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Case report
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A breathless journey: airway management in a pregnant patient with non-Hodgkin lymphoma

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Abstract

Airway compromise due to malignancy in pregnancy is rare but presents significant challenges. Physiological changes during pregnancy may further exacerbate airway obstruction from mediastinal masses, complicating management. We report a case requiring early tracheostomy for airway stabilisation and chemotherapy initiation. A 32-year-old at 17 weeks' gestation presented with non-Hodgkin lymphoma and a large anterior mediastinal mass causing severe airway compression. Multidisciplinary planning prioritised early airway stabilisation to avoid emergent interventions. Awake fibreoptic intubation allowed controlled tracheostomy placement, securing the airway for chemotherapy. Following the third cycle of treatment, the patient showed a good clinical response with significant mass reduction, improved symptoms, and better tolerance of oral intake. Plans were made for elective Caesarean section at 32–34 weeks, with tracheostomy maintained for airway security during delivery. This case underscores the importance of proactive airway management and collaborative planning in pregnancy complicated by mediastinal mass and airway compromise. Early airway stabilisation and multidisciplinary collaboration are critical in managing pregnant patients with compromised airways, thus optimising maternal and foetal outcomes. Future cases with similar risks may benefit from planned airway stabilisation and multidisciplinary collaboration.

Keywords: difficult airway, non-Hodgkin lymphoma, pregnancy, tracheostomy

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Introduction

Airway compromise due to malignancy in pregnancy poses significant risks to both maternal and foetal outcomes. Large anterior mediastinal masses, such as those seen in lymphomas, can progressively obstruct the airway, a condition that may worsened by pregnancy-related physiological changes.[1,2] This case highlights the successful stabilisation of a pregnant patient with non-Hodgkin lymphoma through early tracheostomy, enabling safe chemotherapy initiation. It underscores the critical role of multidisciplinary collaboration, meticulous procedural planning, and clear inter-specialty communication in managing complex airway scenarios during pregnancy.[2]

Case presentation

A 32-year-old Malay woman at 17 weeks and 5 days of gestation presented with newly diagnosed diffuse large B-cell non-Hodgkin lymphoma. The patient presented with progressive enlargement of an anterior chest swelling and increasing dyspnoea, as well as additional symptoms including hoarseness of voice and an inability to tolerate solid food, leading to significant weight loss. She was unable to lie flat due to the compressive effects of a large chest mass. There was no stridor or distended neck vein. Her medical history included no prior surgeries or significant illnesses, except for a seafood allergy. Functional assessment indicated NYHA Class III, with limited activity due to dyspnoea. Physical examination showed a large anterior chest mass (Fig. 1), Mallampati Class II airway good mouth opening, adequate neck extension, and absence of Pemberton's sign absent. Computed tomography revealed a 9.6 × 14.1 × 15.5 cm mediastinal mass (Fig. 1). At the thoracic inlet, the mass compressed the trachea with narrowing of its anterior-posterior diameter measuring 3.7 mm at its narrowest.

An urgent multidisciplinary team (MDT) discussion was held involving the anaesthesia, obstetrics, haematology, and otorhinolaryngology (ORL) teams. Key concerns included the need for high-dose steroids alongside chemotherapy to reduce the mass, the risk of perilesional oedema from initial treatment potentially worsening airway compromise, and the significant concern of neutropenic sepsis and tumour lysis syndrome. Given these factors, early tracheostomy was deemed critical for airway stabilisation and safe chemotherapy initiation.

Nevertheless, due to the severity of the airway narrowing, the MDT decided that if securing the airway was difficult or impossible, the procedure would be abandoned, and she would be referred to a cardiothoracic centre in another state

