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Anesthesia Management in a Pregnant Woman with Severe Sub-glottic Stenosis

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ABSTRACT

Tracheal stenosis is extremely rare during pregnancy and is frequently mistaken for and treated as asthma. We describe the management of anesthesia in a pregnant patient with severe subglottic stenosis requiring rigid bronchoscopy for dilation and laser treatment of the stenotic area. ***(Tanaffos 2008; 7(3): 76-80)***

Key words: *Subglottic stenosis, Pregnancy, Rigid bronchoscopy, Laser therapy, General anesthesia*

INTRODUCTION

Idiopathic tracheal stenosis is an uncommon form of tracheal stenosis usually involving the sub-glottic area. It more commonly occurs in women and some believe that it is related to hormonal factors (1, 2).

Its occurrence during pregnancy is rare (1-3) and only 6 cases of tracheal stenosis during pregnancy have been reported in the literature (2-7).

The diagnosis of tracheal stenosis is difficult and it is usually mistaken for asthma especially when there is a negative history and the patient has no sign or symptom of any associated diseases upon physical or para-clinical examination. Knowledge and awareness regarding the possibility of stenosis can help primary diagnosis (6).

In a pregnant woman with tracheal stenosis it is very important to choose the safest therapeutic intervention to minimize complications in both the mother and the fetus (2). Current reports believe that insertion of a tracheostomy tube under local anesthesia is the safest way to maintain an airway in these patients (2, 6).

In case of using other methods such as dilation and laser therapy of the stenotic site, preserving spontaneous breathing is necessary during induction of anesthesia.

However, maintaining spontaneous breathing through the mask can increase the risk of aspirating stomach contents especially in case of emergency (4, 8).

In this study, we report the management of general anesthesia in a pregnant woman with sub-glottic stenosis who underwent dilation and laser therapy of the stenotic site as an emergency measure to open her airway via rigid bronchoscopy.

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CASE SUMMARIES

Our patient was a 29-year-old woman and a known case of sub-glottic stenosis (G_1 P_0 A_0) referring due to dyspnea in the 31st week of pregnancy. She was hospitalized electively for the laser therapy of the stenotic site. On the 2nd day of hospitalization, the patient was taken to the bronchoscopy operating room as an emergency due to the sudden exacerbation of dyspnea for laser therapy.

The patient was under treatment with bronchodilators, steroids and antibiotics for asthma during the past 3 years. After conception, the patient's dyspnea worsened and in the last month of pregnancy prior to admission the patient developed dyspnea at rest. Speech therapy consultation 2 months prior to hospitalization suggested the possibility of sub-glottic stenosis.

Surgical consultation at the time of admission, tracheostomy under local anesthesia, till the end of pregnancy followed by laser therapy of the stenotic site had been recommended. But the patient did not consent to tracheostomy. Sonography demonstrated a healthy 31 week and 3 day fetus with fetal heart rate (FHR) of 140/min. The patient had a history of intra-tracheal intubation for a short-term general anesthesia for appendectomy with no complications 14 years ago and mentioned allergy to some foods and vegetables.

The patient was agitated when entering the operating room and was in semi-sitting position. She was receiving oxygen 5 lit/min through a nasal canula and had respiratory stridor, inhalatory and exhalatory stridor and hoarsness but she did not have cyanosis. Her vital signs were BP=110/70 mmHg, PR=115/min, RR=28/min and SpO_2=98%. On routine auscultation, exhalatory wheezing along with hoarseness were heard over the lungs. Upon head and neck examination, lymph nodes, thyroid and trachea were normal. Chest x-ray of the neck had not been performed because of pregnancy. Laboratory tests were normal. Spirometry performed 3 months before admission showed a mild obstructive pattern.

The 6 minute walking test one day earlier showed that the patient's arterial oxygen saturation rate dropped from 98% to 94% after walking 420 m.

