



ICAR

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Commission for Mountain Emergency Medicine

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Emergency Intubation and Ventilation on the Field

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Intended for Mountain Emergency Physicians

Preamble:

Controlled ventilation with 100% oxygen after intubation improves oxygen delivery in shock patients and offers the basis for sufficient analgesia and sedation. Thus, the incidence of secondary organ failure in shock patients can be minimized and survival rate increased. Therefore, rescue doctors with anaesthetic practice prefer early endotracheal intubation in a wide range of critically traumatized or ill patients. However, intubation attempts can lead to disastrous events, especially when unexpected serious problems arise during the procedure. Concerning emergency endotracheal intubation on the field, the rescue doctor must decide the indication by weighing up his own experience and skill with the clinical condition and possible risk factors of the patient rendering intubation more difficult. The classification into three levels of difficulty facilitates the individual decision.

The main aim is oxygenation of the patient not intubation at any price.

Three Levels of Difficulty in Emergency Intubation on the Field:

Level 1:

Intubation of a deeply comatose patient without induction of anaesthesia or muscle relaxation, e.g. in the course of CPR. Mountain rescue doctors and qualified rescue personnel, like paramedics, must be familiar with this procedure.

Level 2:

Induction of anaesthesia, intubation and ventilation of a spontaneous breathing patient with the aim to improve impaired respiratory and/or circulatory functions. However, this procedure bears the risk of hypoxia and aspiration so that it should be performed only by doctors / paramedics with anaesthetic experience. If sufficient anaesthetic practice is lacking it is better to rely on airway management by means of oro-/ naso-pharyngeal tubes, and oxygen delivery via face mask or assistant bag-valve-mask ventilation. Pulse oximetry monitoring is especially valuable in this situation.

Level 3:

The unavoidable difficult intubation with induction of anaesthesia in desperate situations, e.g. an entrapped casualty with severe pain and imminent loss of consciousness. In those situations even the most experienced emergency specialist may face his limits.

Indications for Emergency Intubation and Ventilation:

1. Unconsciousness without protective reflexes:

e.g. CPR, intoxications

2. Respiratory failure in trauma patients:

e.g. severe head injury, thorax trauma, polytrauma, shock

of other cause, without improvement after delivery of oxygen via face mask: e.g. cardiogenic shock, status asthmaticus

Essential Equipment for Emergency Tracheal Intubation

Suction apparatus, oxygen source, ventilation bag, anesthesia masks, oro- and nasopharyngeal airways, endotracheal tubes, stylet, 10-ml syringe, clamp, intravenous anesthetics, muscle relaxants, syringes, needles, catheters, laryngoscope, adhesive and umbilical tape, stethoscope

Procedure (Level 2)

1. Clearing of the airway

2. Preoxygenation,

e.g. bag-valve-mask ventilation with O₂-reservoir and high F_iO₂

3. Peripheral intravenous access (large-bore catheter)

4. Intravenous anesthetic:

Diazepam 0,1-0,5 mg / kg, or **Midazolam** 0,03-0,1 mg / kg
and/or **Etomidate** 0,15-0,3 mg / kg, or **Ketamine**, 0,5-1,5 mg / kg

5. Avoid muscle relaxation for emergency intubation !!

Only administer **Succinylcholine**, 1 - 1,5 mg / kg i.v., if absolutely necessary, and the vocal cords are visualized by direct laryngoscopy!

6. Laryngoscopy and insertion of a stylet endotracheal tube

Assistant performs Sellick maneuver and cuff inflation

7. Determination of endotracheal tube location and securement

External markings 20-22 cm, 22-24 cm, auscultation, bandage fixation

8. Controlled ventilation with bag and O₂-reservoir or ventilator, F_iO₂ near 1,0.

9. Intravenous analgesia and sedation:

Ketamine or Fentanyl or Morphine in combination with Midazolam or Diazepam

10. Muscle relaxation with non-depolarizing relaxant, e.g. **Vecuronium**

0,1 mg / kg i.v., if ventilation is insufficient without relaxation.

Miscellaneous

A lot of different details emerge in connection with emergency intubation, e.g.:

Consideration of neck injury: Minimize head and neck movement during intubation.

Before **intubation on snow** put a blanket over your head and let your eyes adapt to the darkness for a moment.

Expected and unexpected difficult intubation, difficult airway algorithm, use of **laryngeal mask, combitube, surgical airway**, etc.

Reference:

Adams HA, Schmitz CS (1996) Analgesie- und Anästhesieverfahren im Rettungsdienst. In: Deutsche Akademie für Anästhesiologische Fortbildung (ed) Aktuelles Wissen für Anästhesisten: Refresher Course. Springer, Berlin Heidelberg New York, p 83