

# Jet Ventilation in a Pregnant Patient with Tracheal Stenosis

Harminder Sandhu, OMS-III, MHSc<sup>1,2</sup>, Hira A. Khan, OMS-II, B.S.<sup>1,2</sup>, Molly A. Drlik, M.D.<sup>2</sup>, Elizabeth L. Wong M.D.<sup>2</sup>, Eric Hsu, M.D.<sup>2</sup>, Wael Saasouh, M.D.<sup>2</sup>

**DMC**  
DETROIT MEDICAL CENTER

<sup>1</sup>Michigan State University College of Osteopathic Medicine, Detroit, MI, USA  
<sup>2</sup>Wayne State University Anesthesiology, Detroit, MI



## Introduction

- Pregnant patients undergo significant respiratory and anatomical changes, including enlarged breasts, edematous mucosa and increased vascularity, which can complicate ventilation.
- Tracheal stenosis in pregnant patients is rare, but when present can exacerbate breathing issues and increase fatigue during delivery, increasing the risk of maternal and fetal mortality<sup>1</sup>.
- Jet ventilation is a technique that delivers small, rapid bursts of oxygen gas directly into the airway to maintain ventilation for patients with complicated airways or those undergoing pharyngeal or tracheal surgery<sup>2</sup>.
- High frequency jet ventilation is safe and effective for pregnant patients with difficult airways who are between 13 to 29 weeks pregnant. However, past 29 weeks, jet ventilation use has been limited and tracheostomy is more commonly used<sup>1,2</sup>.
- There is a dearth of literature exploring the use of jet ventilation in the third trimester of pregnancy in patients undergoing tracheal stenosis repair.

## Case Description

- **History:**
  - A 22-year-old G2P1001 female at 33 weeks and 4 days of gestation presented with a past medical history of severe asthma with prior hospitalization and intubation, vocal cord paralysis, and subglottic stenosis.
- **Presentation:**
  - Arrived at ED clinic for worsening symptoms including dyspnea, audible wheezing, and stridor worsened with exertion.
- **Diagnosis:**
  - Paresis of bilateral vocal cords with subglottic stenosis of approximately 40-50% (Figure 1) and tracheal narrowing of 1.5 cm in length.
- **Treatment :**
  - Emergent tracheal dilation performed by an ENT surgeon with the goal of alleviating subglottic stenosis and debulking the vocal cords.
- **Outcome:**
  - Patient remained stable throughout the procedure.
  - Successful direct laryngoscopy, bronchoscopy, and balloon dilation performed with alleviation of tracheal stenosis and associated symptoms.
  - Patient had appropriate recovery in the post-anaesthetic care unit.
  - No anesthetic complications were noted, and the patient recovered well in the SICU with no adverse events.

## Clinical Course

- **Pre-Operative Phase:**
  - Multidisciplinary team: Health care professionals from various teams were involved in the care of our patient preoperatively, intraoperatively, and postoperatively, including the cardiothoracic surgery, extracorporeal membrane oxygenation (ECMO), obstetric, and neonatal intensive care unit teams.
  - Plans were established for intraoperative fetal monitoring and contingency plans made to convert to an emergency cesarean section.
  - Preoperative medications were administered for airway preparation and gastroesophageal reflux disease prophylaxis.
  - Preoperative procedures included nebulizer treatment, glycopyrrolate, and esmolol administration, alongside vascular access placement.
- **Operative Phase :**
  - Standard anesthetic induction was used, and post-induction the patient was bag/mask ventilated with an oral airway so that a return to mask ventilation would be possible in the event of failure.
  - Jet ventilation was initiated with a rigid catheter passed through the vocal cords for subglottic jet ventilation. Jet ventilation settings: FiO<sub>2</sub> 100%, 120 rpm, and 35 PSI.
  - Jet ventilation resulted in stable oxygenation and ventilation throughout the procedure.
- **Postoperative Phase :**
  - Postoperative care included dexamethasone and heparin administration, continuous pulse oximetry monitoring in the surgical intensive care unit (SICU) and regular non-stress tests (NST) every 12 hours for fetal monitoring.
- **Follow up**
  - Patient discharged on postoperative day 2 with planned follow-up with ENT and OB teams.

