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OLGU SUNUMU
CASE REPORT

A rare cause of noninvasive ventilation failure: tracheal stenosis

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SUMMARY

A rare cause of noninvasive ventilation failure: tracheal stenosis

Noninvasive ventilation is the first line treatment of choice in acute respiratory failure in many diseases including post-extubation respiratory failure. Herein we report a case unresponsive to noninvasive ventilation due to tracheal stenosis. A 49 year old female was admitted to intensive care unit after successful resuscitation of cardiac arrest. During the follow-up, she was extubated on 16th day and then transferred to the coronary ward. Four days later, she started to have progressive dyspnea and difficulty in breathing. Arterial blood gas evaluation showed respiratory acidosis with moderate hypercapnia. Noninvasive ventilation was initiated with the diagnosis of cardiogenic pulmonary edema however she did not respond to noninvasive ventilation therapy. Pulmonary consultation revealed that she had a new onset stridor. She had an urgent fiberoptic bronchoscopy which revealed severe tracheal stenosis. Tracheal stenosis should be considered in patients who do not respond to noninvasive ventilation after extubation like in our case.

Key words: *Noninvasive ventilation, failure, tracheal stenosis, post-extubation, respiratory failure*

ÖZET

Nadir bir noninvaziv ventilasyon başarısızlığı nedeni: trakeal stenoz

Noninvaziv ventilasyon, ekstübasyon sonrası solunum yetmezliği de dahil olmak üzere birçok nedene bağlı olarak gelişen akut solunum yetmezliğinde ilk tercih tedavi yöntemidir. Burada, trakeal stenoza bağlı noninvaziv mekanik ventilasyon başarısızlığı olan bir olgu sunulacaktır. Kırk dokuz yaşında kadın hasta kardiyak arrest ve başarılı resüsitasyon sonrası yoğun bakım ünitesine alındı. İzlemde 16. günde ekstübe edilerek koroner servise transfer edildi. Serviste izleminin dördüncü gününde hastada ilerleyici nefes darlığı ve nefes almada zorluk gelişti. Arteryel kan gazı analizinde solunumsal asidoz ve orta dereceli hiperkapni saptandı. Başlangıçta ön planda kardiyojenik pulmoner ödem düşünüldü ve noninvaziv mekanik ventilasyon desteği başlandı ancak hastada tedaviye yanıt alınamadı. İstenen göğüs hastalıkları konsültasyonunda hastanın yeni gelişen stridoru olduğu fark edildi. Acil olarak yapılan fiberoptik bronkoskopisinde, trakeal stenoz olduğu görüldü. Olgumuzda olduğu şekilde ekstübasyon sonrası uygulanan noninvaziv mekanik ventilasyona yanıt alınamayan durumlarda trakeal stenoz akla gelmelidir.

Anahtar kelimeler: *Noninvaziv ventilasyon, yetmezlik, trakeal stenoz, post-ekstübasyon, solunum yetmezliği*

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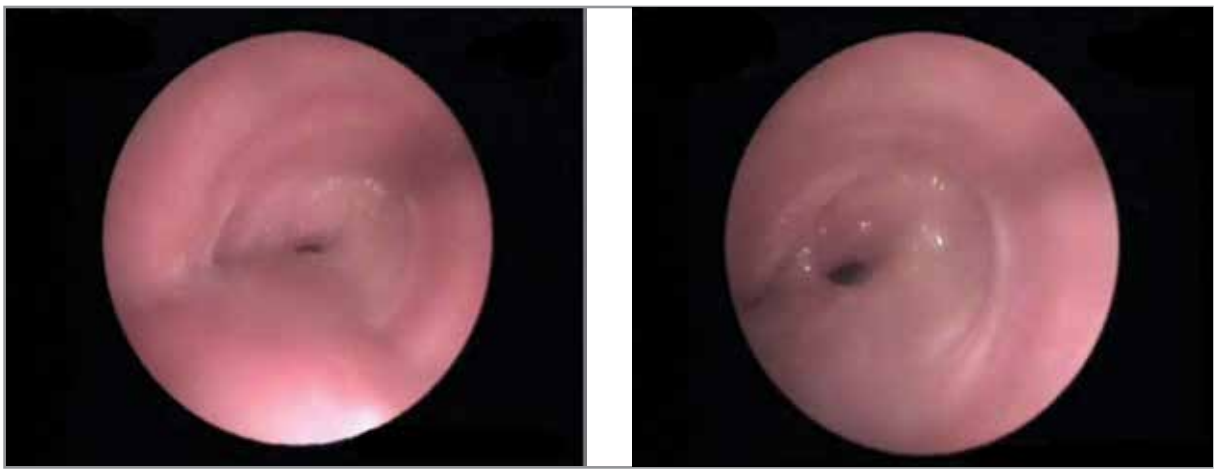

Figure 1,2. Fiberoptic bronchoscopic view of tracheal stenosis.

