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ÜBUNGSBASIERTE THERAPIE FÜR PATIENTEN MIT EILO

HNO medic
Zürich

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EILO OR WHAT?

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- ILO: inducible laryngeal obstruction
- **EILO: Exercise-induced laryngeal obstruction**
- VCD: vocal cord dysfunction
- PVFM: paradoxical vocal fold motion

- CLE: Obstruction at the glottic and/or supraglottic level
  - separately
  - in parallel
  - sequentially

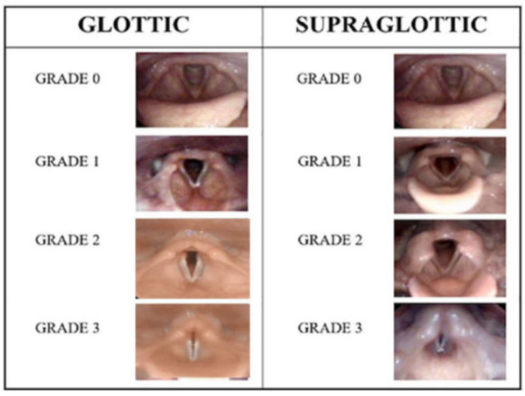

Figure 3 Continuous laryngoscopy exercise grading system. Reproduced with permission from Fretheim Kelly *et al*[89] Frontiers in Physiology.

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NON - SURGICAL THERAPY

- Clemm, H., et. al. (2022). Exercise-induced Laryngeal Obstruction: Protocol for a Randomized Controlled Treatment Trial. *Frontiers in pediatrics, 10*, 817003

adduction of laryngeal structures, and diagnosed by continuous visualization of the larynx during high-intensity exercise. Empirical data suggest that EILO consists of different subtypes, possibly requiring different therapeutic approaches. Currently applied treatments do not rest on randomized controlled trials, and international guidelines based on good evidence can therefore not be established. This study aims to provide

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NON - SURGICAL THERAPY

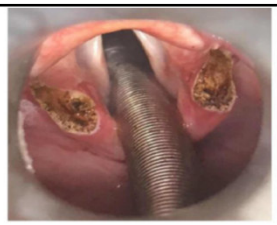

FIGURE 4 | Supraglottoplasty, full procedure, illustrating removal of the cuneiform tubercles on both sides.

Clemm et al., 2022

- Speech therapy has been associated with more than 80 % - 95 % success (Liyanagedera, McLeod et al. 2017 oder Kolnes, L.-J., & Stensrud, T., 2019)
- Surgery only after conservative options have been fully exhausted (Heimdal J.H. et al. 2018)

Respiratory distress during exercise can be caused by exercise-induced laryngeal obstruction (EILO). The obstruction may appear at the level of the laryngeal inlet (supraglottic), similar to supraglottic collapse observed in infants with congenital laryngomalacia (CLM). This observation has encouraged surgeons to treat supraglottic EILO with procedures proven efficient for severe CLM. This article summarizes key features of the published experience related to surgical treatment of EILO. Supraglottoplasty is an irreversible procedure with potential complications. Surgery should be restricted to cases where the supraglottic laryngeal obstruction significantly affects the quality of life in patients for whom conservative treatment modalities have failed.

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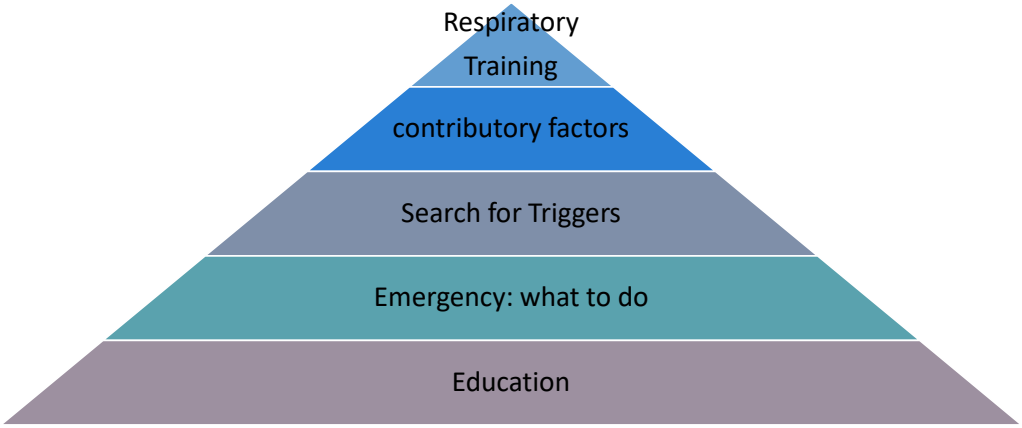

