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A randomized crossover trial comparing the C-MAC and Macintosh laryngoscopes for face-to-face intubation in a manikin



To the Editor,

The ability to intubate the patient is one of the key skills they should possess as paramedics [1,2]. Standard endotracheal intubation (ETI), when patient is lying on his back and intubation is located behind the patient's head, is one of the most commonly used techniques for ETI [3,4]. However, the technique of intubation is not always possible; therefore, paramedics should be able to intubate using other techniques. Face-to-face (FTF) intubation technique is usually performed in EMS when patient is found in a position that makes the performance of standard intubation difficult, such as when a patient is trapped in a seated position in a car [5].

Therefore, we decided to examine the efficacy of intubation face-to-face with the use videolaryngoscope Storz C-MAC with Macintosh blade 3 [C-MAC] (Karl Storz GmbH&Co KG, Tuttlingen, Germany) and standard

Macintosh laryngoscope [MAC] with blade 3 (gold-standard; HEINE Optotechnik, Munch, Germany). We hypothesized that there would be no differences in ETI efficacy between video and direct laryngoscopy of a manikin trapped in a vehicle (Fig. 1). A standard 7.0 ID endotracheal tube (Covidien, Mansfield, MA) was used. All intubations were performed on a SimMan manikin (Laerdal, Stavanger, Norway). A correctly fitting standard cervical immobilization collar (StiffNeck Select, Laerdal, Stavanger, Norway) was applied to the manikins' neck to prevent movement of the cervical spine.

This study was designed as a randomized, crossover, manikin trial, and was approved by the Institute Review Board of the International Institute of Rescue Research and Education (Approval: 03.2016.11.09, January 5th, 2016). Thirty-four paramedics volunteered as subjects and consented to be part of this trial. The ResearchRandomizer software was used to divide the participants into two groups and determine the order in which the ETI devices were applied within each group. The first group attempted ETI using the C-MAC and the second using the MAC (Fig. 2). Participants had a maximum of 3 attempts for ETI with each intubation method. Prior the study, all participants completed a 30-min training session including the techniques of ETI using direct and video-laryngoscopy.

The main endpoint was the time taken to achieve successful ETI, with was defined as the time from insertion of the laryngoscope blade between the teeth to the first manual ventilation of the manikin's lungs. Additional endpoints included grade of glottic view (Cormack and Lehane grades 1–4), incidence of first attempt and overall success rate of intubation, and subjective opinion about the difficulty of each intubation method. Participants were asked to rate it on a Visual Analog Scale (VAS) with a score from 1 (extremely easy) to 10 (extremely difficult).

The results of time, ETI success rate and opinion about ease of intubation according to devices are shown in Table. The results with C-MAC were significantly better than with the MAC ($P < .05$) for all analyzed variables (time to intubation, success of first attempt, overall success rate, Cormack-Lehane grade and ease of intubation).

In conclusion, in this manikin trial, the C-MAC laryngoscope appeared more useful than the conventional Macintosh laryngoscope under simulated condition. The clinical relevance is unknown until similar comparative clinical studies have been conducted to confirm our results.

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None.

Conflict of interests

The authors have no conflict of interests to disclose.

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Fig. 1. Intubation face-to-face when manikin was trapped in vehicle.

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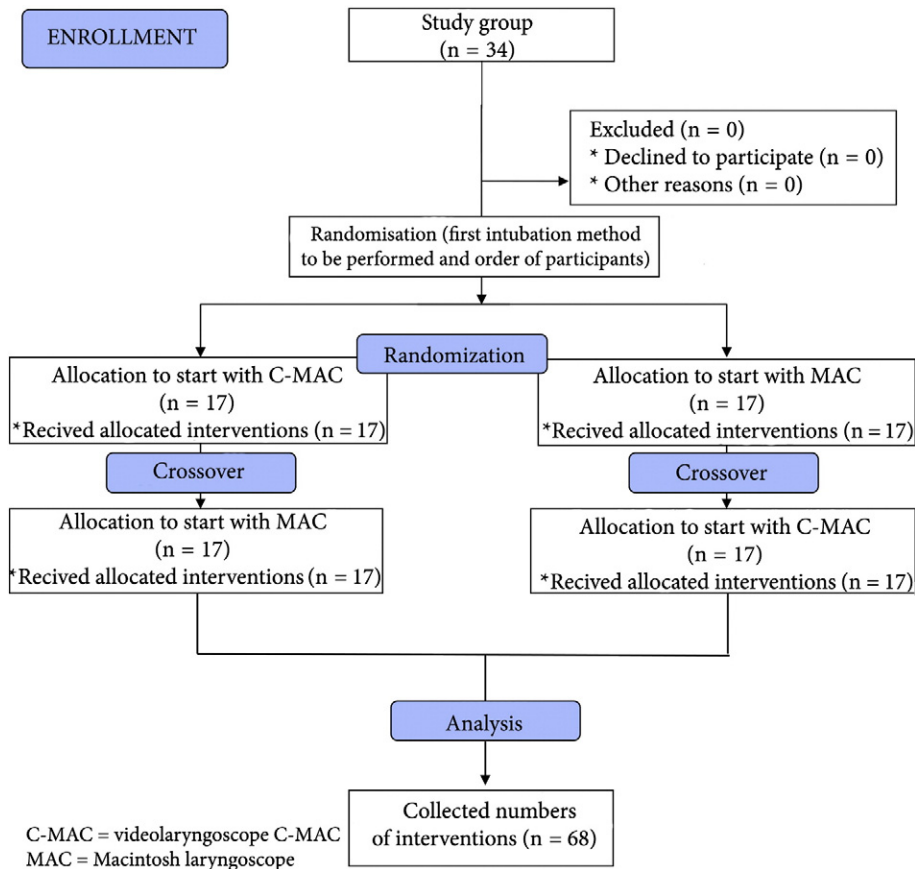