INTRODUCTION

Noninvasive ventilation (NIV) is the treatment of choice in many patient groups with respiratory failure. There is robust evidence for NIV use in chronic obstructive pulmonary disease (COPD) exacerbations, cardiogenic pulmonary edema and pneumonia in immunocompromised patients (1). Recently post-extubation respiratory failure was considered as another important area of NIV use (2). About one quarter of extubated patients may need reintubation and several studies suggested that NIV might be helpful for prevention of reintubation in different patient populations (3-5).

However, like in all other indications for NIV, it is crucial to define the most appropriate patients in the post-extubation group as well. Herein, we report a case with tracheal stenosis which should be considered as another possible contraindication of NIV use during post-extubation period.

CASE REPORT

A 49 year-old otherwise healthy female was admitted to intensive care unit (ICU) after successful cardiopulmonary resuscitation (CPR) of cardiac arrest due to ventricular fibrillation. During CPR, she was intubated and afterwards she was invasively ventilated. On day 16, following a spontaneous breathing trial, she was succesfully extubated. Next day she was transfered to the ward for continuation of medical therapy.

During her stay on the ward, she started to have progressive dyspnea and difficulty in breathing. Nasal oxygen therapy was started again by the cardiologist. On her arterial blood gas (ABG) evaluation she had respiratory acidosis with moderate hypercapnia, therefore she was transfered back to coronary unit for monitorization and NIV with the diagnosis of cardiogenic pulmonary edema. After 2 hours of NIV, her respiratory distress and hypercapnia on ABG did not improve. Coronary unit doctors asked for pulmonary consultation for a possible change in the settings of NIV. On consultation, physical examination revealed the patient had moderate respiratory distress with accessory respiratory muscle use. Respiratory rate was 28 breaths/min and she was on 4 L/min oxygen therapy with nasal cannula with a saturation of 95% on pulse oximeter. Expirium was prolonged and she had a new onset stridor. An emergency fiberoptic bronchoscopy (FOB) was performed and there was severe tracheal stenosis 4 cm below vocal cords (Figure 1,2). The tracheal lumen was nearly occluded and it was impossible to pass to distal part of stenosis. She was immediately started on methyl prednisolone (80 mg intravenous). Patient was consulted for an emergent tracheal surgery. Preoperative computerized tomography (CT) evaluation showed severe tracheal narrowing (Figure 3). She was then scheduled for surgery for the next day but her respiratory distress became worse that night and an emergent bedside tracheostomy was performed. Unfornutanely, during the procedure the patient developed cardiopulmonary arrest. She did not respond to CPR and died.