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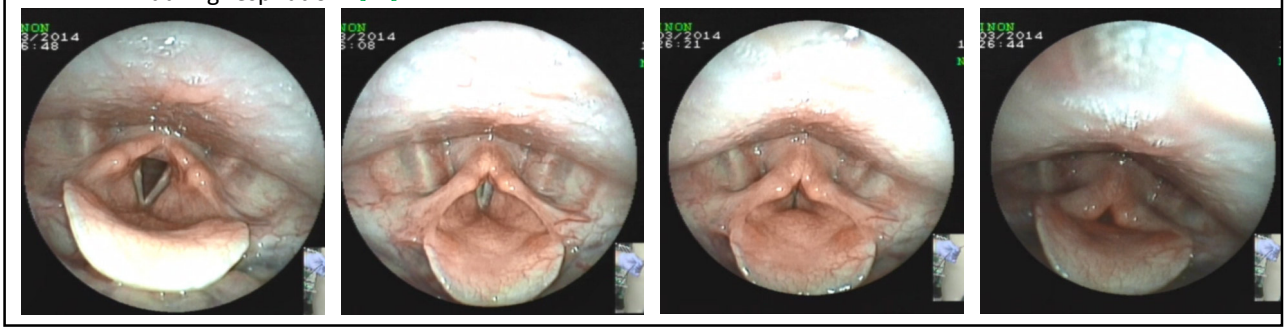
EDUCATION

- detailed discussion and education of physiology of sphincter function of the larynx:
  - during swallowing → ←
  - during phonation → ←
  - during respiration ← →



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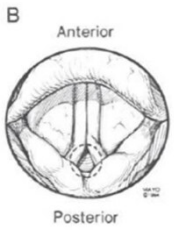
EDUCATION

- physiological respiration during physical activity:
  - In- and expiration: vocal folds and supraglottic structures in (fixed) abducted position.
- individual form of "dysfunction" during sports (cave: choice of words!)
  - laryngeal constriction
  - supraglottic constriction e.g. due to prolapse of the arycartilages, aryepiglottic fold or epiglottic material



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IN CASE OF AN EMERGENCY

- Worst-Case-Szenario
- What to do when an "attack" is brewing?

- Unterbrechen Sie sportliche Tätigkeiten.
- Gehen Sie in eine Körperposition, die Ihnen das Atmen erleichtert. Einigen Menschen hilft eine der abgebildeten Positionen. Finden Sie raus, was Ihnen am besten hilft.


Arme hängen lassen


In die Hocke gehen


Arme heben

Sich hinknien

- Stoppen Sie panikartiges Lufteinziehen! Versuchen Sie langsam durch den Mund auszuatmen (mit ssssss, fffff oder schschschsch) und lassen Sie danach die Luft ruhig einströmen.

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SEARCHING FOR TRIGGERS

- Keeping a breathing journal
  - Recording day and time of “attacks”
  - Recording the severity of “attacks”
- Searching for triggers:
  - Cigarette smoke
  - Deodorant
  - Cough
  - reflux
  - post-nasal-drip
  - lack of warming up
  - ...

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CONTRIBUTORY FACTORS

Evaluate and treat

- in the literature prevention is discussed controversially
- in practice good experiences up to symptom freedom by:
  - PPI (reflux)
  - regular care of the (nasal) mucosa with nasal ointment, nasal douche, sea water spray, inhalation with Bepanthen® SOLUTION with 5% dexpanthenol or physiological saline solution
  - control of air humidity: 45 - 55% RH especially in the bedroom
  - correct inhalation of asthma medication with a spacer if necessary

Deutsche Atemwegsliga e.V.