Fig. 2. Flow chart of design and recruitment of participants according to CONSORT statement.

TableData from face-to-face intubation through the opened driver's door. Data reported as median (IQR), mean (\pm SD) or number

Parameter assessed	C-MAC	MAC	P
Time to intubation (s)	26.4 (IQR, 24.0–29.5)	33.9 (IQR, 26.5–43.2)	.012
Success rate of first attempt (%)	39 (85.3%)	22 (64.7%)	.009
Overall success rate (%)	34 (100%)	30 (88.2%)	.021
Cormack-Lehane grade 1/2/3/4	25/9/0/0	14/13/7/0	.011
Ease of intubation (VAS)	3.5 (IQR, 3.0–4.6)	7.7 (IQR, 6.0–8.5)	<.001

C-MAC = videolaryngoscope Storz C-MAC; MAC = Macintosh laryngoscope; IQR = interquartile range; SD = Standard deviation.

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CSF/blood glucose ratio and bacterial meningitis without pleocytosis in a potentially immunocompromised host[☆]



To the Editor,

We read with great interest the recent case report entitled “*Streptococcus pneumoniae* meningitis without pleocytosis of the cerebrospinal fluid” by Sato et al [1]. The patient had a small spleen ($6 \times 2 \times 1$ cm) requiring prompt treatment, as duly administered by the authors. We would like here to propose that the patient with small spleen should be considered as a potentially immunocompromised patient.

In their article, the authors quoted from our article [2] in reference to our point that a low cerebrospinal fluid (CSF)/blood glucose ratio was related to bacterial meningitis and wrote that the CSF/blood glucose ratio was as high as 0.60 in their case. In view of some uncertainty with respect to the application of this value in their study, we would like to confirm how the CSF/blood glucose ratio should be used in the diagnosis of acute meningitis. One of the inclusion criteria for acute meningitis in our study was a CSF cell count more than $5/\mu\text{L}$. Thus, the case reported by Sato et al would not have been included in our study population. There has been, to the best of our knowledge, no article discussing the CSF/blood glucose ratio in meningitis without CSF pleocytosis. Although we agree with the authors' conclusion that excluding bacterial meningitis based on only single laboratory findings is inadequate for accurate diagnosis or exclusion, we would like to point out some relevant caveats.

The first question is what were the results of the gram staining of the cerebrospinal fluid? If the CSF culture were positive for *S pneumoniae* for only 3 hours, the amount of *S pneumoniae* in the CSF would be sufficient for a positive result for Gram staining. Such a result would justify prompt administration of antibiotics.

We would also like to know the result of the HIV screening test and the possibility of the association of other microbes. Jolobe [3] pointed out that identification of *S pneumoniae* as the culprit pathogen in the presence of meningitis with normocellular CSF may not necessarily rule out the possibility of meningitis resulting from a mix of pneumococcus and other microbes especially in patients with HIV infection. This possibility might be extended generally to immuno-

compromised hosts such as a patient with reduced splenic function and thus underscore the need to consider whether any other pathology might have been associated with the patient's illness, given the worsening of the patient's clinical course.

LP was not necessary as the positive CSF culture confirmed *S pneumoniae* meningitis and clinical course was favorable. Repeated LP should be performed when the clinical course is not as good as expected because other pathologies might be present, as mentioned above.

In the case of Sato et al, the patient presented no neurologic sequelae thanks to the prompt and efficient treatment. There is no review of neurologic sequelae of bacterial meningitis without CSF pleocytosis, whereas neurologic sequelae in meningitis with CSF pleocytosis was not associated with disease severity but rather with a pneumococcal serotype or otitis [4]. Because reports of bacterial meningitis without CSF pleocytosis, especially those containing references to the CSF/blood glucose ratio, are few, further studies are needed to shed light on this matter.

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A new route to life in patients with circulatory shock: intraosseous route[☆]



To the Editor,

We have read with great interest the recently published article by Burgert and coworkers entitled “The effects of proximal and distal

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