Ankara Üniversitesi Tıp Fakültesi Mecmuası 2013, 66 (2)
DOI: 10.1501/Tıpfak_000000844

DAHİLİ TIP BİLİMLERİ/ MEDICAL SCIENCES
Olgu Sunumu / Case Report

Conservative Treatment of Neonatal Pneumomediastinum With Subcutaneous Emphysema Due To Airway Injury

Havayolu Hasarına Bağlı Oluşan Pnömomediastinum ve Subkutan Amfizemli Bir Yenidoğanda Konservatif Tedavi

Dilek Kahvecioğlu[1], Serdar Alan[1], Gülnur Göllü[2], Ömer Erdeve[1], Begüm Atasay[1], Murat Çakmak[2], Saadet Arsan[1]

[1] Ankara University, Faculty of Medicine Department of Pediatrics, , Division of Neonatology
[2]. Ankara University, Faculty of Medicine Department of Pediatric Surgery

Tracheal injury is an uncommon especially in neonates, and urgent recognition and management are needed because of its life-threatening complications. Here we present a-2160 g-female newborn with $34^{2/7}$ weeks gestation who sustained tracheal rupture following intubation for surfactant administration and treated with conservative management. Successful conservative management of tracheal perforation in infants involves the placement of uncuffed tubes distal to injury, holding of oral feeds and broad-spectrum antibiotics prophylaxis. Conservative management should be considered, especially in patient who has stable vital signs.

Key Words: ***Newborn, tracheal injury, pneumomediastinum, subcutaneous emphysemia.***

Trakeal hasarlanma özellikle yenidoğanlarda nadir görülür ve hayatı tehdit eden komplikasyonları nedeniyle acil tanı ve tedavi gerektirir. Biz de bu makalede $34^{2/7}$ haftada, 2160 gr doğan, surfaktan tedavisi verilmesi sırasında trakeal rüptür gelişen ve konservatif tedaviyle iyileşen bir kız yenidoğan olgusunu sunmayı amaçladık. Trakeal perforasyon gelişen yenidoğanlarda konservatif tedavide hasarlı bölgenin ilerisine endotrakeal tüp yerleştirilmesi, oral beslenmenin kesilmesi ve antibiyotik profilaksisi yer alır. Stabil vital bulguları olan hastalarda konservatif tedavi göz önünde bulundurulmalıdır.

Anahtar Sözcükler: ***Yenidoğan, trakeal hasarlanma, pnömomediastinum, subkutan amfizem.***

Tracheal injury in neonates and infants is a well-known but rare iatrogenic complication following tracheal intubation which is a commonly performed procedure in the neonatal intensive care units[1]. Although pneumomediastinum, bilateral pneumothorax, subcutaneous emphysema and occasionally pneumoperitoneum may occur as a result of tracheal injury, true incidence of tracheal injury following intubation is not known (1, 2). There is lack of information regarding the management of this injury. Conservative management is prefered instead of surgical procedure (2, 3). Here we present a case of a newborn who sustained tracheal rupture following intubation for surfactant administration and treated with conservative management.

Case

A-2160 g-female newborn with $34^{2/7}$ weeks gestation was born to a 34-year-old mother by cesarean section after an uneventful twin pregnancy. She did not require any resuscitation at delivery room, but progressive respiratory distress with tachypnea, grunting and subcostal retractions developed in the neonatal intensive care unit. Physical examination except respiratory symptoms was recorded as normal. Dyspnea and desaturation with oxygen saturation $<85\%$ required nasal

Received : Feb 28,2013 • Accepted: Feb 10,2014

Correspondance Author:

Dilek Kahvecioğlu, MD
Phone: 0 312 595 63 90 – 0 505 948 79 40
Fax: 0 312 3191440
e-mail: dileksaracoglu@yahoo.com
Ankara University Faculty of Medicine, Department of Pediatrics Division of Neonatology Cebeci-Ankara/Türkiye

continuous positive airway pressure (nCPAP). Chest x-ray demonstrated bilateral reticulonodular densities and arterial blood gas revealed mild respiratory and decompensated metabolic acidosis. Over the ensuing day, she was suspected to have neonatal pneumonia and received ampicillin and gentamycin. Increased work of breathing under nCPAP and possibility of secondary surfactant insufficiency led us to perform surfactant therapy by intubation-surfactant-extubation (INSURE) technique. Patient did not respond to surfactant and chest X-ray after 18 hours demonstrated pneumomediastinum and parenchymal infiltration (Figure 1). On the physical examination, diffuse swelling with crepitus involving right chest, neck and dorsum was observed (Figure 2). Repeated chest X-ray showed significant subcutaneous emphysema and pneumomediastinum (Figure 3). Subcutaneous emphysema was successfully drained with a needle. The pneumomediastinum and emphysema were stabilized following successful endotracheal intubation. A few hours after initiation of the intubation, patient's respiratory distress symptoms disappeared completely. The patient was kept intubated for three days to heal airway injury before she was successfully extubated. Chest X-ray was normal on postnatal 5th day and no further investigation was needed. She was discharged as completely healthy after ten days.