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CONTRIBUTORY FACTORS

- Jaw control (teeth clenching, pressing)
- Development of perception: relaxation <-> tension larynx, shoulder, …
- Breath-specific posture analysis especially for amateur athletes

Bilder: Datasport

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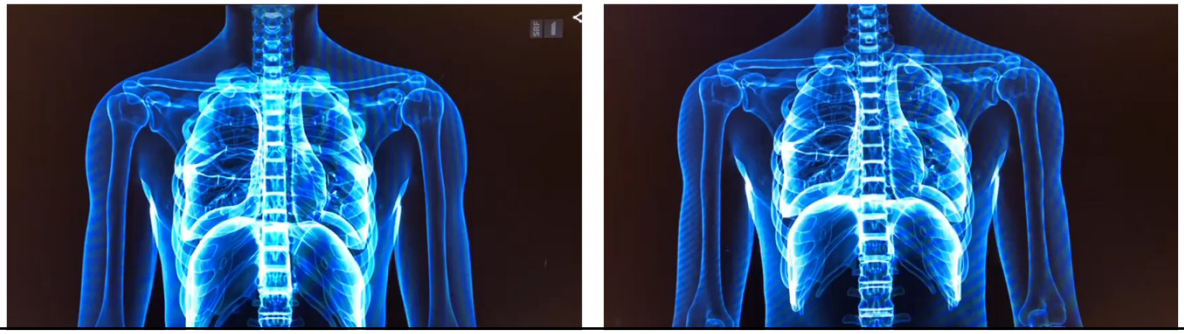
BREATHING THERAPY

- Reduction of disadvantageous patterns and build-up of physiological breathing
- Cooperation with physiotherapy
- the longer EILO, the more intensive measures for automatization



Filme: SRF, Einstein

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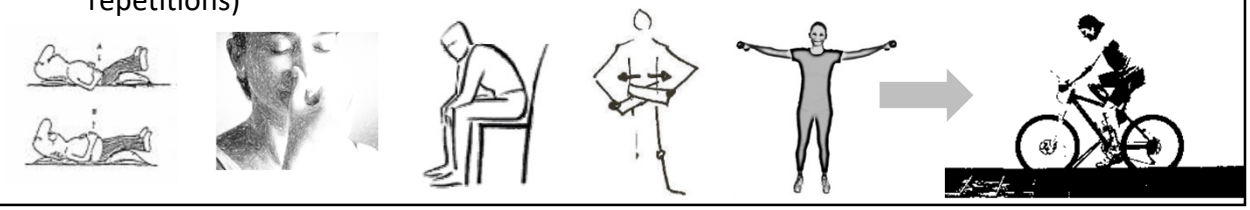
BREATHING THERAPY

- physiological breathing while lying, then sitting and standing
- physiological breathing after short power input (e.g. 20 situps, jumping rope, climbing stairs)
- physiological breathing during controlled movement
- incorporation into warm-up (use individual images and "commands")
- incorporation into training and competition (automation requires 1001 repetitions)



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BREATHING THERAPY

- Costoabdominal breathing → adapted to the sport

Bilder: Simplon, SkiBo tours, sports performance

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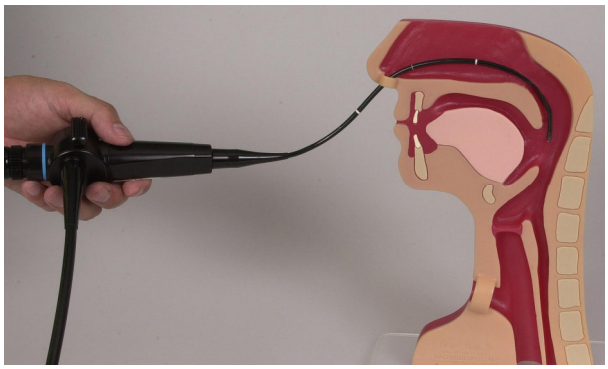
BIOFEEDBACK

- immediate feedback through laryngoscopy
- imitating the tightness / stridor
- observing effects of practiced techniques like breathing
  - with jaw neutral position
  - with laryngeal depression
  - during costo-abdominal breathing

vergl. Olin J. et al., 2017

Fig. 1. Therapeutic laryngoscopy during exercise apparatus configuration.