At first, fiberoptic bronchoscopy was performed for evaluation of the airway and the stenotic site. The patient was placed in a supine position and her uterus was shifted to the left and 5 lit/min oxygen was continued through a nasal canula. Standard monitorings of NIBP, SpO_2 and ECG were also established. Then, a 20-gauge IV line was placed and atropine 0.5 mg, metoclopramide 10 mg, ranitidine 50 mg and hydrocortisone 200 mg were injected slowly. The patient was informed and reassured regarding local anesthesia, fiberoptic bronchoscopy and inhalation anesthesia. Lidocaine 10% spray was used for anesthesizing the oral mucosa and oropharynx then remifentanil 10 µg was injected intravenously. Following definitive diagnosis of sub-glottic stenosis, rigid bronchoscopy and laser therapy of the stenotic site were contemplated and general anesthesia was induced through inhalation by gradually increasing the concentration of halothane up to a maximum of 5% while maintaining spontaneous breathing through the mask. Sufficient depth of anesthesia was achieved 20 minutes later and bronchoscope # 3.5 and then # 4.5 were entered into the trachea and passed the stenotic site with slight pressure. Afterwards, halothane was discontinued and venous infusion of remifentanil (0.25 µg/Kg/min) was started and controlled ventilation of the patient was continued without using muscle relaxants and by using an automatic jet ventilator (Monson Universal Jet Ventilator, Acutronic Company Medical System AG) with FIO_2=50% and RR=60/min through a rigid bronchoscope. Then, the stenotic site was dilated by the consecutive use of bronchoscopes # 4.5, 5.5 and

6.5 and tissue of the stenotic site was removed by using Nd-YAG laser. Bronchoscopy and laser therapy took 15 min. Next, the patient was intubated by # 6 tracheal tube with a cuff, remifentanil infusion was discontinued and dexamethasone 8 mg IV was injected. Spontaneous breathing was established quickly. No complication occurred during anesthesia and SpO_2 was maintained over 90%. After reaching complete consciousness the patient was extubated in the operating room and since FHR monitoring was not available, sonography of the fetus was performed in the OR (which was normal). Then, the patient was transferred to the ICU. Arterial blood gas analysis was within the normal limit 2 hours after bronchoscopy. The patient could not recall any event during anesthesia and was discharged from the hospital in good condition 2 days later.

In the 39th week, our patient underwent C-section electively under epidural anesthesia and gave birth to a healthy baby. Ten days after delivery (2 months after laser therapy of the trachea) the patient was admitted again due to moderate dyspnea.

Spirometry showed obstruction of the upper airway. In the next follow-up 6 months after delivery the patient's respiration relatively improved and there was no need for aggressive therapeutic interventions. The patient was recommended to pursue regular follow-up visits.

DISCUSSION

Patients with upper airway obstruction especially tracheal stenosis are usually treated for asthma by mistake (6). Tumors, long-term tracheal intubation, tracheostomy, trauma, congenital causes, and granulomatous diseases can cause tracheal stenosis. Stenosis is called idiopathic when no cause is found for its occurrence (2).Tracheal stenosis during pregnancy is very rare and only 6 cases of tracheal stenosis in pregnant women have been reported in the literature (2-7). Occurrence of this condition during pregnancy can cause a complicated situation in terms of treatment and airway management especially for the anesthesiologist. Progressive edema and congestion of the airways that usually occur during pregnancy and increased respiratory load due to pregnancy can aggravate the obstruction in patients with tracheal stenosis and result in increased respiratory problems (2, 6). On the other hand, undiagnosed tracheal stenosis during pregnancy can result in difficult intubation at the initiation of anesthesia, hypoxemia, hypercarbia, maternal and neonatal complications (2, 9).

In general, it is recommended to avoid tracheostomy in the management of patients with benign forms of tracheal stenosis such as the idiopathic form and stenosis due to long-term tracheal intubation. Other treatment methods (i.e. repeated dilation, curettage of the granulation tissue or destroying the tissue of the stenotic site with laser through rigid or fiberoptic bronchoscopy and sometimes early resection and anastomosis based on the severity and location of the stricture) are preferred (1, 10-12). But, in pregnant patients, the treatment of choice is elective tracheostomy under local anesthesia and retention until the end of pregnancy to prevent the possible effects of hypoxemia and hypercarbia on the fetus in different stages. In most papers it has been emphasized to use regional anesthesia for C-section in patients with tracheal stenosis (2- 4, 6). Also, a reliable airway should be available in case the patient needs any type of surgery or anesthesia during pregnancy (2). Some authors believe that tracheostomy under local anesthesia is the safest method for maintaining an airway in this group of patients (2, 6).