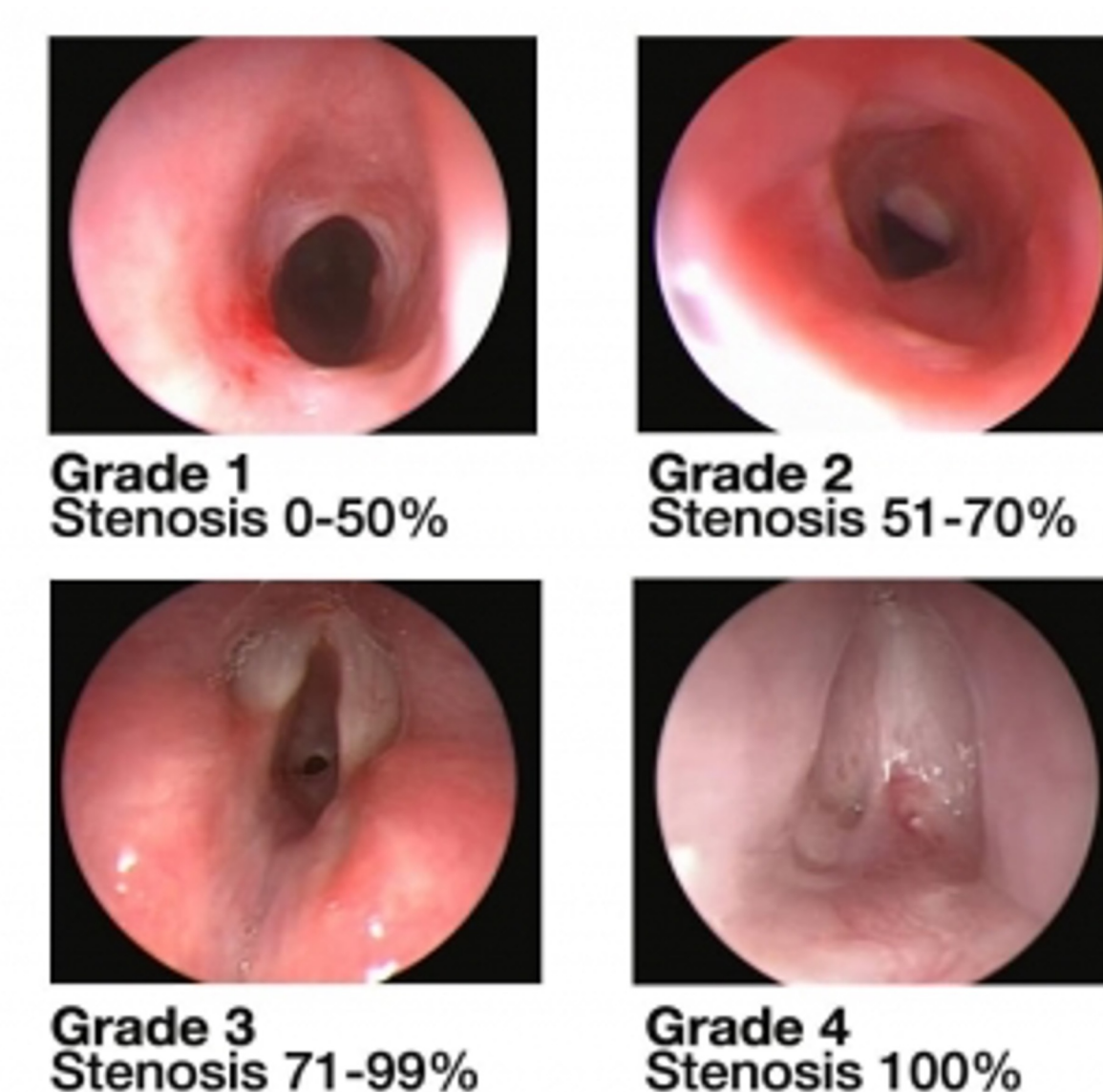


Figure 1: Mild subglottic stenosis (grades 1 and 2) and severe subglottic stenosis (grades 3 and 4)<sup>4</sup>



Figure 2: Lateral neck CT showing tracheal stenosis (arrow)<sup>5</sup>

## Discussion

- Achieving optimal outcomes for pregnant patients with tracheal stenosis requires a multidisciplinary approach with collaboration between various healthcare professionals<sup>1</sup>.
- Repairing severe cases in the first or second trimester of pregnancy can be imperative due to the progression of symptoms<sup>2</sup>.
- With advancing pregnancy, patients with stenosis can have exacerbated of symptoms, which can lead to increased fatigue during delivery and increased chances of mortality for the mother and fetus<sup>1,2</sup>.
- High frequency jet ventilation may be safely used during the third trimester of pregnancy during tracheal stenosis repair.

## Conclusion

- This case adds to the limited literature exploring the use of jet ventilation in pregnant patients in their third trimester undergoing tracheal stenosis repair<sup>1-3</sup> and supports the safe use of high frequency jet ventilation during the third trimester of pregnancy.
- Achieving optimal outcomes for mother and fetus and preventing complications during airway surgery for pregnant patients with complicated airway requires a collaborative approach among surgeons, obstetricians and anesthesiologists.

## References

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