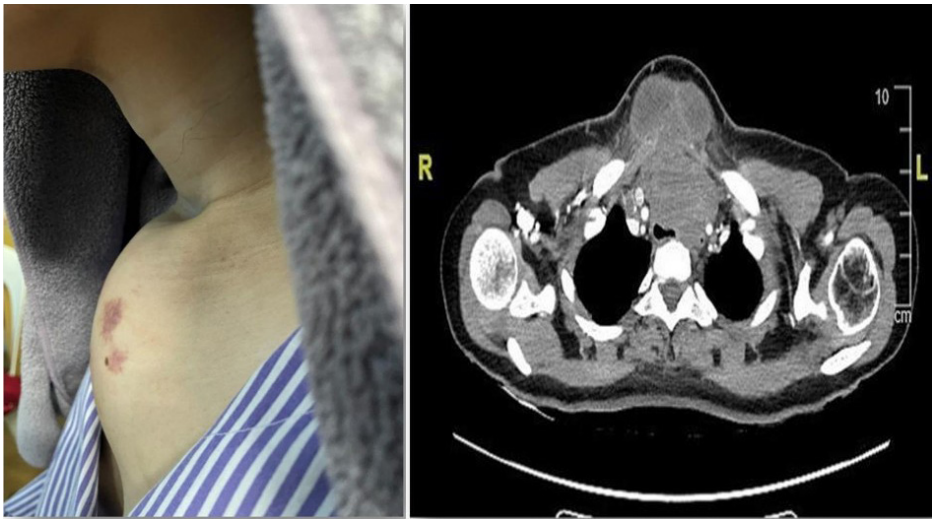

Fig. 1. (Left) A huge, solid mass over the chest area. *(Right)* Computed tomography showed that the mass originated from the mediastinum with extrathoracic extension.

for extracorporeal membrane oxygenation (ECMO) support before further intervention. To maximise the patient's chances of success, no sedation was given during awake fibreoptic intubation (AFOI) to maintain spontaneous breathing and avoid airway collapse. The patient and her family were thoroughly counselled regarding these risks, and consent was obtained for tracheostomy.

Standard monitoring included continuous pulse oximetry, end-tidal carbon dioxide ($ETCO_2$), and an arterial line inserted in the right radial artery for continuous blood pressure monitoring. An injection of intravenous (IV) glycopyrrolate 0.2 mg was administered. Preparations included the presence of the ORL team, who was ready for an emergent airway situation. A consultant anaesthetist performed the procedure in sitting position as the patient turned and became breathless at a lower inclination. A size 6.5 mm nasopharyngeal airway was soaked with 2% lidocaine gel and applied on the larger left nares. The initial scope was advanced through the nasal airway to topicalize the nasopharynx, larynx, supraglottic area, vocal cords, subglottic area, and over at the visualised site of narrowest tracheal compression and beyond distal to the compression above the carina. A total of 9 ml of 2% lidocaine (1 ml solution in 10 ml of air) was given. Continuous verbal communication with the patient was provided while waiting for the onset of the local anaesthetic. A size 5.0 microlaryngeal tube (MLT) was successfully advanced over the fibreoptic scope and through the compressed trachea.

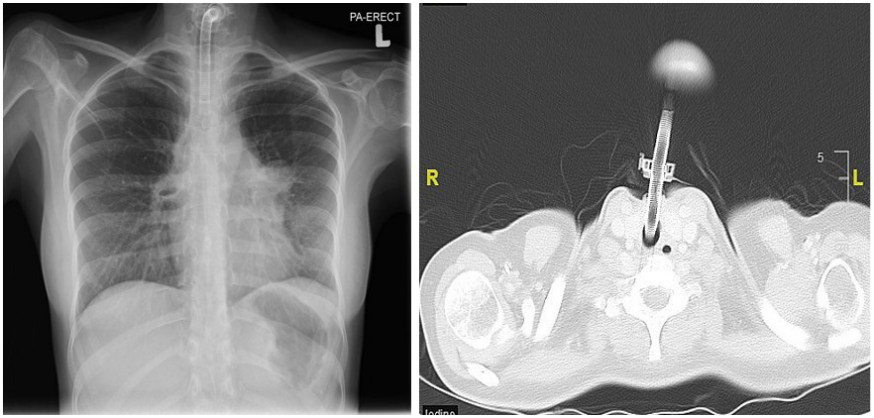

Fig. 2. (Left) Chest X-ray post tracheostomy in ICU. *(Right)* Repeat computed tomography after third cycle of chemotherapy showed significant mass reduction.

The patient was placed in a supine position and anaesthesia was induced with a combination of sevoflurane with 100% oxygen, IV propofol 50 mg, and target-controlled infusion of remifentanil. MLT placement was further confirmed with sustained $ETCO_2$. There was no increase in airway pressure, ventilation was well established, and oxygen saturation remained above 96%.

