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The Use of Lidocaine Aerosol Inhalation in an Awake Tracheal Intubation in an Ankylosing Spondylitis Patient with Fiber Optic Bronchoscopy: A Case Report

XI Yuan Jin*, Hao Zhang*, Qingxu Wang*

Shanghai East Hospital, Tongji University, China

#These authors contributed equally to this work

Case Report

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*For Correspondence

Qingxiu Wang, Department of Anesthesia, Shanghai East Hospital, Affiliated to Tongji University, Jimo Road 150, Shanghai, China, Tel: 06356972656

E-mail: 15269612517@163.com

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ABSTRACT

Ankylosing spondylitis is a chronic inflammatory disease, characterized by fibrous or bony ankylosis and deformity of spine. We report the perioperative course of a patient with long standing ankylosing spondylitis with fixed flexion deformity of the cervical spine and restricted mouth opening. She was scheduled for a laparoscopic cholecystectomy surgery and we performed an awake fiber optic nasal intubation after sufficient topic anesthesia by 2% lidocaine aerosol inhalation and other methods. We aim to discuss the importance of adequate anesthesia in endotracheal intubation and other technique in airway management of severe ankylosing spondylitis patients. This can provide several referential experiences in endotracheal intubation in other difficult airways with cervical deformity or other situations unexpected.

INTRODUCTION

Ankylosing spondylitis (AS), alone with psoriatic arthritis, reactive arthritis, inflammatory bowel disease arthritis and undifferentiated spinal arthritis, used to be called autoimmune seronegative spondyloarthropathy. It is a kind of chronic progressive inflammation of the spine, characterized by spinal activity limitation and lumbar back pain. Pathological changes of AS often start from the sacroiliac joint and gradually spread to the spine, which eventually led to the fibrous or bony ankylosis and deformity of spine. These may bring anesthesiologists several difficulties, such as limited mouth opening, limited cervical movement, and atlanto-axial subluxation, even fractures with little or no history of trauma^[1]. Therefore, the airway management of this type of patient needs some distinctive ways. There are numerous approaches described in the literature. These include laryngeal mask airway^[2], video laryngoscopy guided intubation^[3] and awake tracheal intubation with some new visual laryngoscope^[4]. What we described following is awake nasal incubation in an AS patient with fiber optic bronchoscopy.

CASE REPORT

A 50-year-old female patient with an AS history of 8 years was scheduled for laparoscopic cholecystectomy. She complained about progressive emergence of cervicothoracic spinal kyphosis deformity and spinal mobility constraints for several years. In addition, the patient reported a history of hemangioma of right nose which bleeds easily although can be stanchied by compression. Besides, the patient has no hypertension, diabetes, chronic bronchitis and other diseases. Preoperative airway examination revealed a full set of teeth, intact upper and lower dentition without overbite, fixed flexion deformity of the cervical spine and mild restricted mouth opening (≈ 3 cm) (**Figures 1 and 2**). Her mandible which cannot extend forward is less than 3.5 cm far from the chest. And her forward neck length is only 1.5 cm to 2 cm (**Figure 2**). Furthermore, the patient could not lie flat and fixed at nearly 75° to the bed in the superior thoracic vertebra. The Mallampati score as rated was class IV. These all indicated a difficult

airway and the patient's X-ray preoperative further confirmed **(Figure 3)**.



Figure 1: Mild restricted mouth opening



Figure 2: Cervical spine fixed flexion deformity



Figure 3: Bony ankylosis and fixed flexion deformity of the cervical spine indicates a difficult airway

Based on all the assessment, tracheal intubation was administered. Patient was kept in supine position, with her head and neck supported on pillows and the table was adjusted to moderate head-down position. After topical anesthesia of 2% lidocaine through the oropharynx and cricothyroid membrane puncture, traditional direct laryngoscope (DL) and GlideScope video laryngoscope were conducted. However, neither of them worked secondary to the patient's severe cervical spine deformity, limited mouth opening, and unusual airway configuration. GlideScope video laryngoscope in lateral position can be inserted only 1/3 of the blade. So after additional intravenous sedation (dexmedetomidine 50 ug, sufentanil 10 ug) and ephedrine nasal treatment,

the patient received a size 6.5 endotracheal tube thoroughly lubricated via the left nasopharynx under the guidance of fiber optic bronchoscopy. However, a hyperactive glottis blocked our way. Blind intubation was then provided but failed. After all these, the patient refused to continue due to fear and anxiety. Eventually, the surgery was rearranged.