Salama and colleagues reported a pregnant woman with tracheal stenosis for whom fiberoptic bronchoscopy under local anesthesia had been performed and the stenotic area had been dilated by using a balloon (5). Kuczkowski and colleagues

performed elective tracheostomy under local anesthesia in a pregnant woman (36th week of pregnancy) who was a known case of sub-glottic stenosis and maintained this airway till the end of pregnancy (2). In another case reported by Pare and colleagues tracheal stenosis had occurred 9 years earlier as the result of trauma and separation of the cricoid from the trachea. The patient was under treatment for asthma. This patient underwent tracheostomy as an emergency and C-section afterwards (6). In pregnant patients who do not agree to undergo tracheostomy (like our patient) or the surgeon or bronchoscopist believes that other methods such as dilation or laser therapy with rigid bronchoscopy under general anesthesia are preferred for opening the airway, the safest method of anesthesia should be chosen (2). It is obvious that the safest method of anesthesia is the one during which the anesthesiologist is able to control the airway all the time and maintain sufficient oxygenation and adequate ventilation for the patient. However, there is always a risk of premature delivery and fetal distress (9). Induction of inhalation anesthesia by using a mask is forbidden in pregnant patients especially in the 3rd trimester of pregnancy (4, 9). However, there are several reports regarding cases in whom induction of anesthesia with a mask has resulted in successful management of the airway and anesthesia in these patients (11- 14). Que and colleagues in 1999 reported induction of inhalation anesthesia with sevoflurane for C-section in a pregnant woman with drug-resistant asthma attack (15). Ratner and colleagues used inhalation anesthesia with sevoflurane through a mask for rigid bronchoscopy and curettage of the tissue at the site of stenosis in a pregnant woman with sub-glottic stenosis (4). Sutcliffe and colleagues induced inhalation anesthesia with halothane in a pregnant woman with severe tracheal stenosis due to radiotherapy. They used this method in a prolonged C-section surgery which had been started under spinal anesthesia. At first, they induced inhalation anesthesia with halothane and then intubated the patient by using # 4 tracheal tube. Due to the insufficient ventilation and oxygenation during spontaneous breathing, they ventilated the patient by using an oscillation method without using muscle relaxants (3). In another study by Mallett and colleagues to ease the breathing during natural delivery of a woman with tracheal stenosis, helium was used along with oxygen (7).

Our patient had been suffering from undiagnosed tracheal stenosis before her pregnancy for 3 years and had mistakenly been treated for asthma. Pregnancy exacerbated the signs and symptoms of upper airway obstruction and since no cause was found for occurrence of stenosis and also considering the short length of stricture at the sub-glottic area, it was diagnosed as idiopathic stenosis. Our patient did not consent to tracheostomy and therefore, inhalation anesthesia was induced through a mask and simultaneous breathing was maintained for rigid bronchoscopy, dilation, laser therapy of the stenotic area and maintaining the airway. After maintaining the airway by rigid bronchoscope total intravenous anesthesia (TIVA) with controlled ventilation of the lungs using a jet ventilator was used for continuation of anesthesia. Sub-glottic stenosis was dilated to an acceptable extent by dilation and laser therapy. We did not use another anesthetic drug despite remifentanil because laser therapy of the trachea was accomplished rapidly and clinical signs and symptoms in this time period were indicative of sufficient depth of anesthesia. In this patient we maintained an adequate airway and optimal oxygenation in both phases of induction and maintenance of anesthesia by using two different methods of anesthesia and ventilation.

Providing sufficient ventilation is one of the most important problems during anesthesia in tracheal and bronchial obstructive lesions and preventing

hypoventilation decreases the mortality rate significantly (15). Several studies have proposed the use of jet ventilation as an adjuant to routine mechanical ventilaton as a safe, risk-free method (without load and trauma, bleeding or aspiration) during rigid bronchoscopy and laser therapy of the stenotic site (16). In two separate studies, Schnider and Smith showed that during laser therapy of the trachea through bronchoscopy, oxygenation and ventilation of the patient is maintained more adequately by using jet ventilation. The reason is the resultant positive end expiratory pressure (PEEP) and decreased intrapulmonary shunt (14, 17).