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IMT-DEVICES

- IMT = Inspiratory muscle training
- Goal: To "adapt" larynx to the increased airflow / to “desensitize” larynx. Or to develop sufficient inspiratory force to overcome the laryngeal obstruction (???).
- appears to be successful especially in athletes with glottic constriction - or in some cases counterproductive (Clemm HSH, Sandnes A, Vollsæter M, et al. The heterogeneity of exercise-induced laryngeal obstruction. Am J Respir Crit Care Med 2018;197:1068-9)
- In speech therapy practice: good experience with very **careful increase** of resistance and under supervision of breathing technique.

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IMT: SANDNES, A. ET AL. (2019)

- measure the **maximal inspiratory mouth pressure** (PImax), using the best value of 10 trials (normaler MIP: 75±27 cm H20)
- participants trained every day, for a total of 6 weeks
  - **2 days IMST** (inspiratory muscle **strength** training (IMST): 80% of PImax, subjects performed five maximal inhalations repeated three times, separated by a 1 min break
  - **1 day IMET** (inspiratory muscle **endurance** training (IMET): 60%–80% of PImax., subjects were instructed to breathe in and out 12–16 times for 1 min
- **Results** After the treatment period, **symptoms had decreased** in 22/28 (79%) participants. Mean **overall CLE score had improved after treatment (p<0.001)**

Respifit S (Biegler GmbH, Mauerbach, Austria):

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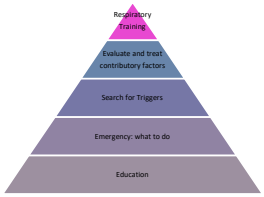
IMT: GAYLORD, PETERSON & RAY, 2022



- the device resistance was initially set at 40% of the average value of maximal inspiratory **pressure according to each participant's age and gender**
- increased level of difficulty each week by a pressure of 2 cm H2O on the device
- increased to as much as 60% of the average maximal inspiratory pressure by the end of the treatment phase
- instructed to complete 15 breaths (slow, resistive inhalations, and normal exhalations),
- 2 times per day for 5 days per week for a total of 5 weeks
- **Results**
  - **reduction in maximum perceived breathlessness.**
  - The majority of participants rated their quality of life regarding dyspnea as significant improved after IMT

IMT Philips

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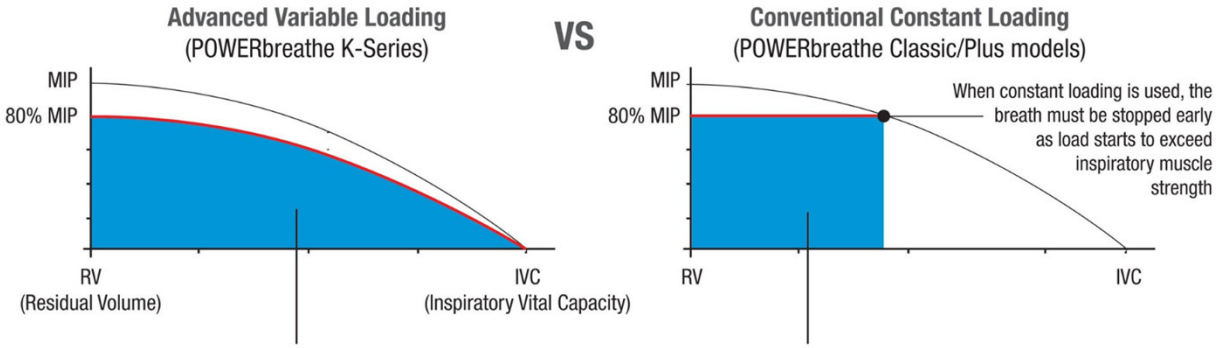
POWERBREATHE



Up to 50% more training work (area under graph) achievable at 80% intensity using variable load training

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LITERATUR

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