

Severe Tracheal Stenosis with Stridor: An Uncommon Complication of Prolonged Ventilation

Stridorlu Şiddetli Trakeal Stenoz: Uzun Süreli Ventilasyonun Yaygın Bir Komplikasyonu

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ABSTRACT

Post intubation (PI) and post tracheostomy (PT) tracheal stenosis are common among patients requiring prolonged ventilation. However, patients presented with symptomatic severe tracheal stenosis are rare. We report a middle aged man presented to us with a left basal ganglia bleeding secondary to hypertensive emergency with an initial Glasgow Coma Scale (GCS) of E2V5M5 (11/15). He was intubated for surgical aspiration of hematoma in the operating theatre and was sent to the Intensive Care Unit (ICU) for weaning. His stay was complicated with restlessness and aspiration pneumonia. A percutaneous tracheostomy was done in the ICU at day seven of hospitalization. After one week, the tracheostomy tube dislodged and developed noisy breathing; however patient was not tachypneic nor distress. An urgent Computed Tomography (CT) Thorax showed narrowing of trachea at level of thoracic inlet – sternoclavicular junction. An emergency tracheostomy and examination under anaesthesia was planned by the Otorhinolaryngology (ORL) team. Direct laryngoscopy showed one centimeter stenotic lesion with matured scar and granulations above the new tracheostomy site. The entire procedure was uneventful. We highlight (1) the importance of ETT cuff pressure monitoring, (2) urgent definitive management of impending total airway obstruction and (3) uncommon presentation of symptomatic severe tracheal stenosis.

Key Words: Tracheal stenosis, cuff pressure

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ÖZET

Entübasyon sonrası (PI) ve trakeostomi (PT) sonrası trakeal darlık, uzun süreli ventilasyon gerektiren hastalarda sık görülür. Ancak semptomatik şiddetli trakeal darlık ile başvuran hastalar nadirdir. Bize, ilk Glasgow Koma Skalası (GCS) E2V5M5 (11/15) ile birlikte hipertansif acillığe bağlı kanaması olan sol bazal ganglionlar ile başvuran orta yaşlı bir adam sunuyoruz. Ameliyathanede hematoma cerrahi aspirasyonu için entübe edildi ve kanamanın kesilmesi için Yoğun Bakım Ünitesine (YBÜ) gönderildi. Yğün bakım huzursuzluk ve aspirasyon pnömonisi ile komplikeydi. YBÜ'de hastaneye yatışının 7. gününde perkütan bir trakeostomi yapıldı. Bir hafta sonra, trakeostomi tüpü yerinden çıktı ve gürültülü solunum geliştirdi; ancak hastada taşipne ve distress yoktu. Acil Bilgisayarlı Tomografi (BT) Toraks, torasik giriş - sternoklaviküler kavşak seviyesinde trakeanın daraldığını gösterdi. Kulak Burun Boğaz ekibi tarafından anestezi altında acil trakeostomi planlandı. Direkt laringoskopi yeni trakeostomi bölgesinin üzerinde olgunlaşmış skar ve granülasyonlarla bir santimetre stenotik lezyon gösterdi. Tüm prosedür sorunsuz geçti. (1) ETT manşet basıncı izlemesinin önemini, (2) yaklaşmakta olan total hava yolu tıkanıklığına acil olarak kesin yaklaşım yönetimini ve (3) semptomatik şiddetli trakeal darlığın nadir bir şekilde ortaya çıkmasını vurguluyoruz.

Anahtar Sözcükler: Trakeal darlık, manşet basıncı

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INTRODUCTION

Tracheal and subglottic stenosis is a common post intubation complication and may develop due to different reasons. One important reason is the endotracheal tube cuff pressure. The optimal cuff pressure is determined to be about 20-30cm H₂O so that aspiration pneumonia due to low cuff pressure and tracheal stenosis due to high cuff pressure can be avoided as much as possible.^{1,2,3}As the cuff pressure can be estimated approximately using palpation and minimal occlusive volume techniques, the accuracy of these techniques should be studied. It is recommended that the best way to measure endotracheal tube cuff is use a cuff manometer, and when there is no access to it, the minimal occlusive volume would be a better alternative as compared to palpation method, so the the cuff pressure is kept within a proper and ideal range to avoid tracheal stenosis.

CASE REPORT

A 44 year-old obese gentlemen who had hypertension for 5 years was admitted to our center for a diagnosis of left basal ganglia bleed secondary to hypertensive emergency. Aspiration of hematoma was successfully performed by the neurosurgical team and managed in the ICU postoperatively. Due to poor GCS recovery, a percutaneous tracheostomy was done. However, the tracheostomy tube was accidentally decannulated one week later and the patient developed noisy breathing for a few days. On examination patient had on and off stridor on deep inspiration; however he was not tachypneic and was able to maintain oxygen saturation under room air between 95 – 98%. His vital signs were normal and blood investigations were within normal limits except for Platelet levels of just 41,000/ml.