CONCLUSION

The method of anesthesia in pregnant women with subglottic stenosis should be selected with the aim of establishing and maintaining a safe and stable airway and sufficient oxygenation. Tracheostomy under local anesthesia is the method of choice for this group of patients and if general anesthesia is needed, it is preferred to induce anesthesia by using the inhalation method and maintaining simultaneous breathing.

REFERENCES

1. Kanarek DJ, Infectious, inflammatory, infiltrative, idiopathic and miscellaneous tracheal lesions. In: Grillo HC, ed, Surgery of the Trachea and Bronchi. Ontario, Canada: BC Decker Inc, 2004; 363-395.
2. Kuczkowski KM, Benumof JL. Subglottic tracheal stenosis in pregnancy: anaesthetic implications. ***Anaesth Intensive Care*** 2003; 31 (5): 576- 7.
3. Sutcliffe N, Remington SA, Ramsay TM, Mason C. Severe tracheal stenosis and operative delivery. ***Anaesthesia*** 1995; 50 (1): 26- 9.
4. Ratner EF, Cohen SE, El Sayed Y, Druzin M. Mask induction with sevoflurane in a parturient with severe tracheal stenosis. ***Anesthesiology*** 2001; 95 (2): 553- 5.
5. Salama DJ, Body SC. Management of a term parturient with tracheal stenosis. ***Br J Anaesth*** 1994; 72 (3): 354- 7.
6. Paré PD, Donevan RE, Nelems JM. Clues to unrecognized upper airway obstruction. ***Can Med Assoc J*** 1982; 127 (1): 39- 41.
7. Mallett VT, Bhatia RK, Kissner DG, Sokol RJ. Use of an HeO2 mixture in the management of upper airway obstruction during labor and delivery. A case report. ***J Reprod Med*** 1989; 34 (6): 429- 30.
8. Dolon JV, Doyle DJ and Feldman MA. Anesthesia for eye, ear and throat surgery.In: Miller RD, ed. Miller's Anesthesia. Philadelphia, USA: Elsevier Churchill Livingstone, 2005; 2527-2555.
9. Birnbach DJ and Browne IM.Anesthesia for obstetrics .In: Miller RD, ed. Miller's Anesthesia. Philadelphia, USA: Elsevier Churchill Livingstone, 2005; 2307-2344.
10. Chao YK, Liu YH, Hsieh MJ, Wu YC, Liu HP, Wang CJ, Ko PJ. Controlling difficult airway by rigid bronchoscope--an old but effective method. ***Interact Cardiovasc Thorac Surg*** 2005; 4 (3): 175- 9.
11. Dedo HH, Catten MD. Idiopathic progressive subglottic stenosis: findings and treatment in 52 patients. ***Ann Otol Rhinol Laryngol*** 2001; 110 (4): 305- 11.
12. Grillo HC. Preoperative consideration.In; Grillo HC, Surgery of trachea and bronchi.ed Ontario; BC Decker Inc, 2004
13. Schaut DJ, Khona R, Gross JB. Sevoflurane inhalation induction for emergency cesarean section in a parturient with no intravenous access. ***Anesthesiology*** 1997; 86 (6): 1392- 4.
14. Schneider M, Probst R. High frequency jet ventilation via a tracheoscope for endobronchial laser surgery. ***Can J Anaesth*** 1990; 37 (3): 372- 6.
15. Que JC, Lusaya VO. Sevoflurane induction for emergency cesarean section in a parturient in status asthmaticus. ***Anesthesiology*** 1999; 90 (5): 1475- 6.
16. Ira J Rampil.Anesthesia for laser surgery. In: Miller RD, ed. Miller's Anesthesia. Philadelphia, USA: Elsevier Churchill Livingstone, 2005; 2573-2587.
17. Smith BE, Scott PV, Fischer HB. High frequency jet ventilation in intensive care--a review of 63 patients. ***Anaesthesia*** 1988; 43 (6): 497- 505.