



## Advantages and Recommendations    Lindholm Anatomical Oval (LAO) Orotracheal Tube

### Solutions for common problems after prolonged tracheal intubation

**Problem 1** - The standard semi-circular tracheal tube is forced to assume the contour of the airway and owing to the tubes elasticity, it exerts pressure on the posterior part of the larynx and on the anterior wall of the trachea (see references 1, 3 and 5).

**As a result**, pressure induced lesions of the mucous membrane occur on the inside of the posterior part of the larynx and anterior wall of the trachea. Decubital ulcerations will gradually develop.

**Solution**, the LAO Tube on the other hand, has the same anatomical contour as the airway, and therefore does not exert pressure posteriorly on the larynx and assumes a central position in the trachea. The frequency and severity of pressure-induced lesions on the posterior larynx and on the anterior wall of the trachea are therefore radically reduced (see reference 2).

**Problem 2** - the space between the arytenoid cartilages is too small to accommodate a standard round tube. The reason for this is that the outer diameter of the commonly used standard round tubes is larger than the distance between the arytenoid cartilages in at least half of the population (see reference 4).

**As a result**, the arytenoid cartilages are pressed laterally and may be displaced at the same time as the mucous membrane is compressed and damaged. Pressure necrosis will gradually develop.

**Solution**, the LAO Tube has an oval cross-section, contrary to the standard tube, which is round. The smallest diameter of the oval cross-section is located between the arytenoid cartilages, there by diminishing the lateral pressure on these cartilages.

The frequency and severity of these pressure-induced lesions at the arytenoid cartilages will therefore be substantially reduced (see reference 4).

**Patent: Sweden and most major countries**



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## Number of patients with post-intubation problems

In a Swedish study about half of the patients intubated with standard tubes experienced a hoarse voice, laryngeal pain and fits of coughing due to decubital ulcers in the larynx. These complications lasted from one week up to three months and sometimes longer. In 3% of the cases post-intubation granulomas on the posterior vocal cords had to be surgically removed (see reference 3).

In some severe cases a scar develops between the posterior parts of the vocal cords, resulting in breathing difficulties (see reference 1).

In a French study, 92 out of 287 patients had to be surgically treated in the post-intubation period, with much suffering for the patients and additional cost for the hospital (see reference 6). Excessive fibrosis in the larynx is impossible to treat and may lead to an incurable outcome.

Surgical correction of these complications is extremely difficult.

## References

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3. Lindholm, C.E. "Prolonged endotracheal intubation" -Acta Anaesthesiol. Snac. Suppl. 33, 1969
4. Randestad, A., et al. "Dimensions of the cricoid cartilage and the trachea" Laryngoscope 110: 1957 - 1961, 2000
5. Steen, A.J., et al. "Tracheal tube forces on the posterior larynx: Index of laryngeal loading" Crit Care Med. 10: 186 - 189, 1982
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## ECONOMICAL ERGONOMICS Lindholm Anatomical Oval Orotracheal Tube

Designed to supercede the standard semi-circular tube that is renowned for causing painful laryngeal damage and hoarseness in as many as 70% of intubations, Professor Carl-Eric Lindholm's LAO Tube conforms to both the contour of the airway and the arytenoid cartilages. This results in safer and more comfortable intubations for the patient (delaying the need for any eventual tracheostomy), shorter recovery times and cost savings.

Hailed by an increasing amount ENT departments across Sweden as the best news for intubated patients in eighty years, the LAO Tube is the clear choice for all procedures requiring especially longer term intubation, the application of which would considerably reduce follow-up surgery and wasted human and financial resources.