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An emergency bronchoscopy by respiratory physician showed normal vocal cords with 80% stenosis noted at subglottic area with granulation nodules on the trachea. CT Thorax showed tracheal narrowing at the thoracic inlet at sternoclavicular junction and is slightly deviated to the right side with a diameter of 0.8cm in transverse and 2.2cm in anterior-posterior (AP) direction.

The patient was then sent to the operating theatre for an emergency tracheostomy, examination under anaesthesia, and bronchoscopy. Patient was induced using Targeted Controlled Infusion (TCI) of Propofol and Remifentanyl and was successfully intubated using nasal awake fiberoptic technique with a size 6mm nasal endotracheal tube (ETT). 4 units of platelets were transfused intraoperatively.

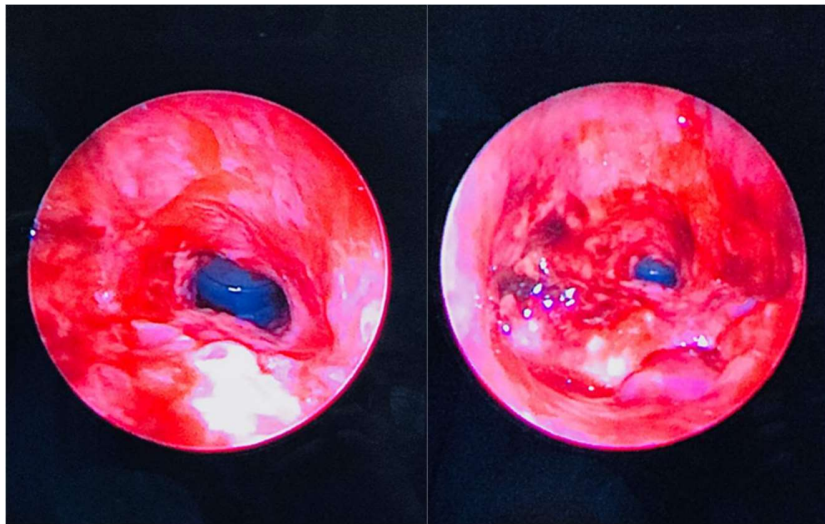


Figure 1 and 2 : views under direct laryngoscope showing subglottic stenosis directly beneath the endotracheal cuff balloon.

DISCUSSION

PI and PT stenosis remains an important cause of acquired tracheal obstruction. When the cuff pressure exceeds the mucosal capillary pressure (30 mm Hg) of the trachea, the mucosa that lies between the cuff of the balloon and the underlying cartilages develops ischemia. Long standing ischemia can lead to ulceration and chondritis of tracheal cartilages, followed by fibrotic healing, leading to progressive tracheal stenosis. It has been suggested that using standardized instrumentation to measure cuff pressure would help to decrease the possibility of injury resulting from endotracheal intubation.^{4,5,6} The inability of clinicians to determine endotracheal tube cuff pressure by the traditional standard method of palpation of the pilot balloon warrant the usage of a cuff manometer.

Usual factors responsible for stenosis are: cuff pressure, size of the tube relative to the tracheal lumen, duration of intubation, cardiovascular status during intubation, movement of tube during the period of intubation, sex and age of the patient, material from which cuff is manufactured and the possible adverse effects of steroids.⁷ However, tracheal stenosis can also be developed by intubation lasting as short as 24 hours only.⁸ These patients may remain asymptomatic for a variable period and then develop difficulty in expectoration and dyspnea on exertion and can progress to airway obstruction with the development of a stridor.

The acute airway management for a patient with a stridor following PI stenosis should always be dependent on the skills and knowledge of the anaesthesiologist. An awake fiberoptic intubation should be the best method. This can be done either by inhalational induction or via TCI method as per our patient. The reason why we chose the awake fiberoptic intubation to be done via TCI is that the patient was obese and we were doubtful regarding the anatomical structure of the airway. In addition, the anaesthesiologist in charge of the patient is well trained in performing awake fiberoptic intubation via TCI method.

A vertical incision was made in between second and third tracheal ring, and a tracheostomy tube 8mm was inserted and inflated. A flexible scope was inserted via tracheostomy tube and was able to view the carina; about one cm from the tip of tube. There were no stenosis nor tracheomalacia. There was a 1cm of stenotic segment located at 2cm below true cord and a circumferential matured scar with 60% stenosis. The stenosis extended to just above the tracheostomy site. The entire procedure was uneventful and patient was sent to the ward with the tracheostomy tube. Subsequent surgeries included endoscopic resection of the granulation tissue and changing of the tube to a permanent adjustable flanged tracheostomy tube to bypass the obstruction were done. The patient was well upon review after 2 months and managed conservatively. The tracheostomy was removed after 5 months after the initial hospitalization and did not develop any acute stridor symptoms soon after (Figure 1,2).

CONCLUSION

It is common for ICU patients to develop PI and PT stenosis. However, it is uncommon for a stenotic patient to develop acute stridor. A constant and regular monitoring of the tracheal cuff pressures are highly recommended to prevent stenosis. It is crucial for a trained anaesthesiologist to have the experiences and ability to manage a patient with airway emergencies.

Conflict of interest

No conflict of interest was declared by the authors.

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