C-MAC videolaryngoscope is superior to the Macintosh laryngoscope for tracheal intubation in patients with a difficult airway

The C-MAC laryngoscope (C-MAC) (Karl Storz, Tuttlingen, Germany) is one of several videolaryngoscopes consisting of a modified Macintosh blade. There have been several studies on videolaryngoscopy in the past, but few studies have concluded whether videolaryngoscopy is advantageous for tracheal intubation. In our study, we reported for the first time that C-MAC is more advantageous than Macintosh laryngoscpe for tracheal intubation, especially in difficult airway situations.

In our study, we performed a systematic review and meta-analysis of several randomized controlled trials to compare the utility of the C-MAC with that of the Macintosh laryngoscope for tracheal intubation in adults.

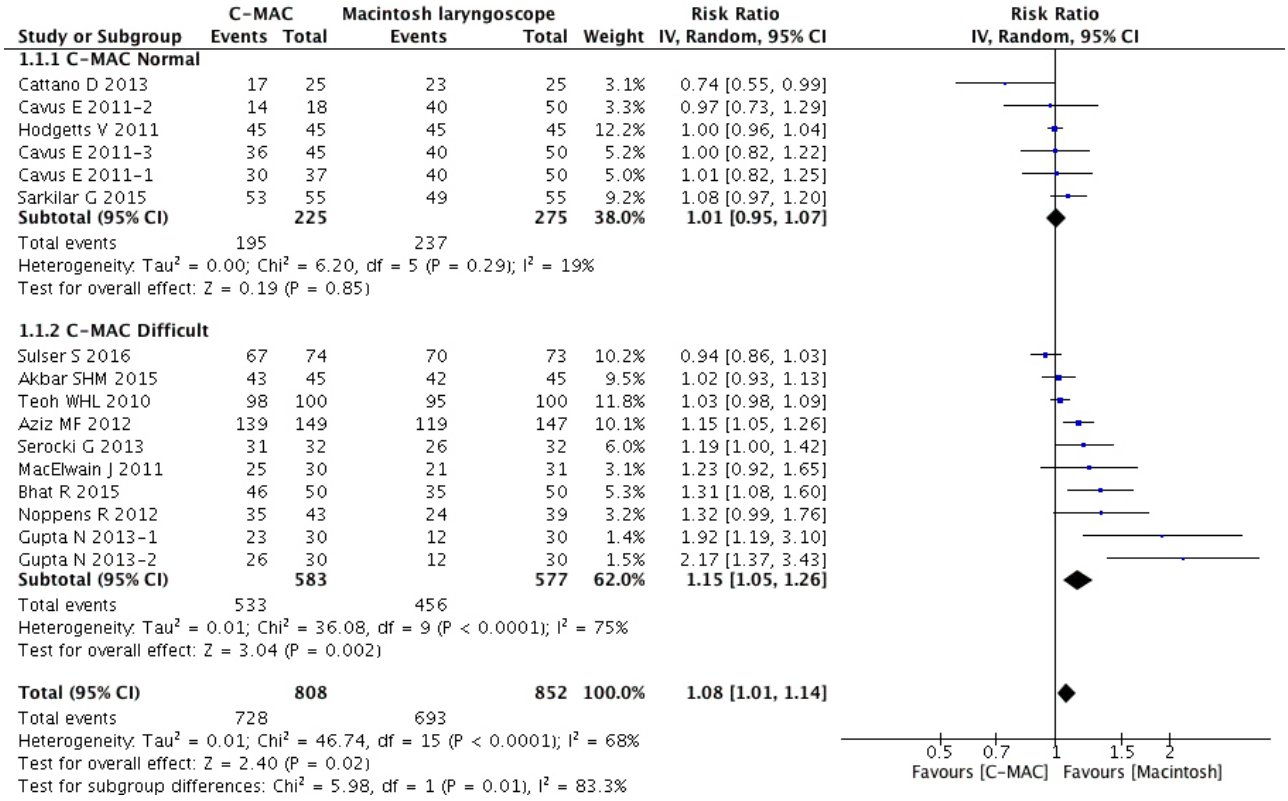

Fig. 1. Forest plot of the success rates of tracheal intubation using the C-MAC compared with the Macintosh laryngoscope.

A comprehensive literature search was performed using PubMed, Cochrane Central Register of Controlled Trials EMBASE and Scopus. Data on success rates, intubation time, glottic visualization and incidence of external laryngeal manipulations (ELM) during tracheal intubation were extracted from the identified studies. In subgroup analysis, we separated those parameters to assess the influence of the airway condition (normal or difficult). We conducted a trial sequential analysis (TSA).

The C-MAC was used for 1007 patients and the Macintosh laryngoscope was used for 1012 patients. Four studies were conducted with patients who had a normal airway and 12 studies examined intubation in patients with potentially difficult airways.

Based on the meta-analysis of these 18 trials the success rates of tracheal intubation with the C-MAC was not significantly different compared to the Macintosh laryngoscope. (RR=1.03; 95% CI, 0.99-1.07; p=0.21; Cochrane's Q = 47.1; I^2=64%) (Fig. 1). TSA corrected the 95% CI to 0.97 to 1.10. The accrued sample size (n = 2019) reached the estimated RIS (n = 597).

Intubation time with the C-MAC was not significantly different compared to the Macintosh laryngoscope (WMD = -1.90; 95% CI -5.95-2.15; P=0.36; Cochrane's Q = 118.9; I^2 = 93%). TSA corrected the 95% CI to -7.18 to 3.37. The Z curve crossed the futility boundary. TSA revealed that the accrued information size (n = 989) was 68.6% of the estimated RIS (n = 1441).

