

Commentary

Intubating trauma patients before reaching hospital – revisited

Frédéric Adnet*, Frédéric Lapostolle*, Agnès Ricard-Hibon†, Pierre Carli‡ and Patrick Goldstein§

*Hôpital Avicenne, Bobigny, France

†Hôpital Beaujon, Clichy, France

‡Hôpital Necker, Paris, France

§CHRU de Lille, Lille, France

Correspondence: Frédéric Adnet, frederic.adnet@avc.ap-hop-paris.fr

Published online: 12 October 2001

Critical Care 2001, **5**:290-291

© 2001 BioMed Central Ltd (Print ISSN 1364-8535; Online ISSN 1466-609X)

Abstract

Endotracheal intubation is widely used for airway management in a prehospital setting, despite a lack of controlled trials demonstrating a positive effect on survival or neurological outcome in adult patients. The benefits, in term of outcomes of invasive airway management before reaching hospital, remain controversial. However, inadequate airway management in this patient population is the primary cause of preventable mortality. An increase in intubation failures and in the rate of complications in trauma patients should induce us to improve airway management skills at the scene of trauma. If the addition of emergency physicians to a prehospital setting is to have any influence on outcome, further studies are merited. However, it has been established that sedation with rapid sequence intubation is superior in terms of success, complications and rates of intubation difficulty. Orotracheal intubation with planned neuromuscular blockade and in-line cervical alignment remains the safest and most effective method for airway control in patients who are severely injured.

Keywords airway management, intubation, prognosis, trauma patients

In a retrospective observational study recently published in *British Medical Journal*, Lockey *et al.* [1] note that trauma patients intubated without sedation before reaching hospital had a poor prognosis. They looked at the records of 1623 patients registered in a helicopter emergency medical service database over six years; of these, 486 had data on survival. Out of 486 patients, only one survived (0.2%). From this, the authors associate non-drug-assisted airway management with poor prognosis in trauma patients.

The study design in the paper by Lockey *et al.* was lacking; observational and retrospective, it provided no information on the trauma patients intubated with sedation, no incidence rate of cardiac arrest in the study group, and no objective measure of the severity of injury of the study patients. It is also not clear from the authors' comments whether they are calling into question the procedure itself or the capacities of those performing it. Nevertheless, it did highlight the quandaries surrounding airway management in trauma patients before

reaching hospital, and raised two fundamental questions. First, is endotracheal intubation necessary, efficient and effective in the prehospital treatment of the trauma patient? Second, is sedation or neuromuscular blockade useful for the intubation of the trauma patient?

Why intubate?

Airway management is widely considered the highest priority in the management of the critically injured patient. The rationale for invasive airway management includes facilitating oxygenation and ventilation, and protecting the patient from aspirating the contents of the stomach, or blood from the upper airway. Consequently, one might expect intubation and mechanical ventilation to be associated with decreased neurological damage as a result of preventing asphyxia and hypoxia. However, some experts consider intubation before reaching the hospital as deleterious, dangerous, and a waste of precious time in trauma patients without a compromised airway [2].

Although there are no broad, prospective, controlled trials comparing the basic and advanced prehospital management of adult trauma patients, several studies have highlighted the benefits of endotracheal intubation before the hospital has been reached [3–5]. For example, Winchell and Hoyt [3] showed that intubation in the prehospital setting improved survival in patients characterized by a Glasgow Coma Scale score of 8 or less with blunt injury from 64% to 74%. Garner *et al.* [4] found that there were between 8 and 19 extra survivors per 100 blunt-trauma patients treated in the advanced prehospital management group (51% of intubated patients) compared with more basic prehospital management (10% of intubated patients; $P < 0.001$).

The drawbacks

Others, however, have not found any advantage of intubation on the scene in terms of outcome [6,7]. For instance, Eckstein *et al.* [6] reported that patients who had bag–mask ventilation had 5.3-fold higher adjusted survival rates than patients who had on-scene tracheal intubation. In a randomized study, Gausche *et al.* [7] compared the survival and neurological outcomes of paediatric patients treated with bag–valve–mask ventilation with patients treated by tracheal intubation in a prehospital setting. They found no significant difference between the two groups in survival or in the rate of achieving a good neurological outcome.

Possibly the greatest factors in the incidence of failure in intubating trauma patients are inadequate sedation, patient combativeness, lack of practice and the concomitant need for in-line cervical spine stabilization [8–10]. All this can be compounded by airway reactivity (gag and cough reflexes), which can be present even in trauma patients with a Glasgow Coma Scale score of 3 [11]. These reflexes contribute to the increase in difficulty of intubation and the rate of complications (vomiting or aspiration).

The ability to intubate trauma patients with success without pharmacological aids is a reflection of the initial severity of patient. Thus, the poor prognosis of patients described in the paper by Lockey *et al.* probably has little to do with the intubation technique, but instead reflects the patients' pre-existing high probability of a fatal outcome and is therefore not surprising.

Today's 'gold standard'

Rapid sequence intubation (RSI) with succinylcholine has been associated with a decrease in intubation failures and complications in several studies, and has become the 'gold standard' for emergency intubation attempts [12–17]. In RSI, the patient is given a potent induction agent (such as thiopental or etomidate) followed immediately by administration of a rapidly acting neuromuscular blocking agent (such as succinylcholine) to induce unconsciousness and motor paralysis; the patient is then intubated. All this is preceded by a preoxygenation phase

to permit a period of apnea to occur safely until intubation has been achieved.

