

# Tracheal intubation in the prone position with an intubating laryngeal mask airway following posterior spine impaled knife injury

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## ABSTRACT

A prone position is not a standard position for anesthesia induction and associated with problems like difficult mask fit, impairment of orotracheal intubation by direct laryngoscopy, and reduction of pulmonary compliance. However anesthetic management of trauma victims presenting with penetrating posterior lumbar spine injury requires airway securement and induction of anesthesia in the prone position to avoid further neurological impairment. We herein present the first reported case of an adult trauma patient presented with an impaled knife protruding out of lower back, who underwent endotracheal intubation with an intubating laryngeal mask airway under general anesthesia in the prone position. Our experience indicates that this technique would be easier and less risky compared to direct laryngoscopy or awake fiber optic intubation and might be considered in an emergency situation.

**Key words:** Airway management, endotracheal intubation, intubating laryngeal mask airway, prone position

## INTRODUCTION

A prone position is not a standard position for anesthesia induction and associated with problems like difficult mask fit, impairment of orotracheal intubation by direct laryngoscopy (DL), and reduction of pulmonary compliance. However anesthetic management of trauma victims presenting with penetrating posterior lumbar spine injury requires airway securement and induction of anesthesia in prone position to avoid further neurological impairment. Awake fiber optic intubation of the trachea requires the patient's cooperation, special equipment, and extensive training, all of which might be difficult to accomplish in emergency situations, whereas DL with endotracheal intubation (ETI) requires deep levels of sedation, muscle relaxant and a limited time for airway manipulation. In such situations, the intubating laryngeal mask airway (ILMA) might play a major role because it

facilitates both ventilation and tracheal intubation. We present a case in which the ILMA was used to secure the airway while the patient was in the prone position.

## CASE REPORT

A 50-year old male was stabbed with a native butcher's knife (known as "Katti" in local language). The patient walked to a nearby health centre with the knife sticking out of his back. The patient was given 75 mg of Diclofenac sodium deep intramuscular and was referred to our center.

On arrival, the casualty medical officer found the patient lying face down with a large knife protruding from his lower back [Figure 1]. He was conscious, breathing spontaneously, and was complaining of severe pain. The patient was immediately immobilized on a "spine board" in the prone position and further evaluation was carried out. The vital signs were stable [blood pressure (BP) 146/84 mmHg, heart rate (HR) 142 beats per minute (bpm), respiratory rate 25-30/ min, oxygen saturation (SpO<sub>2</sub>) on room air 100%] except for sinus tachycardia and tachypnea (possibly because of pain, anxiety, and anger); the estimated blood loss was 500 ml. His neurological examination was unremarkable. Examination of the lumbar region revealed a knife inserted deep into right paraspinal region of his lower back with the retained weapon sticking out. Computerized

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tomography scan (conducted in the prone position) ruled out cervical spine injury but could not establish the exact position of the knife tip due to artifacts (knife was shown to be entering the fourth lumbar vertebra through the left pedicle [Figure 2]).

He was treated in the prone position in the intensive care units. A good intravenous line was secured and injection morphine 10 mg was administered to relieve pain. With this the HR was stabilized at 96 bpm and BP 130/84 mmHg but the SpO<sub>2</sub> fell down to 92%. The patient was put on oxygen mask (flow 12 l/min) and transferred to the operating theater to expose the extent of injury and to remove the knife by surgical exploration. As the surgical team did not want to move the patient (to avoid possible neurological compromise), we decided to establish the airway (intubate the patient's trachea) in the prone position. It was determined that the patient had nothing per oral for more than 5 h. He had a good mouth opening. The patient was preoxygenated with 100% oxygen for 3 min