Glottis visualisation was recorded in 16 of 18 trials, and the C-MAC was found to provide better glottis visualisation compared with the Macintosh laryngoscope (RR=1.08; 95% CI, 1.01-1.14; p = 0.02; Cochrane's Q = 46.7; I^2=68%) (Fig 2). TSA corrected the 95% CI to 1.01 to 1.19. The Z curve reached the TSA monitoring boundary for benefit. The accrued sample size (n = 1660) reached the estimated RIS (n = 652).

The number of ELM during tracheal intubation with the C-MAC was lower compared to the Macintosh laryngoscope (RR = 0.83, 95% CI 0.72-0.96, p = 0.01, Cochrane's Q = 15.1, I^2 = 34%). TSA corrected the CI to 0.67 to 1.03. The Z curve did not reach the TSA monitoring boundary for benefit, nor could we calculate the TSA boundary for futility because of the insufficient sample size; the accrued sample size (n = 1325) was 52.3% of the required sample size (n = 2533).

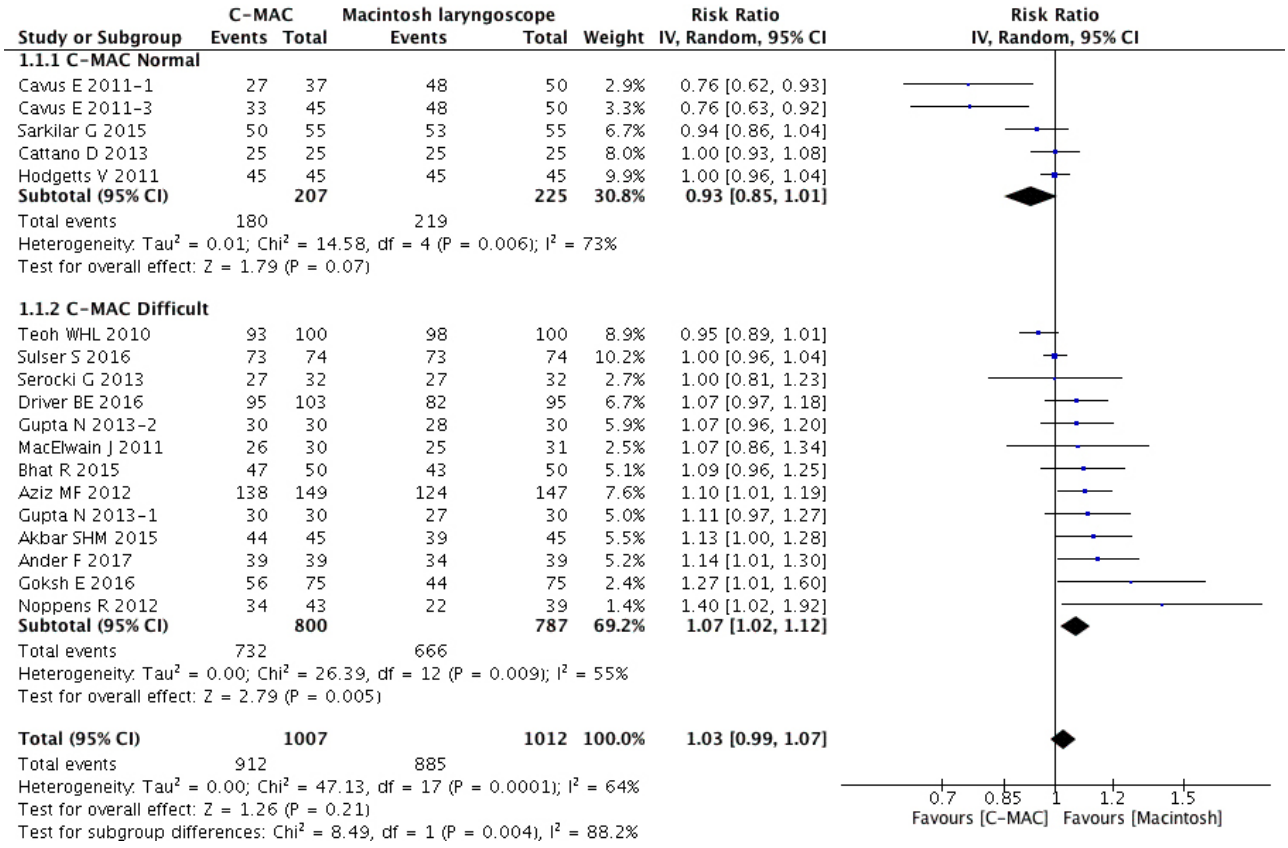

Fig. 2. Forest plot of glottic visualisation with the C-MAC compared with the Macintosh laryngoscope, Cormack–Lehane grade 1,2 vs other grades.

We performed a sub-analysis with regard to airway status, normal or difficult airway. Subgroup analysis comparing normal or difficult airway settings, showed that the success rates, glottic visualisation and number of ELM during tracheal intubation with the C-MAC were superior to those with the Macintosh laryngoscope in difficult airway settings (Fig 1). On the other hand, in normal airway settings there were no significant differences in these parameters between the C-MAC and the Macintosh laryngoscope. Moreover, intubation time with the C-MAC was similar to the Macintosh laryngoscope in both normal and difficult airways (Fig. 2).

In difficult airways, the C-MAC offers superior success rates, glottis visualisation and required less ELM compared to the Macintosh laryngoscope.

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