

Pharyngeal Perforation following Endotracheal Intubation in a Patient with Rheumatoid Arthritis

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Intubation of patients with rheumatoid arthritis (RA) can be difficult and airway trauma can occur with physical force and multiple attempts to intubate. In one such patient, pharyngeal perforation, subcutaneous and mediastinal emphysema, pneumothorax and pneumoperitoneum occurred following attempts of endotracheal intubation. Antibiotic therapy led to good results.

Case Report

A 63-year-old, 147 cm tall woman weighing 50 kg was scheduled for total knee replacement. She had had RA since age 21. She complained of swallowing disturbance as well as knee problem. At age 50, she was put under general anesthesia for cholecystectomy, at our hospital. A review of the anesthetic record at that time showed that endotracheal intubation was difficult and only after several attempts was success attained. Physical examination revealed slight deformity of extremities, but no limitation of cervical spine mobility. The mouth opening was about 3 fingers breadth.

Premedication consisted of atropine,

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0.5 mg and hydrocortisone, 100 mg, im. As difficult intubation was anticipated, direct laryngoscopy was done to examine the degree of difficulty after intravenous sedation with droperidol, 5 mg and fentanyl, 100 μ g. An endotracheal intubation seemed feasible from visualization of oropharyngeal structures. Anesthesia was induced with thiamylal, 200 mg and vecuronium, 8 mg, iv. Although the laryngeal aperture was partially visualized by laryngoscopy, oral intubation of the trachea was unsuccessful despite several attempts with the aid of a stylet, external laryngeal pressure and position change of the head and neck. A nasotracheal intubation was then attempted and eventually a 7.0 mm cuffed endotracheal tube was inserted. Auscultation of the chest revealed distant breath sounds, bilaterally.

Soon after positive pressure ventilation was begun, cervical subcutaneous emphysema and cyanosis developed. Further positive pressure ventilation resulted in a rapid spread of subcutaneous emphysema to the abdomen. Finally, ventilation became impossible because of high airway pressure and bradycardia occurred. The endotracheal tube was removed. An attempt at ventilation via a mask improved chest expansion slightly and increased the heart rate. An emergency tra-

cheostomy was done under mask ventilation and the cyanosis was alleviated. Chest and abdominal radiographs revealed extensive subcutaneous and mediastinal emphysema, pneumothorax of the left lung and pneumoperitoneum. A chest tube was inserted into the left pleural space and ventilation was markedly improved. The knee surgery was postponed.

The patient was transferred to the intensive care unit. Examinations of the upper airway and the esophagus using a flexible fiberoptic endoscope demonstrated severe laryngeal edema, but there were no pharyngeal or esophageal tears. A CT scan of the neck revealed severe laryngeal edema and a low density spot in the cricoid cartilage. The patient was treated with controlled ventilation for two days, iv antibiotics and nasogastric tube feeding. On the 10th postoperative day, an esophagogram showed no evidence of an esophageal leak. A tracheal cannula replaced the tracheostomy tube on the 13th postoperative day and oral intake was resumed, with no untoward effects.

The patient, with a tracheostoma in place, underwent total knee replacement 3 weeks later. Three days after the surgery, a follow-up CT scan of neck was performed. Although no abnormalities were noted in the rest of the upper airway, the region from the left piriform sinus to the posterior cricoid cartilage was abnormal, compared to findings on the right side. The tracheostoma was closed, and the remaining hospital course was uneventful.

Discussion

The development of subcutaneous emphysema, mediastinal emphysema and pneumothorax following endotracheal intubation is evidence of perforations of the pharynx or cervical esophagus^{1,2}. The diagnosis of perforation is usually corroborated with en-

doscopy or radiographic techniques^{2,3,4}. Although our patient had typical signs of perforation, a definitive diagnosis was not made by endoscopy or by a contrast study. The pharynx was the probable site of tear as cervical subcutaneous emphysema appeared early and rapid deterioration of ventilation after nasotracheal intubation and improvement via a face mask followed. If the perforation had occurred in the esophagus, positive-pressure ventilation using a mask might have worsened the patient's condition. As tracheostomy eventually relieved the cyanosis, a pharyngeal perforation probably had occurred.

Perforations of the pharynx and cervical esophagus most commonly occur through the pharynx, posterior to the cricopharyngeal muscle². This site, as formed by the sling of the cricopharyngeal muscle, is anatomically susceptible to trauma. The second most common site of perforation is the piriform sinus². In our patient, esophagoscopy and an esophagogram revealed no esophageal tears. The clinical course also showed that esophageal perforation had not occurred. Based on findings of a follow-up CT and the presence of a left-sided pneumothorax, it is speculated that the junction between the left piriform sinus and the posterior pharyngeal wall was the most probable site of tear. Endoscopy failed to demonstrate the exact site of tear probably due to a marked edema of the glottic opening and pharynx. If a radiographic study using water soluble contrast media had been done immediately after the injury, a leakage of dye from the site of tear into the superior mediastinum would have become evident. We could not determine why the nasal endotracheal tube could not bypass the hypopharyngeal tear. The inflated cuff of the endotracheal tube might extend the tear and promote a rapid spread of gas

by positive-pressure ventilation to the mediastinum.

Most cases of pharyngeal and esophageal perforation heretofore reported were caused by traumatic intubation¹⁻⁴. The common factors included relative inexperience in intubation, a rigid stylet beyond the tip of the endotracheal tube and advance of the tube with force after meeting resistance of the hypopharyngeal wall. In our case, the first and the second factors can be excluded but the third factor may possibly have contributed to the pharyngeal perforation.

Various airway abnormalities associated with RA have been described, laryngeal and pharyngeal involvement have been recognized in 26% of patients with RA⁵. The principal problems facing anesthetists are difficulty in visualization of the larynx and difficulty in passing the endotracheal tube to narrowing of the glottic opening. Cricoarytenoid arthritis is usually suspected from symptoms including hoarseness, stridor, dysphagia and pain radiating to the ears⁶. As the patient had complained of dysphagia in recent years, cricoarytenoid involvement due to RA cannot be excluded. In such a case, the cricoarytenoid tissue may have weakened and contributed to pharyngeal perforation. In the pre-anesthetic evaluation of the patient, a fiberoptic examination of the larynx and the pharynx should have been done.

Previous reports emphasized a high mortality rate of pharyngeal and esophageal perforations from mediastinitis, especially when diagnosis and adequate treatment including surgical intervention were delayed^{1,2}. The location and the size of the tear probably influence morbidity and mortality². Fortunately, the patient was success-

fully treated with the conservative management, mainly antibiotic therapy. The early recognition of perforation prior to development of mediastinitis, and the size and location of perforation which permitted non-surgical therapy probably account for the good outcome. Early surgical closure of perforation and drainage, supported by proper antibiotic therapy, are recommended¹⁻⁴.

In summary, we presented a case in which a patient with RA had pharyngeal perforation following endotracheal intubation during induction of anesthesia. We wish to emphasize the need for careful and gentle intubation, even when fiberoptic laryngoscopy is being used.

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