**Figure 1:** Patient in the prone position, with the knife lodged in the lumbar spine



**Figure 2:** Scout film from the computed tomography scan reveals a retained knife at the 4th lumbar vertebra. The knife appears to enter the vertebral body through the pedicle

with his head lying to one side and placed on a cushioned head ring. After anesthesia was induced with propofol 1 mg/kg, the adequacy of mask ventilation was checked. Thereafter, patient's body was moved close to the head of the operating table, with the help of two assistant patient's head and shoulders were freed and with the head slightly extended in neutral position, the lower jaw pulled down and a size 4 ILMA (LMA-Fastrack™, The Laryngeal Mask Company, Limited, San Diego, CA) was introduced from below<sup>[1]</sup> followed by cuff inflation with 30 mL of air. After checking for the adequacy of ventilation, a LMA Fastrack™ 7.5 mm endotracheal tube (ETT) was blindly passed through the ILMA successfully on the first attempt. The correct placement of the ETT was ensured by auscultation and capnography, the ILMA was removed, and the ETT fixed in place. Vecuronium 0.1 mg/kg intravenous (IV) was then injected to provide muscle relaxation, and anesthesia was maintained with 66% nitrous oxide in oxygen, isoflurane, and IV fentanyl 2 mcg/kg/h. Laminectomy of fourth and fifth lumbar vertebral bodies was done; the knife was removed under vision without any consequences. A small puncture wound in the duramater due to the impingement of the knife tip was closed. At the end of surgery, neuromuscular block was reversed with intravenous neostigmine 2.5 mg and glycopyrrolate 0.5 mg and the patient's trachea was extubated. His postoperative course was uneventful (no neurological impairment was reported) and he was discharged from the hospital 4 days later.

## DISCUSSION

The various options for airway management in the prone position are (1) awake fiberoptic intubation,<sup>[2]</sup> (2) DL and ETI,<sup>[3]</sup> and (3) insertion of a laryngeal mask airway (LMA).<sup>[1,4,5]</sup>

Awake fiberoptic intubation requires patient's cooperation, special equipment, extensive training along with adequate topical anesthesia, and nerve blocks (superior laryngeal and transtracheal blocks); all of which might be difficult to accomplish in emergency situations. In this particular case, there is difficulty in introducing nerve block due to positional disadvantage. Good topical anesthesia with local anesthetic agent is an alternative technique but it is not always adequate.<sup>[6]</sup> Although the author regularly practices awake fiberoptic intubation in difficult airway management scenario, our experience is limited to patients in the supine position. We did not choose this method of airway management because of unwillingness of the patient to be awake while his airway being manipulated.

DL and ETI requires deep levels of sedation and muscle relaxant. The inherent risks associated with this technique are: It gives a limited time for air way manipulation and

there is always risk of failed tracheal intubation because of impaired laryngoscopic view in the prone position. Considering the emergent nature of the situation, unconventional patient positioning, and low oxygen saturation on room air, we thought this technique would not be ideal for this scenario.

Laryngeal mask airway in the prone position is an effective and possibly safe technique but may result in partial airway obstruction and require repositioning.<sup>[1,4,5]</sup>

Only one study from the literature describes insertion of the ILMA in the prone position during elective surgical condition.<sup>[5]</sup> In contrast to the case managed by Agrawal *et al.*,<sup>[5]</sup> our patient is relatively old, scheduled for an emergency surgical exploration of unpredictable duration. These patients pose a challenge in terms of pain management, transportation, positioning, and airway management. The optimal pain management requires careful administration of opioid analgesics with a watch on respiration and oxygen saturation. Our patient had a 8% drop in oxygen saturation from the baseline after administration of IV morphine, which was corrected by providing oxygen enriched air to patient with a face mask. Accidental dislodgement of knife during transport and positioning could have resulted in torrential bleeding<sup>[2]</sup> and possible injury to adjacent neurological structures. We have meticulously transferred the patient on a spinal board to the operating theatre and taken utmost care during positioning. We were prepared to handle any critical

bleeding by securing two large bore IV access and two units cross matched blood as reserve.

Our experience indicates a skilled assistant and a proper size ILMA are very useful in securing the airway when the patient is placed prone.

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