Instrumental Methods for Treating VP dysfunction
腭咽闭合功能不全的器械治疗

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1

Biofeedback 生物反馈

- Biofeedback 生物反馈:
  - Also named as "information feedback"
    又称"信息反馈"
  - Individual produces a physiologic event, such as speech. Some element of the activity is given back to the individual. The individual then modifies the activity by using the information fed back.
    生理活动如说话的某些相关信息被记录并回馈给患者，于是患者可根据这些信息调整自身的生理活动。

Biofeedback 生物反馈

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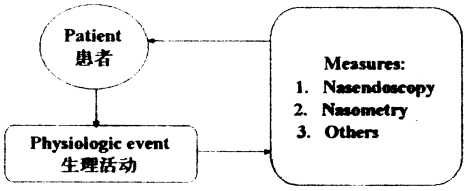


* The measure should be **most relevant** to the target behavior.

Instrumental Methods for Treating VP dysfunction 腭咽闭合功能不全的器械治疗

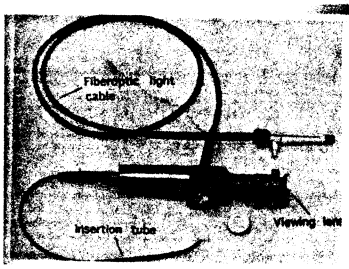
- Instrumental biofeedback to treat VP dysfunction is <u>not</u> necessarily to make muscle stronger, but to shape the VP behavior.

  器械生物反馈治疗腭咽闭合功能不全并不能使肌肉更强壮，但可逐渐改善腭咽闭合的功能活动。

Instrumental Methods for Treating VP dysfunction 腭咽闭合功能不全的器械治疗

- Requirement: 要求：
  - Age: old enough to be cooperative
    年龄：需年长至足以配合治疗
  - Timing relative to surgery: at least 3 months after surgery, so that the VP mechanism becomes stable.
    与外科手术相关的治疗时机：至少术后三个月，使腭咽闭合功能趋于稳定。

Videonasendoscope-feedback
内窥镜反馈治疗



(Original figure from Peterson-Falzone et al.)

Videonasendoscope-feedback
内窥镜反馈治疗

- Videonasendoscope 内窥镜
  - Advantage 优点:
    - Patients can see their VP mechanism directly.
      患者可直接观察自己的腭咽闭合运动。
  - Disadvantages 缺点:
    - Limited availability of equipment
      需要设备
    - Only conducted at hospital
      只能在医院中治疗
    - Invasiveness 需施行侵入性操作

Nasometer-feedback
鼻音计反馈治疗

- Nasometer 鼻音计
  - Advantages 优点:
    - Easy to use 易于使用
    - Non-invasive 无需侵入性操作
  - Disadvantage 缺点:
    - Indirect information measure of VP function
      不能提供腭咽闭合的直接信息

Instrumental Methods for Treating VP dysfunction 腭咽闭合功能不全的器械治疗

- Subject selection 治疗对象的选择:
  - Inconsistent velopharyngeal closure
    不一致性的腭咽闭合不全
  - Borderline velopharyngeal inadequacy
    边缘性的腭咽闭合不全
- Treatment duration 治疗时间:
  - 3-6 months or shorter
    三至六个月或更短

CPAP therapy 持续正压通气治疗

- CPAP therapy
  (continuous positive airway pressure)
  持续正压通气治疗:
  - It generates a continuous positive airway pressure that is transmitted to a patient through a nasal mask.
    正压空气通过鼻罩导入患者的气道。

Airflows(U) and resistance(R) in the upper vocal tract 上部声道的气流和阻抗示意图

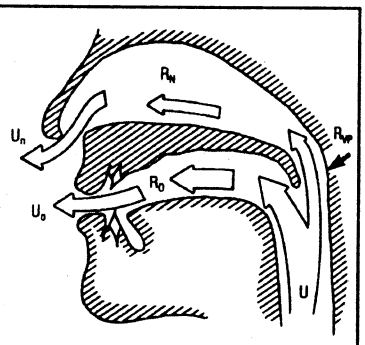


FIGURE 10-8. Airflows (*U*) and resistances (*R*) in the upper vocal tract.

(Original figure from Baken)

CPAP therapy 持续正压通气治疗

- It is used as a muscle resistance training program for speakers with velopharyngeal inadequacy. The muscles of the velopharynx must work against a positive air pressure to close the velopharyngeal port.

