

## Case Report

# Successful Lightwand-Guided Intubation in a Patient with Long Standing Ankylosing Spondylitis Who Had Failed Intubation with Other Intubation Tools

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### Abstract

Tracheal intubation in patients with cervical arthroplasty with occlusion of the upper airway frequently poses great difficulty. The purpose of this case study was to discuss lightwand tracheal intubation in patients with ankylosing spondylitis (AS) through exploring a successful lightwand-guided intubation case of a patient with AS. The patient was a 61-year-old male suffering from a fixed extension-flexion deformity that affected mobility in his entire spine. Any methods including GlideScope, I-gel were failed. Tracheal intubation using lightwand was only successful. Based on this case, we would like to suggest that using a lightwand in cases of AS may be appropriate.

**Keywords:** Ankylosing Spondylitis; Lightwand

### Introduction

Ankylosing Spondylitis (AS) is a chronic, progressive, and autoimmune spondyloarthropathy. AS is a disease that starts with the sacroiliac joint and the spine, causes inflammation of the entire spine, ultimately resulting in the fusion of all vertebral bodies (bamboo spine). [1] The stiffness of the cervical spine and atlantooccipital, temporomandibular, and cricoarytenoid joints caused by AS can cause great difficulty during intubation. Patients who have had chronic AS for a long time may have severe whole spine kyphosis, which makes it impossible for the patient to be positioned properly for normal intubation, because the patient cannot adequately extend their neck [2].

In many studies, a lightwand has proven to be useful for intubation in patients who are unable to extend their neck. [3-5] The purpose of this study was to investigate a case of a successful intubation using a lightwand in an AS patient. Written consent was obtained from patient.

### Case Report

A 61-year-old male patient who was 142 cm tall and weighed

45 kg was referred to our clinic for both phacoemulsification and aspiration of cataracts. There were no underlying diseases other than AS, which the patient was diagnosed with at 30 years old. No abnormalities were found in laboratory tests, such as general blood tests, clinical chemistry tests, and coagulation tests. The patient's mouth opening was relatively good, with Mallampati score of class II, and his tooth state was intact, but any neck extension was impossible (Figure 1). To evaluate the position and patency of the airway, whole spine x-ray and MRI were performed. The results were as follows: (1) thoracic kyphosis (2) ankyloses of the atlantoaxial joint, all apophyseal joints of the cervical spine bilaterally, the first three costovertebral joints and (3) diffuse marginal syndesmophytosis and arthritis of both facet joints of the lumbar spine (Figure 2). As an otorhinolaryngology's confirmed, it was demonstrated that the upper airway patency was good, and it was recommended that a fiber optic bronchoscope should be prepared for intubation. According to the orthopedic consult, it was impossible for the patient to maintain supine position during the expected operation time. The anesthesia team decided to use a semi-sitting position with a pillow under the neck and back and proceeded with surgery. In addition to the fiber optic bronchoscope, video laryngoscopes, including the Glide Scope, LMA, and lightwand, and the equipment for a cricothyrotomy were prepared. Sugammadex was

also prepared for the reversal of the muscle relaxant, due to anticipated difficulty of the intubation. Large pillows on the neck and back were needed to maintain the semi-sitting position. (Figure 1), and led to the following heights: the bed-head height was 32 cm, the bed-shoulder height was 14 cm, and the bed-nipple height was 5 cm. After preoxygenation for more than three minutes with 100% O<sub>2</sub> at 8 L/min, pentothal sodium was administered at 4 mg/kg and rocuronium at 0.6 mg/kg. After the BIS was kept below 60, the degree of muscle relaxation was checked with a nerve stimulator to confirm that the TOF was 0, and intubation was attempted after confirming that the vital signs of the patient were stable. I-gel supraglottic airway #3 and #4 insertion were attempted. However, insertion of both I-gel #3 and #4 failed even though neck manipulation was tried several times. Afterwards, tracheal intubation using a GlideScope was attempted, but it failed because there was a grade IV laryngeal view and the advancement of the endotracheal tube was not possible. At that time, mask ventilation was still possible, and the pulse oximetry showed that the SpO<sub>2</sub> remained above 95%, indicating that the patient's airway was not in a state of "CICO" (cannot intubate cannot oxygenate). Therefore, lightwand guided intubation was attempted. A lightwand railroaded with an endotracheal tube was bent 90° at 5 cm the distal end. Lightwand intubation was successful in less than 10 seconds without any stimulation.



**Figure 1:** Supine position of patient. Large pillows under the head and neck were placed to support a neutral position.



**Figure 2:** Radiological findings with diffuse marginal syndesmophytosis and arthritis of both facet joints of the lumbar spine.

## Discussion

AS occurs in 1% of the male population and 0.5% of the female population (in Caucasians). In males, it is the most common at the age of 20-30 and invades the spine and pelvic joints more often than in females [5]. The cause of the disease is not known, and environmental factors (bacterial or viral agents) are thought to be susceptible to diseases (HLA-B27) and gender, age, and ethnicity [2].

The formation of ectopic bone due to a persistent inflammatory response and inflammation of the vertebral ligaments produce syndesmophytosis, which are vulnerable to injury due to fractures. Through this process, fractures associated with bamboo spines are formed. Cervical fracture is common in C5-6, which may occur with impact or hyperextension. For this reason, there is a risk of causing cervical spine and spinal cord injury by neck extension during intubation, and neck movement (extension & flexion) should be evaluated radiographically before intubation [3-5].

The GlideScope is useful for visualization of the larynx in patients with difficult airways, such as patients [6]. The Glide Scope provides a better glottic view than that of direct laryngoscopy, and endotracheal intubation using a GlideScope may be a suitable alternative in AS patients. Indirect awake fiber optic intubation is the safest option in patients with poor larynx structure, and laryngeal mask insertion is an alternative when the patient refuses the former procedure or for other reasons [7-9]. Also, lightwand-guided intubation, which allows intubation without larynx visualization, can be considered. Previous studies have shown that lightwand-guided intubation in difficult intubation cases is useful [10-12]. However, it is difficult to directly study which intubation tools are most useful in some situations, due to various limitations (especially due to ethical issues).

In this case, we attempted intubation after induction of general anesthesia rather than awake intubation because patient refused awake fiber optic intubation and wanted general anesthesia. Because face mask ventilation during preoxygenation was well maintained, the patient's situation was not a CICO situation, and other intubation tools could be used after the first failed attempt without waking the patient.

Airway management in AS patients poses many difficulties for anesthesiologists. The rigidity of the joints due to the arthroplasty of the cervical vertebrae and the resulting limited neck extension is not only a great threat to intubation but also increases the risk of cervical fracture during neck manipulation for intubation. According to these limitations, the safest method for intubation is awake fiber optic intubation, but in this case the position of the patient is fixed to the supine (the circuit does not

need to move unstably). I-gel supraglottic airway #3 insertion was first attempted because the patient's mouth opening and the patency of the airway were good. After this attempt failed, the view of the glottis through the GlideScope did not show any possibility for intubation at all, and the lightwand, a tool for intubation regardless of mouth opening or glottis view, was used.

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