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# Tactical indications of cricothyrotomy in complex austere setting: a case report

Service de santé des armées


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Figure 1: Patient's photography. Obstructed airway conditions, due to an active hemorrhagic wound in the left mandibular angle (comminuted fracture) with a facial metal foreign body.

## CASE REPORT

- Tactical context
  - Mass casualty incident (40 casualties in two hours, 60 total casualties)
  - French Surgical Life-saving Module (SLM)

- Allied soldier wounded by an improvised explosive device (IED)
  - GCS= 13(E4-V4-M5), confused and agitated
  - Class 3 shock : Heart rate = 140 bpm - Systolic blood pressure = 120 mmHg
  - Dyspneic with compromised airway - Oxygen saturation = 91% - Oxygen mask, hardly accepted by the patient
  - Active hemorrhage wounds (Figures 1 and 2)
  - Open right chest wound (Figure 2) – no argument for tension physiology

- Indication of emergent surgical definitive airway management before facial bleeding control and medical evacuation
  - Inability to compress the facial injuries to stop hemorrhage
  - Concern for upper airway and possibly tracheal injury
  - Worsening mental status

- Emergency cricothyrotomy procedure (Figure 3)
  - Bedside surgical technique conducted by otolaryngologist
  - Light procedural anesthesia
    - Intravenous injection : 2 mg of midazolam and 80 mg of ketamine
    - No local anesthesia (according to French military guidelines)
  - 'scalpel-bougie-tube' method : an endotracheal tube was cut to a smaller length and carefully secured
  - In about 3 minutes
  - No immediate complication
  - After : Oxygen saturation = 96%

- Bleeding control with cervicofacial compressive packing (Figure 3)

- Thorax
  - As he desaturated before the cricothyrotomy, a needle thoracostomy was performed and found to be negative for tension pneumothorax
  - Extended-Focused Assessment with Sonography for Trauma (E-FAST) : no hemopneumothorax
  - A three-sided occlusive chest bandage was placed on the thoracic wound (Figure 3)

- Helicopter medical evacuation - no complications en route

- The patient was alive two days later.

## DISCUSSION

- Afghanistan and Iraq conflicts (2001– 2011) : traumatic airway obstruction ➔ 8% of fatalities caused by penetrating injury to the face and neck anatomy - second leading cause of preventable mortality [2-5]
- Definitive airway management in the emergency setting is most commonly accomplished by endotracheal intubation[6,7]. Several operational factors that made endotracheal intubation was considered a poor option in this case.
  - SLM was still receiving urgent casualties and it was felt to be quicker to do a surgical airway then to attempt direct laryngoscopy.
  - A helicopter medical evacuation was available in fifteen minutes.
  - The helicopter did not have the capability of ventilator support nor monitoring a sedated patient. It was the opinion of the SLM team that the patient would be able to maintain his own airway if the bleeding was stopped and the potential airway injury was bypassed.
- Rapid sequence intubation (RSI) is not practical in all situations in the combat setting such as multiple trauma patients for one individual to acutely manage or RSI medications are not available[7]. When endotracheal intubation fails or is not possible, a surgical airway, usually cricothyrotomy, represents an alternative of choice to ensure a fast and efficient definitive airway[8,9]. It allows spontaneous ventilation and facilitates the evacuation of an injured person in case of transport without ventilation capability[10-12].
- Due to concerns about over sedation, which would have precluded his evacuation and required ongoing monitoring during a mass casualty incident, the SLM team elected to use light procedural anesthesia.
- Use of local anesthesia and ketamine significantly reduces the risks associated with traditional RSI (hypotension and loss of respiratory effort). The ease of this procedure would have been improved without compromising the transport of the patient.
  - A Ketamine dosage more consistent with the Tactical Combat Casualties Care (TCCC) guidelines near 200mg IM or even the newer guideline of 300mg IM ketamine would have allowed the patient to maintain their airway[11].
  - Local anesthesia could have spared the patient the additional discomfort and should be used if operational situations allow.
  - The French military guidelines currently do not recommend the use of local anesthesia due to the theoretical risk of obscuring the anatomic landmarks. However, this case report highlights the pitfalls of this approach. A critical appraisal of the evidence on this subject should form the basis of a new version of those guidelines.

**This is a case report of a unique situation where endotracheal intubation was not indicated, in the context of a mass casualty event and poor medical resources and capabilities during evacuation. It illustrates the complexity and rapidity of tactical decision making in an operational environment and highlights the operation indications for emergent cricothyrotomy in patients with severe cervicofacial injury.**



Figure 4: French Surgical Life-Saving Module (SLM).



Figure 2: Patient's photography. Hemorrhagic right lateral zone III wound cervical and non-blowing, non-hemorrhagic chest wound.

## FRENCH SURGICAL LIFE-SAVING MODULE (SLM)

- Deployed for small-scale military operations (Special Operations Forces)
  - As close to the frontline as possible [1]
  - Rapidly deployable (operational in 45 minutes)
  - Flexible and rapidly mobile

- Smaller footprint than the French role 2 or 3
  - Small surgical team
    - a general trauma surgeon
    - a head and neck trauma surgeon
    - an anesthesiologist-intensivist
    - two specialized nurses (one operating room nurse and one nurse anesthetist)
  - Volume = 4 m3
  - Weight = 1 ton

- SLM capacity : stabilize one or two severe combat casualties

- Comparable to the US Surgical Resuscitation Teams (SRT) and Forward Surgical Teams (FST)



Figure 3: Patient's photography. Damage control management with emergency cricothyrotomy, needle thoracostomy, three-sided occlusive chest bandage and cervico-facial compressive packing with QuikClot Combat Gauze®

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