As well as fewer failures with RSI, emergency systems using emergency physicians in the prehospital setting seem have better success with intubation attempts [4,18,19]. However, it remains unclear whether such improved outcomes are due to additional training or are simply due to additional experience.

Conclusion

Several studies suggest that timely intubation in the severely injured patient at the scene improves outcome. Conversely, inadequate airway management in this patient population is the primary cause of preventable mortality. Endotracheal intubation should therefore be considered necessary, efficient and effective in the treatment of the trauma patient before reaching hospital. The use of RSI with neuromuscular blockade remains the procedure of choice, even in the unconscious trauma patient; sedation or neuromuscular blockade therefore seems to be useful for the intubation of trauma patients. Whether the presence of an emergency physician at the scene (as opposed to a paramedic experienced in RSI) is associated with better outcome merits additional study.

Competing interests

None declared.

References

1. Lockey D, Davies G, Coats T: **Survival of trauma patients who have prehospital tracheal intubation without anaesthesia or muscle relaxants: observational study.** *Br Med J* 2001, **323**: 141.
2. Liberman M, Mulder D, Sampalis J: **Advanced or basic life support for trauma: meta-analysis and critical review of the literature.** *J Trauma* 2000, **49**:584-599.
3. Winchell RJ, Hoyt DB: **Endotracheal intubation in the field improves survival in patients with severe head injury.** *Arch Surg* 1997, **132**:592-597.
4. Garner A, Rashford S, Lee A, Bartolacci R: **Addition of physicians to paramedic helicopter services decreases blunt trauma mortality.** *Aust N Z J Surg* 1999, **69**:697-701.
5. Regel G, Stalp M, Lehmann U, Seekamp A: **Prehospital care, importance of early intervention on outcome.** *Acta Anaesthesiol Scand* 1997, **110**:71-76.
6. Eckstein M, Chan L, Schneir A, Palmer R: **Effect of prehospital advanced life support on outcomes of major trauma patients.** *J Trauma* 2000, **48**:643-648.
7. Gausche M, Lewis RJ, Stratton SJ, Haynes BE, Gunter CS, Goodrich SM, Poore PD, McCollough MD, Henderson DP, Pratt FD, Seidel JS: **Effect of out-of-hospital pediatric endotracheal intubation on survival and neurological outcome: a controlled clinical trial.** *JAMA* 2000, **283**:783-790.
8. Stewart RD, Paris PM, Winter PM, Pelton GH, Cannon GM: **Field endotracheal intubation by paramedical personnel.** *Chest* 1984, **85**:341-345.
9. Krisanda TJ, Eitel DR, Hess D, Ormanoski R, Bernini R, Sabulsky N: **An analysis of invasive airway management in a suburban emergency medical services system.** *Prehosp Disaster Med* 1992, **7**:121-126.
10. Karch SB, Lewis T, Young S, Hales D, Ho CH: **Field intubation of trauma patients: complications, indications, and outcomes.** *Am J Emerg Med* 1996, **14**:617-619.
11. Moulton C, Pennycook AG: **Relation between Glasgow coma score and cough reflex.** *Lancet* 1994, **343**:1261-1262.

12. Vijayakumar E, Bosscher H, Renzi FP, Baker S, Heard SO: **The use of neuromuscular blocking agents in the emergency department to facilitate tracheal intubation in the trauma patient: help or hindrance?** *J Crit Care* 1998, **13**:1-6.
13. Dronen SC, Merigian KS, Hedges JR, Hoekstra JW, Borron SW: **A comparison of blind nasotracheal and succinylcholine-assisted intubation in the poisoned patient.** *Ann Emerg Med* 1987, **16**:650-652.
14. Syverud SA, Borron SW, Storer DL, Hedges JR, Dronen SC, Braustein LT, Hubbard BJ: **Prehospital use of neuromuscular blocking agents in a helicopter ambulance program.** *Ann Emerg Med* 1988, **17**:236-242.
15. Ma OJ, Atchley RB, Hatley T, Green M, Young J, Brady W: **Intubation success rates improve for an air medical program after implementing the use of neuromuscular blocking agents.** *Am J Emerg Med* 1998, **16**:125-127.
16. Ligier B, Buchman TG, Breslow MJ, Deutschman CS: **The role of anesthetic induction agents and neuromuscular blockade in the endotracheal intubation of trauma victims.** *Surg Gynecol Obstet* 1991, **173**:477-481.
17. Li J, Murphy-Lavoie H, Bugas C, Martinez J, Preston C: **Complications of emergency intubation with and without paralysis.** *Am J Emerg Med* 1999, **17**:141-144.
18. Adnet F, Jouriles NJ, Le Toumelin P, Hennequin B, Taillandier C, Rayeh F, Couvreur J, Nougier B, Nadiras P, Ladka A, Fleury M: **A survey of out-of-hospital emergency intubations in the French Prehospital Medical System: a multicenter study.** *Ann Emerg Med* 1998, **32**:454-460.
19. Schmidt U, Frame SB, Nerlich ML, Rowe DW, Enderson BL, Maull KI, Tscherne H: **On-scene helicopter transport of patients with multiple injuries – comparison of a German and an American system.** *J Trauma* 1992, **33**:548-555.