STAB Cric: Surgical Technique Against Bougie Cricothyrotomy
An Observational Study Comparing Two Techniques Using Pig Tracheas

Jeremy Kadish DO[†], Edwin Layng BS[*], Matthew Berrios DO[†], John Pester DO[†]

[†]St. Luke's University Hospital Department of Emergency Medicine   [*]Temple-St. Luke's School of Medicine

Background

Performing a surgical airway is a last resort heroic measure when a physician cannot ventilate nor intubate a patient. Historically, the open surgical technique has been the standard approach. However, this method is complex and involves many steps. Newer methods utilizing fewer instruments have been described in recent literature [1,2]. This observational study examines if the bougie-assisted cricothyrotomy is easier to learn and faster to perform than the classically taught open surgical method.

Methods

This is a single center, randomized, observational, crossover study comparing the traditional surgical and bougie-assisted cricothyrotomy methods. Twelve medical students (MS3 and MS4) volunteered and were randomized to one of the two techniques prior to watching an educational video describing and demonstrating that specific technique. After the video, students performed their assigned cricothyrotomy method on a pig trachea. After a four-week washout period, the same students were brought back to watch the video of the remaining technique then performed it on a pig trachea. The primary outcome was time to correct endotracheal tube placement verified by real time bronchoscopic video and timer. Our secondary outcome was time spent viewing each video to learn both techniques.

Results

Our sample size was twelve including seven MS3 level students and five MS4 level students. Data were entered into SPSS v22 (IBM Corporation, Armonk NY) for analysis. Wilcoxon signed rank test was chosen to compare time to endotracheal tube placement as well as time spent learning each technique. Median time to placement for open surgical vs bougie-assisted was 310.5 seconds (IQR 235.75 – 418.5) vs 195.5 seconds (IQR 162.75 – 284.5) respectively. This was found to be significantly different; p=0.034. Median time to learn for open surgical vs bougie-assisted technique was 339 seconds (IQR 287.25 – 436.75) vs 249.5 seconds (IQR 166.75 – 300.75) respectively. This was also found to be significantly different; p=0.005.

| N = 12	Bougie-Assisted	Open Surgical	p value
Median Time For Tube Placement (sec)	195.5	310.5	0.034
Median Time to Learn Technique (sec)	249.5	339	0.005

Conclusion

In novice learners, the bougie-assisted cricothyrotomy method was more rapidly learned than the open surgical technique. More importantly, time to placement was significantly shorter using the bougie-assisted technique as well.

Discussion

Emergency cricothyrotomy is a critically time-dependent procedure which is performed rarely and on the most unstable patients. While there are many studies comparing the surgical technique to others, this study offers a unique addition to the anthology of existing literature. We selected a group of learners who were inexperienced and novice with regards to both techniques thus reducing any bias introduced from previous experience. Additionally, this study uses a pre-randomized crossover analysis thus reducing any bias introduced by the process of learning each technique. The limitations are this is a single center study and a small sample size was used. More importantly, it is difficult to extrapolate the clinical performance of this technique when used on humans, as the model we selected was exsanguinated pig tracheas. While this is a small pilot study, our results suggest that the bougie-assisted technique should be the preferred technique when performing an emergent cricothyrotomy. A larger study which is sufficiently powered will be required to verify these conclusions.
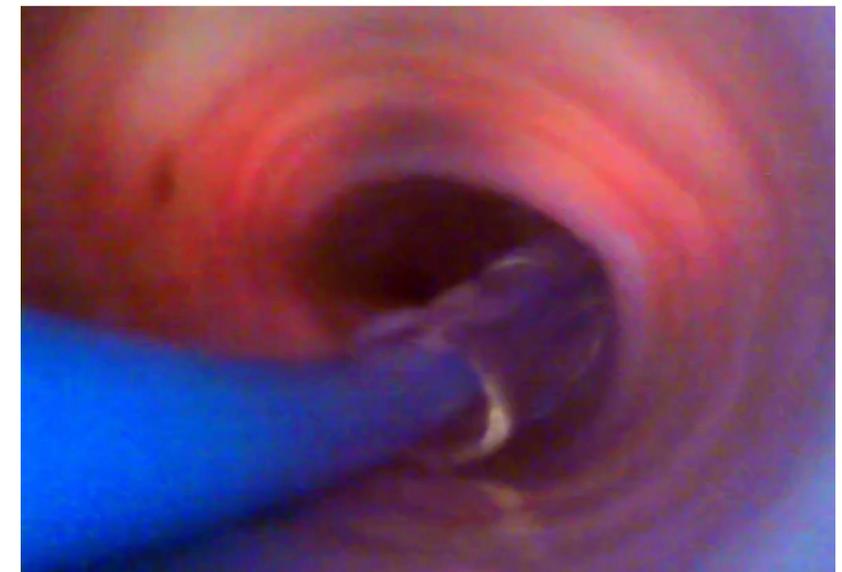
References

1. Patrick Schober et al. Emergency cricothyrotomy- A comparative study of different techniques in human cadavers, *Resuscitation* 80: 204- 209 (2009)
2. Chandler Hill. Cricothyrotomy technique using gum elastoc bougie is faster than standard technique: A study of emergency medicine residents and medical students in an animal lab, *Academic of Emergency Medicine* 17: 666-669 (2010).
3. Robert L. Mabry, A comparison of two open surgical cricothyroidotomy techniques by military medics using a cadaver model, *Annals of Emergency Medicne* 63: 1-5 (2014).

Acknowledgments