:50 ratio), along with sevoflurane (2% vol) as the volatile agent. Crystalloid infusion (Ringer's Lactate / NaCl) of 2500 ml was administered. Tranexamic Acid was given intravenously at a dosage of 2 x 500 mg. The patient remained intubated with an Endotracheal Tube throughout the surgery, which lasted 3 hours and 10 minutes, with the anesthesia duration being 3 hours and 15 minutes.

In the postoperative period, there were no complications in the patient. The patient was still attached to the ETT tube. The patient was not breathing spontaneously and adequately, and the effect of anesthetic drugs was extended (to avoid the patient feeling postoperative pain in the chest). The patient was evaluated for Aldrete Score and showed a score of 4 (less

than 8). Therefore, the patient was transferred to the ICU for more intensive postoperative care. Close monitoring was conducted by checking vital signs every 15 minutes for the first 24 hours to ensure the patient's condition remained stable. Additionally, intravenous infusions were carefully monitored to maintain fluid and electrolyte balance. The patient's nutritional intake was also closely managed to support recovery, prevent malnutrition, and aid the healing process after surgery. This approach aims to detect potential postoperative complications early and ensure the patient's optimal recovery.

3.2 Discussion

The treatment of chylothorax lacks standardization, with no widely accepted consensus or algorithm in place. Common treatment approaches involve sternotomy and thoracotomy [9]. When considering anesthesia for chylothorax, General Anesthesia is recommended for major operations lasting over 3 hours. During sternotomy, respiratory muscle function is affected, requiring general anesthesia (GA) and ventilator support to monitor hemodynamic stability and respiratory function intraoperatively [11].

In chylothorax, the leakage of proteins and immunoglobulins into the pleural cavity can cause significant issues for the patient. Firstly, protein loss can result in malnutrition, characterized by weight loss and overall nutrient deficiency. Secondly, the loss of immunoglobulins weakens the immune system, increasing susceptibility to infections. This dual impact can lead to complications such as malnutrition-related weight loss and heightened infection risks due to immunosuppression. Managing these conditions is crucial for effective treatment [12].

In this case, the placement of a Central Venous Catheter (CVC) is necessary due to a major surgery that requires a long operating time. Central Venous Catheters (CVC) are essential tools in the management of critically ill patients, primarily providing venous access needed for the administration of medication and fluids. The placement of a CVC also serves to monitor central venous pressure and is used to deliver medications such as cytotoxic drugs or hyperosmolar fluids, as well as when other venous access options are unsuccessful [13].

Perioperative anemia is known to impact morbidity and mortality and increase the risk of surgical site infection. Preoperative anemia is a major factor in blood transfusion, which can lead to complications. Therefore, managing the patient's blood with a focus on addressing anemia before surgery is crucial to improving patient health outcomes and reducing the need for blood transfusions. Thoroughly evaluating anemia involves a comprehensive history, physical examination, and systematic diagnostic testing. Preoperative transfusions can significantly impact surgical outcomes. It is advised to assess the patient's condition before surgery carefully, ensuring continuous monitoring and appropriate treatment [14] [15].

Dexamethasone is a medication commonly used in anesthesia and surgery, particularly for the prophylaxis and treatment of nausea and vomiting. Administering dexamethasone preoperatively can reduce postoperative nausea and vomiting, help manage postoperative pain, and improve the quality of patient recovery [16]. Preoperative administration of ondansetron may prevent Post post-operative nausea and Vomiting (PONV) in patients given volatile agents (Sevoflurane) [17]. Ondansetron is effective in preventing postoperative nausea and vomiting, especially when combined with dexamethasone for more optimal results [18].

Administering Vitamin K before surgery can help reduce blood loss without raising the risk of stroke or thrombosis. This supplementation addresses deficiencies and enhances the function of crucial vitamin K-dependent clotting factors [19]. The administration of pre-operative Vitamin K can reduce bleeding in patients. Patients who received Vitamin K experienced a significant reduction in the use of blood products during surgery, particularly

platelets and plasma, and had a lower complication rate compared to those who did not receive Vitamin K [20].

Propofol has advantages as an anti-stress response and antioxidant agent. It can be used as an adjunct therapy in conditions with high-stress response and oxidative stress, such as during surgery and in the Intensive Care Unit (ICU) [21].

The use of rocuronium helps increase tidal volume (the amount of air inhaled and exhaled by the patient) during ventilation. Patients who received rocuronium showed a more significant increase in tidal volume. This indicates that the administration of rocuronium can facilitate more effective ventilation during anesthesia induction [22].

Selecting an appropriate endotracheal tube (ETT) for general anesthesia helps prevent aspiration, isolates the lungs, maintains a clear surgical field in the facial region, and enables monitoring for laryngeal nerve injuries during surgery [23].

Tranexamic Acid (TXA) reduces perioperative bleeding and blood transfusion in various surgeries due to its antifibrinolytic properties [24]. Tranexamic Acid (TXA) is effective in preventing and treating bleeding in various surgical procedures and trauma. Its use has been proven to reduce the need for blood transfusions and lower the risk of death from bleeding in patients [25].

After major surgery, patients are transferred to the intensive care unit (ICU) for closer monitoring. Patients who undergo major surgery are at high risk of mortality and morbidity. Therefore, more intensive care in the ICU is required to ensure the survival of these patients. During ICU care, the patient is closely monitored with vital signs measurements every 15 minutes for the first 24 hours, as well as monitoring of IV infusions and nutritional intake. This evaluation is necessary due to the risk of postoperative complications in patients with complex conditions like this, including potential respiratory issues and hemodynamic instability. The ICU allows for early detection and immediate management of any changes in the patient's condition, making it essential for postoperative patients to be transferred to the ICU [26].

4 Conclusion

Chylothorax patients require meticulous anesthesia planning due to the prolonged duration of the procedure and the associated high risk of hemodynamic instability. Perioperative assessment demands expertise and coordination between the surgical and anesthesia teams. Careful consideration of anesthetic agents is crucial to ensure they do not compromise the patient's respiratory function, a primary concern in these cases.

The prognosis for recovery in patients with chylothorax and severe obesity post-sternotomy appears quite favorable, despite the risk of complications. The patient successfully underwent the procedure without complications during both the surgery and the initial postoperative period. Transfer to the ICU was carried out for close monitoring, especially given the patient's complex condition involving risk factors like anemia, which could potentially affect hemodynamic stability and respiratory function.

For future research, further studies on optimal managements standard for chylothorax cases with various comorbidities are expected, particularly in high-risk patients such as those with obesity and anemia. Research can focus on the safest and most effective anesthesia options, as well as more efficient monitoring methods for early detection of postoperative complications.

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