Severe Aryepiglottic Edema following Extubation in a Patient with Rheumatoid Arthritis

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Rheumatoid arthritis (RA) is often associated with limited mouth opening, unstable cervical spine, hypoplastic mandible, deviation of larynx and glottic narrowing due to arthritis of the cricoarytenoid joint, all of which significantly contribute to difficutlty in direct laryngoscopy and tracheal intubation[1,2]. An elderly woman with a long history of RA undergoing anterior cervical spine fusion was nasally intubated with the aid of fiberoptic bronchoscope after multiple attempts. After extubation, she developed severe inspiratory stridor and signs of upper airway obstruction despite complete recovery of consciousness. Edema of the aryepiglottic fold was noted and the patient required re-intubation.

Case Report

A 75-year-old woman, 140 cm tall and weighing 33 kg, was scheduled to undergo elective fixation of unstable cervical spine (C 4/5) from anterior approach. She had a 25-year history of rheumatoid arthritis and had been treated with non-steroidal anti-inflammatory drug. She had experienced posterior cervical spine fixation at the age of 67, fixation of the fractured hip at 69. She had been taking nicardipine 20 mg and furosemide 20 mg twice daily since she was 72 years old. The patient could not extend or flex her neck and could open her mouth only slightly (3 cm). Severe deformity of fingers were noted. The patient was found to have moderate exertional dyspnea but had neither stridor nor a remarkable degree of hoarseness. Cardiorespiratory findings were normal. Laboratory results were; WBC 3,000/mm^3, hemoglobin 10.8 g·dl^{-1}, hematocrit 32.6%, platelet 149,000, bleeding time 3'00", PT 12.8 sec, APTT 35.0 sec. Serum proteins, enzymes and electrolytes were normal, as well as preoperative chest X-ray and ECG.

Atropine 0.3 mg and meperidine 21 mg were given as preanesthetic medication. After routine monitoring was commenced, the patient was sedated with incremental dose of fentanyl (total 75 μg) and 0.5 mg of midazolam while beathing 100% oxygen via face mask. Fiberoptic laryngoscopy via right nostril was extremely difficult due to deviation of larynx and glot-

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tic narrowing. The patient became gradually somnolent and 20 minutes later, she did not respond to verbal command, which made it even more difficult to keep patent airway. Fiberoptic bronchoscope was inserted to just above the carina, but endotracheal tube could not be threaded over the bronchoscope easily, and significant nasal bleeding occurred during the procedure. Forty micrograms of naloxone was administered to reverse the effect of fentanyl. After multiple attempts, her trachea was finally intubated with 6.5 mm cuffed endotracheal tube. Anesthesia was maintained with isoflurane and nitrous oxide in 40% oxygen. Intraoperative course was stable and the narrowed intervertebral space between C4 and C5 was fixated with iliac bone graft.

Emergence from anesthesia was smooth and with full muscle strength. However, immediately after extubation, the patient developed severe inspiratory stridor and effort respiration. She could maintain hemoglobin oxygen saturation above 97% with a fractional inspired oxygen ($F_{I_{O_2}}$) of 1.0. Arterial blood gas while breathing 100% oxygen showed a pH of 7.31, Pa_{CO_2} 60 mmHg and Pa_{O_2} 111 mmHg. Direct visualization of the larynx was difficult and revealed severe edema of the aryepiglottic fold. It was noted that the vocal cords were adducted and fixed. Methylprednisolone 125 mg was given i.v. for prevention of glottic edema. The patient was transfered to the intensive care unit (ICU). Shortly after admission to ICU, upper airway became progressively obstructed and the trachea was orally re-intubated with 6.5 mm cuffed tube under direct laryngoscopy. Following re-intubation, her vital signs stabilized with blood pressure 120/90 mmHg, heart rate 90 beats·min^{-1}and respiratory rate 10–15/min. Arterial blood gas with a Fi_{O_2} of 0.5 demonstrated a pH of 7.40, Pa_{CO_2} 39 mmHg and Pa_{O_2} 155 mmHg. Four milligrams of dexamethasone was administered i.v. Postoperative course was uneventful and she was extubated on the following morning. Repeat fiberoptic laryngoscopy revealed slight improvement of aryepiglottic edema.

Discussion

Rheumatoid arthritis is a disease characterized by immune-mediated synovitis, which affects multiple joints throughout the body. The anesthesiologist's immediate concerns when managing patients with RA are related to airway problems. The trachea may be difficult to intubate because of a number of reasons, such as unstable or stiff cervical spine, hypoplastic mandible, limited jaw mobility, laryngeal rotation and disorder of the cricoarytenoid joint[1,2]. Retrograde intubation technique and tracheostomy may be difficult or impossible in patients with most advanced stage of RA, in which surgical access to anterior neck is severely limited. In such a case, intubation with the aid of fiberoptic bronchoscope may be the only method for securing the airway. Judicious use of sedative and analgesic is important for successful fiberoptic bronchoscopy. Premedication with meperidine and i.v. sedation with fentanyl (2.3 $\mu g \cdot kg^{-1}$) and midazolam (0.015 $mg \cdot kg^{-1}$) might have been excessive for this elderly, undernourished woman. Attempted passage of endotracheal tube resulted in massive nasal hemorrhage, which obscured the visual field through the bronchoscope significantly. Although nasotracheal route is much easier for fiberoptic intubation than orotracheal route in patients with normal airway anatomy, that may not be the case in patients with RA because of laryngeal rotation. Involvement of the cricoarytenoid joints produces progressive narrowing

of the rima glottidis, thus making intubation difficult, or almost impossible without concomitant laryngeal injury[3]. Nasal mucosa of RA patients is also fragile and prone to bleeding, especially in patients who are taking corticosteroids. So we should have avoided the nasotracheal intubation and rather intubation via orotracheal route should have been selected.

RA patients can develop airway difficulty even after a benign perioperative course[4,5]. Cricoarytenoid arthritis is a fairly common pathology in RA patients. Bienenstock et al. reported a 26 per cent incidence of this lesion[6]. However, it is difficult to determine which RA patient will present an airway problem, because arthritic involvement of the larynx is not so easily assessed preoperatively[7]. Certain clinical signs and symptoms such as dysphagia, inspiratory stridor, hoarseness, dyspnea and laryngeal tenderness should arouse suspision, and preoperative laryngoscopy indicated[3,8].

Although the recovery of consciousness was rapid and complete, possible upper airway problems should have been exptected as this patient required multiple, traumatic upper airway manipulation at the start of anesthesia. Edema of the aryepiglottic fold following extubation was severe enough to necessitate immediate re-intubation. Whether this patient's aryepiglottic edema is only the sequelae of multipe attempts of intubation, or it is also related to pre-existing rheumatic lesion of the cricoarytenoid joint is unclear, but possible difficulty in maintaining patent airway after extubation should have been anticipated. In RA patients, difficulty in laryngoscopy and intubation is well appreciated, but we should also bear in mind the existence of undiagnosed glottic narrowing. Special care should be taken to avoid trauma, as airway obstruction may occur following extubation.

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