Discussion

Tracheal and subglottic injuries from trauma by endotracheal intubation are rare in neonates (2). Among 360 patients who were intubated in our neonatal intensive care unit (NICU) in the last three years, only this case developed subcutaneous emphysema and pneumomediastinum due to tracheal injury. Schuman et al (4) have reported iatrogenic perinatal pharyngoesophageal injury in only six cases of 5910 patients who were discharged from NICU between 2004-2008 with an overall incidence of 0.01 % (4).

Acute tracheal rupture following intubation may occur as a consequence of direct mechanical trauma or ischemic pressure necrosis. The spectrum of potential lesions includes mucosal laceration, cartilaginous fracture and disruption of the cartilaginous framework (2). The area of tracheal injury in neonates occurs more commonly in the anterior wall in the subglottis or trachea at the cricothyroid junction (2, 5). The narrowest part of the trachea is the level of cricoid cartilage in neonates, so that the endotracheal tube fit tightly in the cricoid cartilage and may cause mucosal injury and tracheal rupture in this area. Multiple procedure-and patient-related factors have been cited as potential risk factors of tracheal injury (2, 6).

The most important signs of airway rupture include respiratory distress, subcutaneous emphysema, and pneumomediastinum (7). Because of high mortality rate, urgent recognition and management are needed (1, 2). In our patient pneumomediastinum occurred 18 hours after intubation. A small amount of air, arising from a tear in tracheal muchosa, might be the cause of this clinical situation. Plain X-ray of the chest is the most important to obtain. Although computed tomography may further delineate the area of the injury, it is necessary only in some cases with pneumomediastinum who are not visible by conventional chest X-rays (2, 8). Chest x-rays and the clinical history were well diagnostic for pneumomediastinum and subcutaneous emphysemia, therefore no further investigation like bronchoscopy was needed in our patient.

Therapy is centered around stabilizing the airway and preventing and managing complications. Historically, surgical exploration and immediate repair was recommended, however, expectant management has been advocated as an option for stable patients (9). If patients have stable vital signs, absence of respiratory distress, stable pneumomediastinum or subcutaneous emphysema, absence of sepsis and tracheal laceration less than 1 cm, conservative management of tracheal rupture is recommended (2). Successful conservative management of tracheal perforation in infants involves the placement of uncuffed tubes distal to injury, holding of oral feeds and broad-spectrum antibiotics prophylaxis (2, 4, 7). In our patient, the pneumomediastinum and emphysema were stabilized following successful endotracheal intubation and a few hours after respiratory distress symptoms disappeared completely.

In conclusion, tracheal intubation is a commonly performed procedure in the NICU but tracheal or subglottic injuries are very rare. Urgent recognition and management are needed for tracheal injury because of life-threatening complications. Conservative management should be considered, especially in a patient who has stable vital signs.

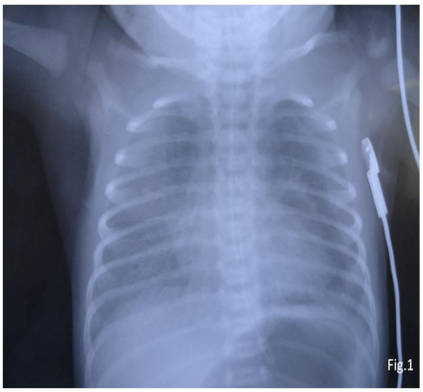

Figure 1: Pneumomediastinum and parenchymal infiltration on chest x-ray after 18 hours of INSURE treatment.

Figure 2: Diffuse cutaneous swelling involving neck, right chest and axillary regions

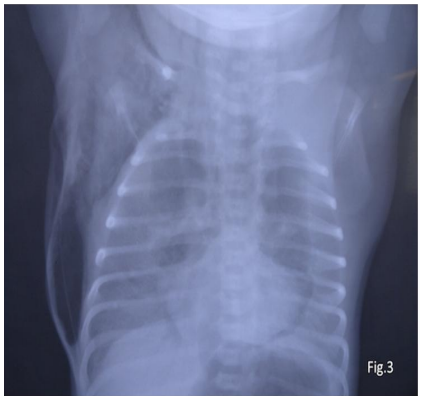

Figure 3: Significant subcutaneous emphysema in addition to pneumomediastinum

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