  在治疗中，腭咽部肌肉必须抵抗正压闭合腭咽。所以CPAP是一种肌肉抗力训练，可用于治疗腭咽闭合功能不全。

CPAP therapy 持续正压通气治疗

- Procedure 步骤:

  1. CPAP mask is placed over the patient's nose. 给患者戴上鼻罩。
  2. Appropriate pressure and duration are set for corresponding session.
     每个训练段设定适当的气压和时间。

CPAP therapy Schedule
持续正压通气治疗程序

	Mon	Tues	Wed	Thurs	Fri	Sat
Week 1	4.0*	4.5	5	4	4.5	4.5
	10**	10	10	10	10	10
Week 2	4.5	5	5.5	4.5	5	5
	12	12	12	12	12	12
Week 3	5	5.5	6	5	5.5	5.5
	14	14	14	14	14	14
Week 4	5.5	6	6.5	5.5	6	6
	16	16	16	16	16	16
Week 5	6	6.5	7	6	6.5	6.5
	18	18	18	18	18	18
Week 6	6.5	7	7.5	6.5	7	7
	20	20	20	20	20	20
Week 7	7	7.5	8	7	7.5	7.5
	22	22	22	22	22	22
Week 8	7.5	8	8.5	7.5	8	8
	24	24	24	24	24	24

Pressure Settings and Time per Session
气压及时间设置

*CPAP pressure in cm H20
*CPAP气压：厘米水柱
**Time per session in minutes
**时间：分钟

CPAP therapy 持续正压通气治疗

- Procedure 步骤:
  3. The patient produces 50 VNCV utterances.
     嘱患者念50个辅/鼻/辅/元音的音素组合。
  4. The patient produces 6 sentences.
     嘱患者念六个句子。
  5. Repeat the steps 3 and 4 until session time expires.
     重复步骤3和4直至达到设定时间。

CPAP therapy 持续正压通气治疗

- Advantages 优点:
  - Training is conducted during speech production.
    在说话的功能活动中进行肌肉训练。
  - Training can be conducted at home.
    治疗可在患者家中完成。

CPAP therapy 持续正压通气治疗

- Disadvantages 缺点：
  - Limited availability of instrument
    需要设备支持

Acoustic Analysis 声学分析：

- Acoustic analysis of speech sound:
  语音的声学分析：
  - The spectrograph provides a visual display of changes in the frequency and intensity of speech sounds over time.
    语音频谱分析可显示出语音在不同的时间的频率和强度的变化。

Acoustic Analysis 声学分析

- Some features that have been found to be associated with hypernasality
  已发现与过高鼻音有关的声学特征：
  - Increase in formant bandwidth 共振峰带宽增加
  - Formant frequency shift 共振峰频率迁移
  - Extra formants 共振峰过多
  - Diminished formants 共振峰减弱
  - Noise between formants 共振峰之间的噪音
  - General decrease of vowel or overall speech intensity 元音或总的语音强度减弱。

Acoustic Analysis 声学分析

- Acoustic measures (features) have not yet been found that are consistently related to hypernasality across all speech sounds.

现在尚未发现与过高鼻音一致相关的声学特征。

Acoustic Analysis 声学分析

- Few SLPs utilize spectrographic measures in the analysis and treatment of VP function.

声学分析很少用于腭咽闭合功能的评价与治疗。

4th case study 病案4分析

- Is the fistula "communicating"?

(Connecting the oral and nasal cavity)

(漏)孔是否"交通性"(连通口鼻腔)?

  - Nasal regurgitation
    有无鼻腔返流

4th case study 病案4分析

- If fistula communicating
  如(漏)孔属交通性
  - Mirror test 镜子实验：
    - The patient produces /papapa..../ and then /kakaka..../.
      嘱患者发 /papapa..../ 和 /kakaka..../.
  - Plug the fistula with chewing gum, dental wax, or a thin bread wafer, to determine whether speech improves.
    用口香糖、牙科用蜡等堵住(漏)孔，观察语音有无改善。

4th case study 病案4分析

- Cont'd 续：
  - Barium swallows in lateral-view videofluoroscopy
    在侧位X线动态录像观察下行吞钡实验
    - The patient is instructed to try to force the barium up into the nasal passages.
      教患者将钡剂从(漏)孔逼入鼻道

4th case study 病案4分析

- If the fistula really is that large (5 mm) and is communicating freely with the nasal cavities, it may have to be repaired surgically.
  如果(漏)孔确实较大(5毫米)，且与鼻腔交通自如，可能需外科修复.
- In addition, the integrity of the VP port should be assessed by using nasendoscopy or videofluoroscopy.
  此外，还应用内窥镜和X线动态录像检查腭咽闭合功能.

4th case study 病案4分析

- If there is significant VPI, the VP mechanism may have to be repaired as well.

如存在显著的腭咽闭合不全，腭咽部需进行外科治疗。

4th case study 病案4分析

- However, given that nasal emission and hypernasality are described as "mild," VP function may not be severely impaired. Then, the surgical repair to VP mechanism may not be necessary. The surgical repair of the fistula may solve the oral-nasal resonance imbalance problem.

然而，此病例仅有"轻度"过高鼻音，其腭咽闭合可能并无严重的功能不全。所以，腭咽部的外科治疗可不必要。通过手术修复(漏)孔可解决其口/鼻共鸣失衡的问题。

4th case study 病案4分析

- If slight nasality persists even with surgical correction of the fistula, CPAP therapy before VP surgery is recommended.

如术后轻度的过高鼻音仍存在，建议在腭咽部的外科治疗前进行持续正压通气治疗。

4th case study 病案4分析

- It should be determined whether the child would benefit from orthodontia, to reduce the malocclusion, or whether he/she might eventually need to receive orthognathic surgery. The latter in particular might improve the situation regarding articulation errors.

  确定患儿是否需要正畸或正颌治疗，尤其后者可能有益于改善发音错误。