Postintubation tracheal rupture is rare, but serious. Emergency intubation is often conducted during cardiopulmonary resuscitation (CPR), and the risk of postintubation tracheal rupture can be increased during CPR. We describe here a case of postintubation tracheal rupture in a 65-year-old female who was transferred from another hospital after CPR. Postintubation tracheal rupture in this case is thought to have been related to malposition of the endotracheal tube (ETT), elevation of the intratrachea pressure due to chest compression, and an overinflated cuff. However, the most important factor is considered to be the overinflated cuff, which is often caused by manual palpation. Therefore, emergency physicians should consider using a manometer to check the cuff pressure of the ETT, even during CPR. When spontaneous circulation is restored, the pressure of the cuff must be measured with a manometer.

Keywords: Cardiopulmonary resuscitation, intubation, pressure, rupture, trachea
was 40 cmH\textsubscript{2}O. Tube cuff pressure and depth were corrected to 25 cmH\textsubscript{2}O and 18 cm, respectively. Follow-up of chest CT 2 days later clearly revealed a posterior tracheal wall rupture [Figure 3a] and bronchoscopy was conducted. A 4 cm size longitudinal rupture was observed at the posterior lower tracheal wall on bronchoscopy [Figure 3b]. However, no esophagography was performed to determine if there was also an esophageal perforation. Emergency surgery for tracheal wall repair was performed because of increased subcutaneous emphysema. Although esophagography was not performed, it was thought that there was no esophageal perforation because the patient was able to eat without any problems from 5 days after the operation and she was discharged at 8 days after tracheal surgery. The patient’s written consent has not been obtained. [This study was approved by the institutional review board of Inha University Hospital (INHAUH 2018-04-001). IRB authorized the patient’s consent exemption].

**DISCUSSION**

The incidence of postintubation tracheal rupture is reportedly 0.005%–0.03%.[1] Although the mechanisms of postintubation tracheal rupture have not yet been fully identified, known patient-associated factors are older age, female, tracheal disorders, chronic obstructive pulmonary disease, and long-term corticosteroid use, while mechanical risk factors include oversized tube, overinflated tube cuff, use of double lumen tube or rigid stylet, and multiple forced attempts.[1-3] Thus, during CPR, multiple risk factors can be combined to increase the risk of developing this serious complication. Emergency physicians often conduct emergency intubation without any advance knowledge of patients. Accordingly, it can be challenging to choose an appropriate-sized ETT, place it at an appropriate depth, and produce cuff pressure correctly by manual regulation during CPR. There have been four reported cases of tracheal rupture after emergency intubation during CPR: two with overinflated tube cuff, one after difficult intubation, and one in which there was a malpositioned tube.[2,4,5] We assume that, in this case, chest compressions were performed when an ETT with an overinflated cuff was inserted too deeply; thus, the risk of her tracheal rupture was greatly increased. This is because intrathoracic pressure, which is increased by chest compressions, might abruptly increase intratracheobronchial pressure.[5] However, we believe that the most important risk factor in this case was the overinflated tube cuff. The recommended ETT cuff pressure to prevent ischemia of tracheal mucosa while reducing the risk of aspiration is 20–30 cm H\textsubscript{2}O.[6] However, the cuff pressure by manual palpation is usually underestimated, even by experienced emergency physicians.[3,7] Therefore, to avoid postintubation tracheal rupture during CPR, it would be better to measure the ETT cuff pressure with a manometer immediately after auscultation for tube position confirmation. In addition, chest X-ray should be checked immediately after return of spontaneous circulation to determine if there are complications such as rib fractures, hemopneumothorax, or pneumomediastinum, which may be caused by CPR. In addition to these complications, the degree of cuff inflation should be checked on chest X-ray and the pressure should be rechecked with a manometer immediately after return of spontaneous circulation. Emergency physicians should also conduct these procedures when patients have been transferred from other hospitals. When these conditions are verified, if other signs such as pneumothorax, pneumomediastinum, or subcutaneous emphysema are present, chest CT and bronchoscopy should be considered. Even if there are no other signs at that time, follow-up for tracheal rupture is prudent. Although our patient received surgical repair because of increased subcutaneous emphysema, postintubation tracheal ruptures have different therapeutic options from
tracheal ruptures of traumatic origin, and most cases without mediastinitis have been treated successfully with conservative nonoperative therapy.\(^{4,8}\) Therefore, therapeutic options for postintubation tracheal rupture should be determined considering its morphological appearance and related complications.

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**Conflicts of interest**
There are no conflicts of interest.

**References**
1. Tacquard C, Collange O, Olland A, Dégot T, Steib A. Post‑intubation tracheal rupture: Poor healing of the tracheal wall. Can J Anaesth 2014;61:357‑61.
2. Laughland F, Brand J, Round S, Khan K. Iatrogenic tracheal rupture during cardiac arrest. J Cardiothorac Vasc Anesth 2018;32:1403‑6.
3. Sudhoff TH, Seidl RO, Estel B, Coordes A. Association of oversized tracheal tubes and cuff overinsufflation with postintubation tracheal ruptures. Clin Exp Otorhinolaryngol 2015;8:409‑15.
4. Conti M, Pougeois M, Wurtz A, Porte H, Fourrier F, Ramon P, et al. Management of postintubation tracheobronchial ruptures. Chest 2006;130:412‑8.
5. Wagner A, Roeggla M, Hirschl MM, Roeggla G, Schreiber W, Sterz F, et al. Tracheal rupture after emergency intubation during cardiopulmonary resuscitation. Resuscitation 1995;30:263‑66.
6. Rosero EB, Ozayar E, Eslava‑Schmalbach J, Minhajuddin A, Joshi GP. Effects of increasing airway pressures on the pressure of the endotracheal tube cuff during pelvic laparoscopic surgery. Anesth Analg 2018;127:120‑5.
7. Lim H, Kim JH, Kim D, Lee J, Son JS, Kim DC, et al. Tracheal rupture after endotracheal intubation – A report of three cases. Korean J Anesthesiol 2012;62:277‑80.
8. Cardillo G, Carbone L, Carleo F, Batzella S, Jacono RD, Lucantoni G, et al. Tracheal lacerations after endotracheal intubation: A proposed morphological classification to guide non‑surgical treatment. Eur J Cardiothorac Surg 2010;37:581‑7.