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Facial Rehabilitation:
Treatment strategies for Facial Palsy
Part 2

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Summary of Facial Palsy

<table>
<thead>
<tr>
<th>Flaccid</th>
<th>Paresis</th>
<th>Synkinesis</th>
<th>Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute BP Tumor Excision</td>
<td>Subacute BP Congenital Facial Tumor</td>
<td>Chronic BP Incomplete recovery following FN injury</td>
<td>Lyme Disease Moebius Syndrome NF 2</td>
</tr>
</tbody>
</table>
Impairments

**Acute** *(onset to 6 months)*: Paralysis / Paresis
- Motor Loss of the facial muscles, unilateral/bilateral
- Impaired taste sensation
- Impaired vision (due to incomplete eye closure)
- Sensitivity to sound
- Auricular pain

**Chronic**: (> 6 months): Paralysis from complete FN injury or Synkinesis from incomplete recovery
- As above if paralysis persists, plus muscle atrophy
- Muscle stiffness due to synkinesis and hypertonicity that presents as muscle pain/tightness

Functional Limitations

- Incomplete eye closure: dry or teary, corneal abrasion
- Inability to move the corner of mouth: smile, laugh
- Inability to pucker lips
- Impaired articulation
- Limited expression of emotions:
  - Perceived by others to have negative affect (Ishii and colleagues 2012)
  - Observed by others as less normal, more distressed, less intelligent (Li and colleagues 2016)
Disability

- Social isolation, Anxiety and Depression
  - Studies show between 30-60% have anxiety and depression; higher grades of facial dysfunction had higher depression scores, lower quality of life; higher in females

- Unable to eat in public, in restaurants

- Unable to work due to articulation difficulties, visual dysfunction, pain, cosmesis

- Avoid being in photos

Facial Physical Therapy Evaluation

- History: onset, recovery to date, prior intervention
- Chief Complaint:
  - Smiling
  - Eating
  - Drinking
  - Speaking
  - Facial expressions
  - Vision
  - Pain/muscle tightness:
  - Involuntary movements (synkinesis)

- Sunnybrook Facial Grading Scale (FGS)
- eFACE
- Review of Systems: Cranial Nerves, Balance, TMJ, C-Spine
- Measurement Tools: FaCE Instrument, Facial Disability Index
FaCE Instrument

Total score - # of items scored, divided by (# of items scored x4) x100.

Example:
55 - 15/ (15x4) x 100 = 66.6/100

FaCE questionnaire research

- Ross and colleagues validated and showed that increased facial impairment leads to worse physical and social function (Otolaryngol Head Neck Surg 1996)
- Volk and colleagues found no relationship between psychosocial scores and severity (Laryngoscope 2016)
Critical thinking...from evaluation to treatment

Classification of Treatment: Assessment

- Initiation
- Facilitation
- Movement control
- Relaxation

VanSwearingen J and Brach J.
Facial rehabilitation: A neuromuscular reeducation, patient-centered approach.
Initiation Category

Impairments
- moderate to severe facial asymmetry at rest due to flaccid facial regions
- **flaccid**: unable to initiate movement on the affected side
- (-) synkinesis

Initiation Interventions
- Patient education
- Cornea protection
- Gentle superficial massage
- AVOID mass movement patterns
  - avoid overuse of the uninvolved side
- Passive movement exercises
Facial Nerve and Muscles

**FACIAL NERVE BRANCHES**
- Temporal (T)
- Zygomaticus (Z)
- Buccal (B)
- Mandibular (M)
- Cervical (C)

**FACIAL MUSCLES**
- Frontalis (FRS)
- Corrugator (COK)
- Procerus (PRC)
- Orbicularis oculi superioris (OCS)
- Orbicularis oculi inferioris (OCI)
- Dilator nasi (DN)
- Compressor naris (COM)
- Levator labii alaeque (LLA)
- Levator labii supercilii (LLS)
- Levator anguli oris (LAO)
- Zygomaticus major (ZM)
- Zygomaticus minor (ZMN)
- Risorius (RS)
- Orbicularis oris superioris (OOS)
- Orbicularis oris inferioris (OOD)
- Depressor anguli oris (DAO)
- Depressor labii inferioris (DLI)
- Metaeph (MEP)
- Platysma (PLA)

