

## Case Report

# Lightwand-Assisted Nasotracheal Intubation in Awake Ankylosing Spondylitis

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Several techniques of airway management in ankylosing spondylitis (AS) have been reported. No study related specifically to the use of a lightwand-assisted intubation in AS has been previously described. The present case report demonstrates that an awake, nasotracheal intubation can be successfully performed to provide general anesthesia in a patient with AS. A 65-year-old Thai male was scheduled for exploratory surgery under general anesthesia. Past medical history consisted of hypertension and AS. The preoperative airway assessment showed limitation of mouth opening, an extremely anteriorly flexed and immobile cervical spine. An awake intubation under sedation and topical airway anesthesia were chosen. Multiple attempts at blind nasotracheal intubation and oral approach with lightwand were unsuccessful. Finally, intubation was successfully performed with lightwand by nasal route. This serves to show that an awake nasotracheal intubation with a lightwand may be a safe and useful alternative option for airway management in patients with severe ankylosing spondylitis.

**Keywords:** Ankylosing spondylitis, Nasotracheal intubation, Lightwand

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Ankylosing spondylitis (AS) is a progressive inflammatory disease, characterized by stiffening of the joints and ligaments. AS produces a severely rigid spine, known as "bamboo spine", which causes marked limitation of cervical spine movement. Involvement of the atlanto-occipital joint restricts head extension and temporomandibular joint ankylosis restricts mouth opening. Difficult airway is the main problem with these patients. Thus, AS presents specific challenges to the anesthesiologist.

In recent years, to overcome the problem of difficult intubation, several methods have been used, such as blind nasotracheal intubation, intubating laryngeal mask airway<sup>(1-3)</sup>, retrograde intubation<sup>(4,5)</sup>, flexible fiber optic-guided intubation<sup>(5,6)</sup> and lightwand device<sup>(7-15)</sup>. However, no study related specifically to the use of a lightwand-assisted intubation in AS has been previously described.

The present case report demonstrates that an awake, nasotracheal lightwand-assisted intubation can

be successfully performed and can be an alternative technique to provide general anesthesia in patients with AS.

### Case Report

A 65-year-old Thai male, 53 kg body weight and 160 cm tall, was scheduled for exploratory surgery of the common bile duct under general anesthesia. At the age of 19 years, he had undergone spinal anesthesia for lower extremity surgery. Since the age of 45, he had had limitations of neck and back movement in flexion, extension, and rotation. He could not walk because of progressive stiffening of both hip joints. He was diagnosed with ankylosing spondylitis. Ten years prior to this admission, he had undergone total hip arthroplasty on both sides under general anesthesia 3 times. No complications related to the anesthesia occurred.

The preoperative airway assessment showed limitation of mouth opening and neck movement in any direction. The interincisor gap and thyromental distance were 2.5 and 3 cm, respectively. The jaw could not move anteriorly. The hard palate, soft palate and base of the uvula were visible (Mallampati class II)<sup>(16)</sup>.

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The patient showed an extremely anteriorly flexed and immobile cervical spine (Fig. 1). Lateral radiographs of the cervical spine revealed that all segments of the cervical spine were bridged by anterior and posterior syndesmophytes (Fig. 2).

He had well controlled hypertension with  $\beta$ -blocker. His blood pressure was 140/80 mm-Hg and other preoperative laboratory investigations were normal (American Society of Anesthesiologists class II). Preoperative medication consisted of 2 mg diazepam and 50 mg metoprolol given orally 1 hr before being taken to the operating room.

Following discussion about anesthetic choices and intubating techniques, the patient had accepted the suggestion of awake intubation and informed consent was obtained. After the electrocardiogram was performed, the patient was continually monitored through a sphygmomanometer and pulse oximeter. The patient was preoxygenated while 1 mg midazolam and 25  $\mu$ g fentanyl were slowly given intravenously for sedation. Topical anesthesia of the oropharynx, right nostril and nasopharynx were achieved with 10% lidocaine spray. Laryngeal anesthesia was produced by transtracheal injection through the cricothyroid membrane with 3 ml of 4% lidocaine. Lidocaine jelly was used for lubrication at the right nostril before insertion of the endotracheal tube. During these procedures, the patient's position was supine and his head was supported with a 10 cm high pillow.

