Table 8 Complication data summary

Complications	Cricothyroidotomy (n=725 pts)% (total events)	Tracheostomy (n=282 patients)% (total events)	P-value 1	Cricothyroidotomy *vs* Tracheostomy OR (95%CI)	P-value 2
Minor	8.97 (65)	12.41 (35)	0.1	0.60 (0.08, 4.25)	0.61
Major	16.41(119)	17.38(49)	0.71	0.77 (0.16, 3.64)	0.74
Early	23.86 (173)	18.79(53)	0.08	0.72 (0.14, 3.63)	0.69
Late*	7.97 (11)	28.97 (31)	<0.0001	0.21 (0.20, 0.22)	<0.0001

*n for late complications: cricothyrotomy (138 patients), tracheostomy (107 patients).

Airway societies guidelines recommend an emergency surgical airway as the life-saving treatment in a 'cannot intubate, cannot oxygenate' (CICO) situation.[1] Surgical airways can be achieved either through a *cricothyrotomy* or *tracheostomy*[2]. Currently, there are limited data in the literature comparing complications between these two techniques. The objective of this systematic review is to analyse complications after cricothyrotomy and tracheostomy in emergency surgical airways.

This synthesis of literature was exempt from ethics approval. Two reviewers independently assessed titles, abstracts, and full-text English articles through the Ovid Medline, EMBASE, and other seven databases for studies describing complications after cricothyrotomy and tracheostomy performed in emergency situation. Complications were classified as minor (evolving to spontaneous remission and/or not requiring intervention and/or not persisting chronically), major (requiring intervention and/or persisting chronically), early (from the start of the procedure up to 7 days), and late (beyond 7 days of the procedure). We retrieved 2452 references from our search criteria. After title and abstract review, 33 articles were selected for full-text reading. Twelve articles did not meet the inclusion criteria. Therefore, 21 articles were included in the systematic review.

No difference was observed in minor, major, or early complications. Late complications were significantly more in the tracheostomy group (Table 8).

The reported *P*-value 1 was based on the comparisons of outcomes between two groups using χ^2, where the number of events and total sample size were obtained by pooling all the studies. The reported *P*-value 2 was based on the weighted logistic regression, where the weight was defined based on the sample size of each study

In conclusion, our results demonstrate that *late complications are more frequent when a tracheostomy is performed as an emergency surgical airway*. This information might be considered to re-evaluate the recommendation of converting a cricothyrotomy into a tracheostomy after the airway is established.

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Supraglottic jet ventilation for elective laryngotracheal surgery: 1300 patient experience in a tertiary referral hospital

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Supraglottic high-frequency jet ventilation (HFJV) is used routinely in elective laryngotracheal surgery at our institution. It provides a tubeless surgical field with minimal vocal cord movement and improves surgical access[1]. Complications associated with jet ventilation include barotrauma and ventilatory insufficiency causing hypoxia and hypercapnoea[2]. The ability to predict patients likely to de-saturate is useful to both anaesthetist and surgeon. A database was constructed to record and monitor our institution's experience and we present a 1300 patient dataset.

Prospective continuous anonymised data were collected in a secure database from 2014 including all elective laryngotracheal surgery patients requiring HFJV. Collected parameters included demographic data, body mass index (BMI), duration, driving pressure, desaturation < 90%, and pre- and post-HFJV $ETCO_2$. Excel (Microsoft Corporation, Redmond, WA, USA) and Stata-15 (StataCorp, College Station, TX, USA) software were used for analysis. Intraoperatively, HFJV was delivered by Mistral or Monsoon (Acutronic) or Twinstream™ (Carl Reiner) ventilators via injector needle secured to a rigid surgical laryngoscope. Anaesthesia was maintained with propofol and remifentanil infusions. The local ethics committee was consulted but no formal approval was required.

Demographic data demonstrated a 38%:62% male to female ratio, with a mean age of 50 (range 17–90) yr. There was a desaturation incidence of 16%. The length of procedure ranged from 2 to 80 min, with a mean of 18 min. Probability of desaturation increased with procedure length, with logistic regression showing males having a higher probability of desaturating than females for any given procedure length. The mean BMI was 26.4 (range 14–59.5) kg m^{-2}. Increased BMI increased the probability of desaturation, again with males more likely to desaturate at any given BMI than females. A BMI increase from 25 to 35 kg m^{-2} doubled the probability of desaturation in females, and tripled it in males. $ETCO_2$ was stable in the patient group as a whole (mean

increase, 0.24 kPa). There was no significant increase in $EtCO_2$ with increased BMI ($P>0.05$).

