

Flexible Medical-Robotic Instruments

Modification and Evaluation of an Adjustable Laryngoscope using Shape Memory Alloy Actuation

— 11th January 2023 —

Master's Thesis

Context

Flexible medical-robotic instruments in minimally invasive surgery might be of great help to surgeons while operating next to or within critical structures of the human body.

The design and control of such instruments is challenging. *Smart materials*, e.g. Shape Memory Alloys (**SMA**) could be very useful to face these challenges due to their shape memory and self-sensing ability. At HERA, we thus developed a **SMA-actuated laryngoscope** for standard and emergency endotracheal intubation.



Figure 1: Team of surgeons in the operation theatre. Source: © Solvay 2020.

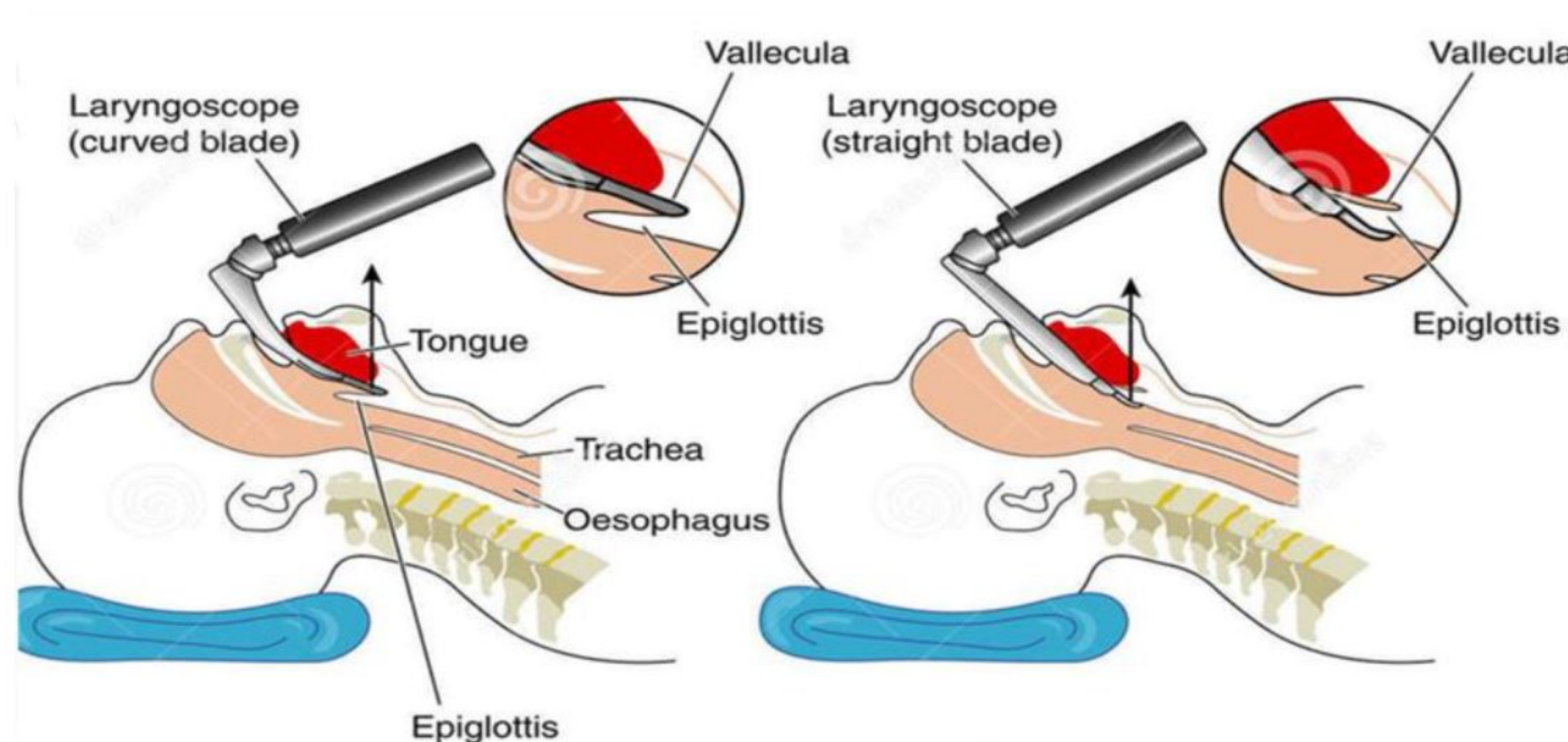


Figure 2: Laryngoscopy with curved and straight blade as discussed by Momani et al. (2022).

Objective

Enhance the existing system technically for clinical use and evaluate it with our clinical partners.

Task Summary

- **Study** SMA actuation and laryngoscopy.
- **Modify** the existing system for clinical use (e.g. integration of electronics/power supply, compatibility with standard endoscope camera)
- **Plan** the evaluation with our clinical partners.
- **Evaluate** the system in a user study.

Requirements

We are seeking qualified candidates from:

- Engineering (Mechatronics, Electronics, Mechanical)
- Computer Science
- Material Science
- Physics

They should be interested in:

- Mechatronics, Electronics
- Microcontroller
- Experimentation

Contact

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