EDITORIAL

Can we intubate while the ambulance is moving?

¿Podemos intubar mientras la ambulancia está en movimiento? ¿Debemos?

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This issue of EMERGENCIAS contains an article by Castejón et al. examining intubation of high-fidelity (but easy-airway) mannequins in stationary versus in-motion environments[1]. The stationary environment was a simulation lab, while the in-motion environment was an advanced life support ambulance driving at a maximum speed of 30 kph on a standard road. Three different clinical scenarios (traumatic brain injury, acute asthma with hypoxia and hypotension, and septic shock) were programmed into the mannequins, and three different intubation devices were used (Airtraq™ rigid optical laryngoscope, Fastrach™ intubating laryngeal mask, and standard Macintosh laryngoscope). The study participants (36 prehospital physicians) were randomized to various combinations of scenario, device, and motion. The study found no differences between the in-motion and motionless groups in successful intubation (though these rates were surprisingly low, at 62.0% for in-motion and 65.7% for motionless), effectiveness (three or fewer attempts needed), and safety. While there were no overall differences in time to intubation, interestingly, when using a standard laryngoscope, total intubation time was nearly a minute shorter when in motion as compared to when motionless.

There were a few differences between the groups in adverse events (shown in Table 3 of the article). For example, the mean heart rate in the Shock scenario, which began at 144, dropped to a mean of 44.4 in the in-motion group, vs 97.4 in the motionless group; this would seem to favor motionless intubation (less bradycardia). But in the Asthma scenario, where heart rate began at 30, the opposite was found: mean 89.3 in the in-motion group, vs 44.5 in the motionless group, favoring in-motion intubation (better resolution of the presenting bradycardia). The blood pressure and oxygenation differences seem less clinically crucial, though the in-motion group had better resolution of hypotension in the Asthma scenario, and better resolution of hypoxemia in the Shock scenario. Overall, it does not seem that these adverse events data strongly favor one group or the other, and if anything, the in-motion group seem to have done slightly better.

It appears that there is only one similar study in the literature, conducted in Hong Kong involving 22 EMS physicians in an ambulance driving at 20 kph[2]. In easy intubation scenarios, the success rate for standard Macintosh laryngoscopes were >95% both stationary and moving, and was also >95% for GlideScope (video) intubation while moving. Even with difficult airways, success rates were 86.4%, 90.0%, and 100%, respectively.

Several air medical services studies have examined intubation in helicopters – an environment that is typically even more cramped than a ground ambulance. A study of 939 advanced airway management procedures completed by a US-based air medical service between 1995 and 2007 reported that 64 of the 939 occurred during transport in the helicopter, with an 89% success rate[3]. The helicopter crew intubated 3 additional patients in ground ambulances, with a 100% success rate. Of the 7 unsuccessful in-flight intubations, 6 had their airways managed with laryngeal mask airways, and one with bag-valve-mask ventilation, and no surgical airways were needed. The authors note that almost half of the in-flight intubations were performed in a Bell 430 aircraft, which offers only 4.5 m^3 of cabin space – about half the space of a typical ground ambulance (9.2 m^3 per current US ground ambulance standards[4]). One-quarter of the intubations were performed in a Bell 407, with 2.4 m^3 of cabin space, and 3 in a Bell 206, with a miniscule 1.12 m^3 of cabin space. The remainder were performed in a Pilatus 12, with a spacious 9.34 m^3 of cabin space – almost exactly the same as the US minimum ambulance requirement.

Another helicopter service study reports on 13 intubations performed by experienced anesthetists with video laryngoscopy in ground ambulances: 12 patients with severe head and facial injuries, and one with burns including inhalation injury[5]. The video scope was chosen for these intubations due to anticipated difficulty airways, and all were successful. It is not reported whether the ambulances were moving at the time of intubation or not.

All of these data, combined with the findings from the current study, suggest that intubation in a moving ambulance (or helicopter) is feasible. So it seems that we can intubate in a moving ambulance – but should

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we? While the current study focuses on the safety of the procedure for the patient, examining such factors as esophageal intubations and dental injury, one must also consider the safety of the procedure for the clinician. The authors note that "the law prohibits travelling on these roads without a restraint system", and while there are similar laws in my jurisdiction, most of my EMS colleagues (primarily EMTs and paramedics, not physicians) do not wear the required seat belts while caring for patients in the rear compartment of the ambulance. Being of fairly small stature, I can generally intubate from the chair at the head of the patient, allowing me to use a lap belt though not a shoulder belt. Many of my larger colleagues cannot intubate from the chair, and need to kneel or sit on the ambulance floor between the cephalad end of the stretcher and the chair to intubate – a very challenging position, and one that does not allow for appropriate safety belt restraints. I have seen EMS colleagues thrown across the patient care compartment due to improper restraint, but fortunately we rarely see equipment turned into flying missiles any longer, due to careful attention to securing oxygen tanks, monitors, and other equipment so they remain in place during sudden vehicle maneuvers or collisions. But ambulance crashes remain a frequent reality[6,7]. If we are going to be advocating for intubating while in motion, we need to ensure that the clinician performing the intubation is properly restrained and can remain safe while performing the procedure. The other EMS personnel assisting with the procedure (managing suction, medications, etc) must also be restrained so they can safely provide their crucial support to the intubator.

While further study of this issue is clearly needed, common sense is also needed, with appropriate safety precautions taken to ensure that our EMS personnel remain safe while performing this most challenging and risky invasive procedure.

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