Multiple attempts at blind nasotracheal intubation were unsuccessful, after which the author attempted to insert a transillumination lightwand device (Trachlight™) orally (Fig. 3). The author was unable to manipulate the lightwand past the oropharynx, however, with the angle of this device apparently causing the failure. The author tried several times with no success.

Finally, intubation was achieved by using a nasal approach with the lightwand. After an optimal and central transillumination glow was clearly visible on the glottis, a cuffed 7.5 mm internal diameter endotracheal tube was threaded over the lightwand into the patient's trachea. The successful intubation required only one attempt. A capnograph was used to confirm the endotracheal intubation. No desaturation and mucosal bleeding occurred during the intubation. The general anesthesia and surgical procedure lasted 1.5 hrs and was carried out without any complications. He had a mild symptom of sore throat that resolved within 2 days postoperatively. No hoarseness and other airway complications were found.



**Fig. 1** In the supine position, the patient showed an anteriorly flexed cervical spine



**Fig. 2** A lateral radiograph of the cervical spine with the patient in a sitting position demonstrated all segments of the cervical spine were bridged by anterior and posterior syndesmophytes



**Fig. 3** Lightwand device (Trachlight™) and the cuffed 7.5 mm internal diameter endotracheal tube

## Discussion

In the present case, preoperative airway assessment revealed severe fixed flexion deformity of the cervical spine, indicating an obviously difficult intubation. In addition, limitation of jaw movement showed potentially difficult ventilation. Therefore, it was decided to prepare an awake intubation followed by a difficult airway algorithm<sup>(17)</sup>.

Several techniques of airway management in AS have been reported, most notably the laryngeal mask airway<sup>(18)</sup>, intubating laryngeal mask airway<sup>(1-3)</sup>, fiber optic-guided intubation<sup>(5)</sup> and retrograde intubation<sup>(4,5)</sup>. An airway approach through a laryngeal mask airway was omitted, because general anesthesia and endotracheal intubation were needed for the surgical procedure. Normally an intubating laryngeal mask airway and fiber optic-guided intubation are the alternatives for this condition. Lin et al reported cases of successful airway management in AS using awake fiber optic endotracheal intubation<sup>(5)</sup>. Fiber optic-guided intubation is the safe technique of difficult airway management because it can be done under awake and spontaneous ventilation. In addition, direct visualization of glottis produces a high success rate of endotracheal intubation under experienced hands. Contrary to lightwand device, intubation needed transillumination technique. Although fiber optic-guided intubation has some advantages but the equipment is expensive. Therefore, it has not been widely used in many district hospitals of developing countries. For this case, the fiber optic-guided equipment and intubating laryngeal mask airway were not available in the presented institution. The first technique attempted was awake blind nasotracheal intubation, the safe and normal technique for difficult airway management. However, this technique requires special skills and an experienced anesthesiologist, and unfortunately failed.

The lightwand device is an alternative intubating technique for patients with limited mouth opening and cervical spine movement. Many studies have demonstrated the successful use of a lightwand in patients with difficult airway, such as cervical spine instability<sup>(10,15)</sup>, temporo-mandibular joint ankylosis<sup>(8)</sup>, and severe burn scar contracture<sup>(9)</sup>. However, a study related specifically to the use of a lightwand in an AS patient with flexion deformity of cervical spine has not been previously described.