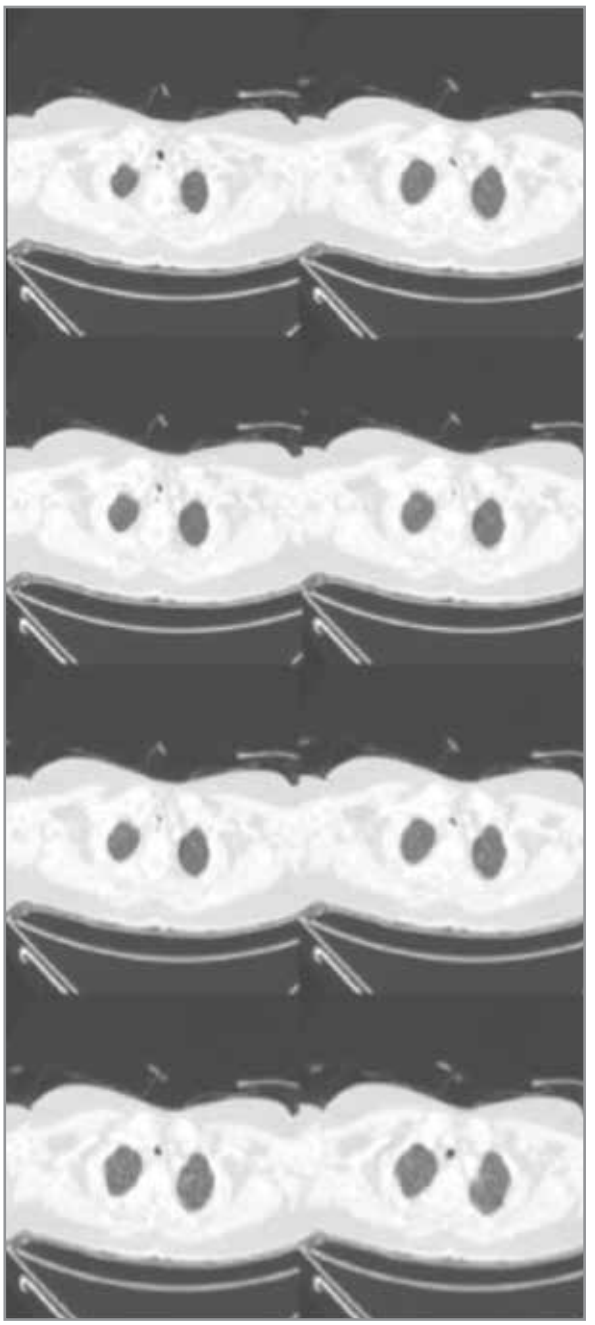

Figure 3. Serial computerized tomography images showing tracheal stenosis.

DISCUSSION

Post-intubation tracheal stenosis is a rare complication of intubation. About 2% of patients develop severe tracheal stenosis after intubation (6). It can occur any where from the level of the endotracheal tube tip up to the glottic and subglottic area, but the most common site is the level of endotracheal tube cuff. Cuff pressures higher than 20-30 cmH_2O may cause impaired microcirculation in the tracheal mucosawhich end up with mucosal ischemia causing fibrotic healing (7). Duration of intubation and artificial ventilation are reported as the most important factors in the development of stenosis. Whited et al. showed 2% incidence for less than 6 days of intubation whereas the incidence rises up to 12% for intubations more than 11 days (8). Despite routine measurement and monitorization of cuff pressures in the ICUs, tracheal stenosis still constitutes a serious clinical problem. Cuff leak test and newer screening methods, such as ultrasonographic evaluation of laryngeal air column width before extubation may be also helpful however, no reliable test for the identification of high-risk patients is currently available (9,10).

The diagnosis of tracheal stenosis depends on clinical suspicion and experience. Patients usually remain asymptomatic in mild forms of tracheal stenosis and exertional dyspnea is the most common presenting symptom when the tracheal lumen becomes 10 mm in diameter. Resting dyspnea and stridor appears only when the tracheal lumen is narrowed to 5 mm or less (7). When the diagnosis is considered, FOB can be helpful for direct visualization of tracheal narrowing. CT can also give additional information about the degree and length of stenosis.

There is growing evidence to use NIV in post-extubation respiratory failure (2).Whatever the cause, NIV needs intact upper airways which permit application of positive pressure ventilation via an oro-nasal or total face mask. Lower airways are also important for the success of NIV. It is well known that the presence of thick secretions and inability to cough are relative contraindications of NIV (1). Besides these well-known airway problems for NIV application, we think that our case deserves specific attention. Although there are several studies concerning NIV after extubation, there is no data for NIV failure due to tracheal stenosis. We think that this might be because of two reasons: First, patients with severe forms tracheal stenosis who were presented with symptoms were probably excluded from the studies due to the diagnosis of tracheal stenosis. Second, patients with milder forms of tracheal stenosis could have been missed, it should also be kept in mind that most patients with tracheal stenosis had either an alternative diagnosis like asthma, or remain asymptomatic in the early phase of treatment (7).

The application of NIV is increasing throughout worldwide Although it was a therapy limited to ICU many years ago, currently many centers use NIV in the wards because of limited ICU bed capacity. However this may result some important problems as well. Tracheal stenosis is a relatively well-known problem in the ICU setting and intensive care physicians usually start prophylactic bronchodilator and steroid therapy during extubation process, but the diagnosis outside of ICU environment may be problematic as in our case. Especially late presentations may be missed in the wards by the staff who have limited knowledge and experience for airway problems (10). We think that clinicians who perform NIV treatment especially outside of ICU should be aware of tracheal stenosis as a complication in recently extubated patients. Application of NIV in these patients can be potentially harmful due to delay to intubation (10).

In conclusion, NIV is an important treatment of choice in post-extubation respiratory failure. We want to emphasize that tracheal stenosis is a rare but important complication that should be kept in mind in recently extubated patients who are candidates for NIV.

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