The ORL team performed the tracheostomy using a flexible tracheostomy tube size 7.0 (Shiley™, Medtronic, Minneapolis, MN, USA). The tube position was reconfirmed via flexible scope, with the tip seen to lie just above the carina and bypassing the external compression. Atracurium 25 mg was administered for muscle relaxation, with no significant impact on ventilation or oxygen saturation. Anaesthesia was maintained with oxygen, air, and sevoflurane. The patient remained haemodynamically stable without any inotropes or vasopressor support.

She was sent to the intensive care unit for further stabilisation and close monitoring. A chest X-ray confirmed tracheostomy placement with no acute complications (Fig 2). Chemotherapy commenced 10 days post-tracheostomy. After the third cycle, there was a significant reduction in the mediastinal mass size, allowing the patient to tolerate semi-solid food and sleep with one pillow (Fig. 2). A follow-up MDT discussion determined that the tracheostomy should remain in place to provide secure airway access for Caesarean delivery. Given the ongoing maternal condition and the need for coordinated care, early delivery via elective Caesarean section at 32 to 34 weeks' gestation was planned.

However, due to severe intrauterine growth restriction, early delivery was planned at 28 weeks' gestation. General anaesthesia was induced via the tracheostomy for Caesarean delivery. The procedure was uneventful, and the patient was weaned to a tracheostomy mask by the end of the surgery. Her baby was admitted to the neonatal intensive care unit for prematurity. She was successfully decannulated 2 weeks post-delivery. Despite an initial good response to chemotherapy, the disease later became resistant to treatment, and the patient ultimately succumbed 18 months after diagnosis.

Discussion

There is limited guidance in the literature on the optimal management of pregnant patients with an anterior mediastinal mass, with most available evidence derived from a small number of case reports documenting successful outcomes.[1,3,4]

In cases such as this, well-planned airway management is crucial, as documented by Boyne *et al.*, who highlighted the successful use of AFOI in a 35-week pregnant patient with airway compression for Caesarean delivery.[5] In our case, a proactive approach prevented rapid deterioration, while collaboration via MDT provided continuous risk assessment. In pregnant patients, reduced functional residual capacity, combined with increased blood volume and tissue swelling, can markedly decrease respiratory reserve.[5]

In contrast, Rocha *et al.* described a pregnant patient with significant airway obstruction managed successfully with high-dose corticosteroids alone,[3] thereby avoiding invasive airway intervention. Their report highlighted the potential for steroids to reduce airway compression. However, our patient presented with severe tracheal narrowing (3.7 mm anteroposterior diameter) and potential perilesional oedema following steroid therapy, making airway intervention essential. This highlights the importance of individualised management strategies.

Although successful intubation was achieved in our case, we remained vigilant for potential ventilation difficulties after administering neuromuscular blockade. Our patient did not exhibit any signs of worsening ventilation or airway collapse following muscle relaxant administration, likely due to the bypassing of the compression site via the tracheostomy. Boyne *et al.* reported worsening airway compression despite successful intubation upon loss of spontaneous breathing in a patient with a mediastinal mass, leading to increased airway pressures and ventilation difficulties.[4]

In a situation where intubation using AFOI is unsuccessful, ECMO can serve as a vital bridge for oxygenation while addressing the airway issue.[4] Some recommend femoral vessel cannulation before anaesthesia induction in patients with > 50% lower airway obstruction to facilitate ECMO if oxygenation fails.[6]

A case reported a 23-week pregnant patient with malignant thymoma and superior vena cava syndrome requiring sternotomy and one-lung ventilation. The airway was secured under general anaesthesia with spontaneous breathing, and positive pressure ventilation was initiated only after sternotomy. ECMO cannulas were not placed, as the surgical plan involved tumour elevation if ventilatory failure occurred.[3] In our case, in situations where intubation or tracheostomy is anticipated to be difficult or impossible, the patient will then be referred to a centre equipped with ECMO expertise to ensure optimal management of the airway and oxygenation.

Conclusion

Early airway stabilisation and multidisciplinary collaboration are critical in managing pregnant patients with compromised airways, thus optimising maternal and foetal outcomes. Future cases with similar risks may benefit from planned airway stabilisation and multidisciplinary collaboration.

Declarations

Informed consent for publication
This case report was presented and published with the patient's informed written consent.

Competing interests
None to declare.

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