

Are video laryngoscopes useful for paramedics during cardiopulmonary resuscitation?

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Tracheal intubation has been considered to be the most reliable method for securing the airway during cardiopulmonary resuscitation, and paramedics in some countries (including Japan) are licensed to perform this task. The Macintosh laryngoscope has long been the main device for tracheal intubation, but one technical problem is that a considerably long-term clinical training is required for each paramedic to be able to perform tracheal intubation reliably [1]. In Japan, paramedics are required to complete 30 successful tracheal intubations in anesthetized patients in the operating room, after undergoing training using manikins, to obtain certification by a prefectural medical control committee. Another major problem with this system is that it is difficult to maintain acquired intubation skills, without constant practice. Because the majority of Japanese paramedics only perform one or two tracheal intubations each year [2], it would generally be difficult to maintain their skills.

Recently, Japanese paramedics have been allowed to use a rigid indirect-optical laryngoscope (or a “video laryngoscope”) for tracheal intubation, because it is expected that less clinical training would be required to obtain and maintain skills. At the moment, paramedics who have already been trained with the Macintosh laryngoscope are eligible to be trained with a video laryngoscope. In this issue of the *Journal of Anesthesia*, Ota et al. [3] assessed the usefulness of this new system.

Main findings of the studies of Ota and colleagues

Ota et al. [3] performed an observational study comparing the success rate of tracheal intubation using a video laryngoscope (Pentax Airway Scope) by paramedics with and without previous training of tracheal intubation using a Macintosh laryngoscope in anesthetized patients. The success rate of tracheal intubation using the Airway Scope was high for both groups of paramedics, indicating the usefulness of the video laryngoscope. In addition, to somewhat a surprise, the success rate of tracheal intubation at the first attempt with the video laryngoscope was significantly higher (96 %) for paramedics *without* previous training with a Macintosh laryngoscope than for those with previous training with a Macintosh laryngoscope (64 %).

Advantages of video laryngoscopes

Video laryngoscopes are useful for oral and nasal tracheal intubation, with several advantages over a Macintosh laryngoscope [4, 5]. For a Macintosh laryngoscope, even by experienced hands, it is frequently difficult to see the glottis, and tracheal intubation may fail (after several attempts) in roughly 6 % [6]. The incidence of failed intubation will increase when it is difficult to place the head and neck to the sniffing position to align the oral, pharyngeal, and laryngeal axes. In contrast, for the video laryngoscopes, this alignment is not required to see the glottis, and thus successful rate of tracheal intubation is generally high even in patients with restricted head and neck positions [7, 8]. With these advantages in mind, Ota et al. [3] have concluded that previous experience with a Macintosh laryngoscope is not necessary or required for paramedics to be trained to use the Airway Scope effectively.

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Should a video laryngoscope be the first choice?

So, should training with a Macintosh laryngoscope be abandoned and training be performed only with a video laryngoscope? The answer would be that it is too early to say yes. There are several reasons for this. First, during cardiopulmonary resuscitation, interruption of chest compression should be as short as possible. Several studies have shown that the time required to intubate the trachea is frequently longer with a video laryngoscope (including the Airway Scope) than with a Macintosh laryngoscope [9, 10], although opposite results have also been reported. This increase in the interruption time may well reduce the chance of successful resuscitation.

Second, although video laryngoscopes have roles in patients with difficult airways [8, 11, 12], they may fail in a limited number of patients. Reported difficulties include the limited mouth opening, a large tongue, a tumor in the oropharynx and laryngospasm [5, 13]. In addition, the camera view would frequently be blurred by fogging, secretions, blood, or vomitus in the oropharynx, making tracheal intubation difficult or impossible [8, 14]. These problems are more likely to occur during cardiopulmonary resuscitation, and in fact in one study, the success rate of tracheal intubation was much lower for the Airway Scope than for a Macintosh laryngoscope [14].

Third, correct tracheal intubation is usually confirmed by visual confirmation of a tube passing through the vocal cords and by confirmation of expansion of the chest, during cardiopulmonary resuscitation. Nevertheless, these methods are unreliable [15], and inadvertent esophageal intubation may be undetected in 10–15 % of cases [16, 17]. The use of a video laryngoscope would provide a better view of the glottis, but it has been shown that the esophageal inlet displayed on a monitor of a video laryngoscope may frequently be misjudged as the tracheal inlet [18]. Therefore, the use of a video laryngoscope may not reduce the incidence of undetected inadvertent esophageal intubation. In addition, no data are available as to whether tracheal intubation using a video laryngoscope (in comparison with a direct laryngoscope) is less likely to injure the upper airway and to obstruct the airway.

Fourth, several different video laryngoscopes are available, but the efficacies are likely to be different between these devices [13]. Therefore, there is no guarantee that all video laryngoscopes are as effective as, and as easy as, the Airway Scope.

Search for training system

In the era of evidence-based medicine, we should attempt to find through research as to which device is the most

suitable for tracheal intubation during cardiopulmonary resuscitation. Recent reports indicate that the survival rate may be *lower* in patients in whom tracheal intubation was attempted than in those to whom a facemask was used, during cardiopulmonary resuscitation [19–21]. For example, one large study looking at neurologically favorable survival rates of 649,359 patients with out-of-hospital cardiac arrest, patients to whom a tracheal tube or a supraglottic airway was used, had recovered much less frequently (1.1 %) than those to whom a bag-valve-mask was used (2.9 %) [21]. Therefore, by studying whether tracheal intubation is necessary during cardiopulmonary resuscitation, we need to revise the training system of airway management for paramedics, with a broader view.

Conclusions

Compared with direct laryngoscopes, video laryngoscopes generally provide a better view of the glottis and a higher success rate of tracheal intubation. Nevertheless, there is still insufficient evidence to judge whether a video laryngoscope provides a faster tracheal intubation than a Macintosh laryngoscope, during cardiopulmonary resuscitation. The efficacy and the safety of each video laryngoscope should be compared with a conventional Macintosh laryngoscope, with the other video laryngoscopes, and with the other types of intubation devices (e.g., a facemask or supraglottic airway), to determine which device is the most suitable for airway management during cardiopulmonary resuscitation.

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