Our extensive dataset demonstrates that HFJV is safe and effective in elective laryngotracheal surgery. As expected, significant desaturation increases with increased operative length and increased BMI. Hypercapnoea was not an issue, and perhaps unexpectedly was not affected by BMI. Care should be exercised ventilating a male patient BMI >35 where there is an increased probability of desaturation.

References

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Blind tracheal intubation through intubating laryngeal tube iLTS-D® and Fastrach®: a multicentric randomised study

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The intubating laryngeal tube suction–disposable (iLTS-D®) (VBM Medical Inc., Sulz, Germany) is a new laryngeal tube with gastric access and is specifically designed to allow tracheal intubation through the device. Effective ventilation through a laryngeal tube has already been demonstrated and could be achieved quicker than ventilation with other type of supra-glottic devices. The Fastrach® (Teleflex, Buckinghamshire, UK) is an established laryngeal mask and is still recognised as the Gold Standard for blind intubation in case of difficult airways. Many studies concerning other intubating laryngeal masks showed the superiority of Fastrach. Two clinical studies concerning the iLTS-D already demonstrated successful fibreoptic intubation through the device on manikins and real patients. The aim of this prospective multicentric randomised study was to establish if iLTS-D was as effective for blind intubation as Fastrach with the advantage of a gastric access and quicker ventilation achievement.

Ninety-nine patients requiring general anaesthesia with orotracheal intubation were randomised to one of the two study groups: iLTS-D or Fastrach. After anaesthesia induction, the assigned device was inserted, and success rate and time for successful ventilation were measured. The main investigator then proceeded to a blind intubation through the device under fibreoptic control by a second anaesthetist. Success rate after one and two attempts and time for intubation were recorded. Ethical approval was granted (Commission cantonale d'éthique, Lausanne, Switzerland), and data were collected in two primary centres and one secondary centre.

Fifty and forty-nine patients were respectively recruited in each study group. The success rate for tracheal intubation after one attempt was 43% with iLTS-D and 82% with Fastrach ($P=0.001$). The overall successful tracheal intubation was also significantly lower with iLTS-D (70% *vs* 92%, $P=0.006$). Times for intubation were similar in the two groups (44 *vs* 50 s, $P=0.59$) Successful ventilation was achieved in 94% of patients in the iLTS-D group and 100% in the Fastrach group ($P=0.829$). Time for ventilation was also similar in the two groups (31 *vs* 36 s, $P=0.15$). The success rate for the placement of a gastric tube with iLTS-D when intubation was successful was 100%. No major complication was recorded in both groups.

Our study provides the first data concerning blind intubation through a laryngeal tube. The iLTS-D had an overall successful tracheal intubation rate significantly lower than the Fastrach. Ventilation success rate and time were identical. Even if the iLTS-D bears the advantage of a gastric access and effective ventilation, it should require modifications to become suitable for blind intubation.

A model for ultrasound-assisted cricothyroidotomy: making a mark before taking the plunge

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The 4th National Audit Project (NAP4) showed that there was ~60% failure rate of emergency cannula cricothyroidotomy, and suggested that anaesthetists should be trained to perform a surgical airway.[1] The ability to identify the cricothyroid membrane, especially in patients with difficult anatomy (e.g. obesity, burns), is an important contributor to this high failure rate. It has been recommended that ultrasound identification of the cricothyroid membrane should be used in those whom inspection and palpation are not adequate.[2]

We have developed a cost-effective, high-fidelity airway model of adjustable difficulty for cricothyroidotomy practice.[3] It has the added benefit of being useful for ultrasonography (Fig. 8).

The model components consist of: a larynx made of silicone bathroom sealant, and anaesthetic breathing circuit tubing, which acts as a trachea and a reservoir bag as the lungs. Layers of ADAMgel (Aqueous Dietary Fibre Antifreeze

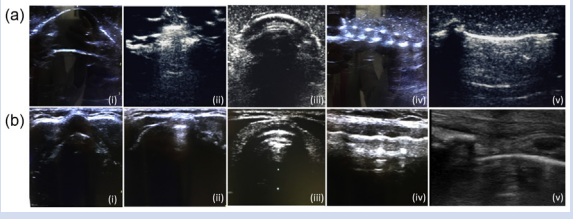

Fig 8 Collage of sonographs showing anatomical structures in the airway model (a) and a live subject (b). Axial view of the thyroid cartilage, cricothyroid membrane and cricoid cartilage are shown in columns (i), (ii), and (iii), respectively. Sagittal views of the trachea and cricothyroid membrane are shown in columns (iv) and (v), respectively.