In the present case, intubation with the lightwand using an oral approach was unsuccessful, but was smoothly performed with a nasal approach. The reasons for this are not completely clear. Cesur et al<sup>(4)</sup>

reported the case of a patient with AS who had large anterior cervical osteophytes at C<sub>2</sub> and C<sub>3</sub> that protruded into the posterior pharyngeal space. The osteophytic mass prevented the advance of the endotracheal tube through a retrograde guide wire. This was similar to a report of Ranasinghe et al<sup>(19)</sup>, which discussed a difficult fiber optic nasal intubation in a patient with AS, due to a large anterior osteophyte of the cervical spine. There was, however, no such abnormality noted on a lateral radiograph of the cervical spine in the presented case, and thus the difficulty with the transoral lightwand in the presented case was not likely caused by an oropharyngeal osteophytic mass. The most likely explanation is that the severe fixed flexion deformity of the cervical spine in the presented patient may have caused some resistance to the J-shaped lightwand. A similar result in a study by Hung et al<sup>(10)</sup> reported unsuccessful use of lightwand in one patient with fixed flexion deformity of cervical spine secondary to rheumatoid arthritis. Furthermore, the reason for successful nasal approach is possibly explained by the flexion deformity of the cervical spine in the presented patient that rendered nasopharyngeal space matching with the usual curve of the lightwand.

Lightwand can be performed either with the patients awake or under general anesthesia. A number of studies have investigated using a lightwand under general anesthesia<sup>(8,10,14,15)</sup>. Only one study by Hung et al<sup>(10)</sup> showed successful use of lightwand under awake condition. Nevertheless, Hung's study did not describe oral or nasal route for this condition. Favaro et al<sup>(8)</sup> reported on the effectiveness of nasotracheal intubation using a modified transillumination technique under general anesthesia in patients with restricted mouth opening. Cervical spine deformity was not included in Favaro's study. The results showed that a modified "J" technique characterized by the short arm of the "J" was given by the length of the patient's gonial angle-mandibular symphysis distance, had a successful intubation rate of 98.4%. For the presented case with flexion deformity of cervical spine, nasotracheal intubation with lightwand was performed successfully under awake conditions without application of the modified "J" technique.

In summary, this is the first case report of successful nasal intubation with lightwand assisted technique in an ankylosing spondylitis patient. The author experience demonstrated that a lightwand device could be used under awake conditions with adequate topical airway anesthesia. Moreover, the author suggests that the use of lightwand by nasal route may be an

alternative to an oral route for endotracheal intubation in AS patients with fixed flexion deformity of the cervical spine.

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## การใช้ lightwand สำหรับการใส่ท่อช่วยหายใจทางจมูกในผู้ป่วยโรค Ankylosing spondylitis: รายงานผู้ป่วย

ธิดา เอื้อกฤดาภิการ

รายงานผู้ป่วยโรค Ankylosing spondylitis (AS) ที่มารับการผ่าตัดโดยให้ยาระงับความรู้สึกแบบทั้งตัว จากการประเมินทางเดินหายใจพบว่า ผู้ป่วยอ้าปากได้น้อย ไม่สามารถก้มและแหงนศีรษะได้ วิชาญญีแพทย์จึงเลือกใส่ท่อช่วยหายใจโดยวิธีพ่นยาชาบริเวณทางเดินหายใจและใช้ blind nasal intubation หลังจากพยายามใส่ท่อช่วยหายใจด้วยวิธีดังกล่าวหลายครั้งแล้วไม่สำเร็จ จึงเลือกใช้ lightwand เพื่อใส่ท่อช่วยหายใจทางปากแต่ไม่สำเร็จเช่นกัน ในที่สุดสามารถใส่ท่อช่วยหายใจสำเร็จด้วยการใส่ lightwand ทางจมูกเพียงครั้งเดียวโดยไม่มีภาวะแทรกซ้อนใด ๆ เกิดขึ้นในระหว่างการใส่ท่อช่วยหายใจ จากประสบการณ์ดังกล่าวแสดงให้เห็นว่าในผู้ป่วย AS ซึ่งมีปัญหาการใส่ท่อช่วยหายใจยาก การใช้ lightwand ช่วยในการใส่ท่อช่วยหายใจทางจมูกขณะที่ผู้ป่วยยังรู้สึกตัว สามารถเป็นอีกทางเลือกหนึ่งในการดูแลทางเดินหายใจในผู้ป่วยกลุ่มนี้

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