Three days later, after fully communicated with the patient and eliminated her anxiety, the second attempt was performed. To ensure adequate anesthesia of oropharynx and glottis, several efforts were made. Firstly, 2% lidocaine aerosol inhalation 10 min was provided, the patient hinted numbness in tongue and whole upper respiratory tract when completed (**Figure 4**). What follows is 2% lidocaine injected via the cricothyroid membrane into the trachea. With dexmedetomidine 50 ug, sufentanil 10 ug intravenous and ephedrine nasal treatment again, a size 6.5 endotracheal tube via the left nasopharynx advanced over the fiber optic bronchoscopy into the trachea easily. This time the activeness of glottis was substantially restrained and the patient felt hardly any discomfort (**Figure 5**).



Figure 4: 2% lidocaine aerosol inhalations route



Figure 5: Fiber optic bronchoscopy guided endotracheal

DISCUSSION

Ankylosing spondylitis is a chronic inflammatory disease, mostly strike young male body. It is also considered to be highly correlated with HLA-27. The main pathological change of this disease is fibrous or bony ankylosis and deformity of the spine. This always reshapes the airway of the patient and makes it more intractable and challenging to conduct endotracheal intubation for these patients when needed.

To manage airway for AS patients smoothly, first of all, a thorough pre-operative assessment is essential. We need to evaluate the severity of the disease, in particular airway condition and the extra-articular manifestations of the disease [5]. Besides diseases history of the patient, electrocardiogram, pulmonary function and some routine preoperative examinations, an X-ray or CT of head and neck is necessary. As fracture-dislocation after endotracheal intubation has been reported and even neurological decline if the patient has preexisting cervical spine disease [6]. We need to acquaint ourselves previously with the deformity of the spine and its influence on airway or spinal cord by X-ray or CT pre-operative to take measures in advance. In our patient, we acquired useful information of her disease but omitted her unusual fear for surgery since she got to know that her neighbor was dead in a surgery. The anxiety and distrust of doctors led to the first attempt's failure to some degree.

Awake intubation is the safest option for AS patients. Some anesthetists prefer low dose of propofol intravenous before intubation. Which is acceptable, but the dose should be controlled properly to avoid respiratory depression. Adversely, the use of muscular relaxant is considered undesired relatively. As in patient with severe ossification and stiffness of the spine, loosening throat muscles does not help but atony of diaphragm is dangerous instead.

Topical anesthesia is another factor should not be ignored. Actually the main difference between the two attempts in our case truly is topical anesthesia. Cetacaine or lidocaine spray to the tongue and oropharynx is the most adopted choice. The same with lidocaine injected via the cricothyroid membrane. But these are not sufficient in some occasions. In our case, lidocaine aerosol inhalation is provided and facts have proved that this is an effective method. Similar technique has been reported in another case [7]. They sprayed 4% lidocaine onto the hypopharynx and laryngeal inlet by a mucosal atomization device, MAD (Wolfe Troy Medical, Inc., Salt Lake City, UT). And as the author narrated, this manually sprays a fine mist of local anesthetic onto a discrete area of the mucosa and further confirmed the effectiveness of topical anesthesia.

As for the method to facilitate tracheal intubation, nasal fiber optic intubation is a reliable choice with higher success [8]. The intubating laryngeal mask (ILM) and the classic laryngeal mask are also available alternatives in AS patients especially in those who cannot bear awake nasal fiber optic intubation. ILM is even superior for fiber optic intubation some time because of its convenience. But we have to be vigilant when employing ILM in case it slips out. Glidescope, Airtraq airway, McCoy laryngoscope are other options, if manipulated expertly and properly can be very helpful [9-11].

When surgery admitted, spinal and epidural anesthesia can be approaches. But they are supposed to be technically difficult and may result in an increased risk of complications. The fusion of vertebrae makes it challenging to apply spinal or epidural anesthesia. Mini-laminectomy and C-arm assisted technique may be able to solve this [12,13]. Deformity of spine also brings about stenosis of spinal space or epidural space. Local anesthetic agent should be administered slowly in small doses to avoid total spinal anesthesia as a solution.

In this case report, we describe an alternative technique for endotracheal intubation in a patient with ankylosing spondylitis to provide additional information on various aspects of airway management for laparoscopic cholecystectomy surgery.

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