**OTHER TERMS**
- Synkinesis
- Aberrant (nerve) regeneration

Eye /Corneal Protection

- Tape the eye closed, use of an eye patch
- Eye drops
- Surgical implantation of a thin profile platinum weight
- Manual eye lid stretch
Eyelid Stretch: Levator Palpebrae Superior
Begin at ~2 months

Initiation Interventions

- No nerve input
- Passive movements
- AVOID mass movement patterns
  - avoid overuse of the uninvolved side
Facilitation Category

Impairments

- mild to moderate facial asymmetry at rest
- *paresis*: able to initiate slight movement (scores of 2 on the voluntary movement section of the FGS) in any or all regions of the face
- (-) synkinesis

Facilitation Interventions

- Education
- Effleurage massage
- Active assistive exercises and neuromuscular retraining
- Functional Retraining
- EMG biofeedback
- Educate about synkinesis
Video – Gentle massage

Active Assistive
Neuromuscular Retraining
Symmetry

- Drinking
  - Midline
  - Straw
  - Thin Rim
  - Sip
- Eating
  - Slow
  - Small
  - Soft
  - Side
Movement Control Category

Impairments
- mild to moderate facial asymmetry at rest
- able to initiate at least slight movement (scores of 2 on the voluntary movement section of the FGS) in any or all regions of the face
- (+) synkinesis

Movement Control Interventions
- Education: synkinesis!!
- Soft tissue mobilization of the facial muscles and neck
- Neuromuscular Re-education: slow and purposeful facial expressions with the goal of symmetry between the sides of the face while simultaneously controlling the synkinetic movements in other regions of their face
- Relaxation/meditations
Education Synkinesis

Video: Soft tissue mobilization
Neuromuscular Re-education

Facial Movement/Expression while also decreasing synkinesis
- Slow execution
- Small movements
- Symmetry
- Mind to muscle connection
- Relax, Release, Soften, Drain
- Mirror feedback initially for visual cues, then decrease to proprioceptive cues
- EMG Biofeedback can be used

Video: Neuromuscular Retraining
Goal:
less synkinesis and more symmetry

Relaxation Category

**Impairments**
- facial asymmetry at rest due to hypertonicity
- able to initiate at least slight movement in any or all regions of the face
- (+) synkinesis, severe
- limited movement because of tightness rather than weakness
Relaxation Interventions

- Patient education
- Aggressive deep soft tissue mobilization of the facial muscles
- Meditation-relaxation strategies
- Neuromuscular re-education in front of a mirror

Summary

Facial Rehabilitation

- Education
- Soft tissue massage
- Neuromuscular Re-education
- Psycho-social support
- Functional Retraining
- Relaxation Strategies
Focus on the positive!
Get up, Get dressed and Get going!

Research Review


- Facial exercises (3): some evidence in chronic stage
- Electrical Stim (4): no evidence
- Form of PT compared to acupuncture (5): no evidence
<table>
<thead>
<tr>
<th>Author and year</th>
<th>Methods of evaluation</th>
<th>Type of injury</th>
<th>Interventions</th>
<th>Result</th>
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<tbody>
<tr>
<td>Beurskens 2006</td>
<td>Sunnybrook and House-Brackmann scale</td>
<td>Facial palsy</td>
<td>25 mime therapy, 25 without treatment</td>
<td>Mime therapy effective</td>
</tr>
<tr>
<td>Nakamura 2003</td>
<td>Recording and compare with sound side</td>
<td>Facial palsy</td>
<td>12 mirror biofeedback, 15 without treatment</td>
<td>Mirror biofeedback effective</td>
</tr>
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<td>Pourmomeny 2013</td>
<td>Sunnybrook and House-Brackmann scale</td>
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<td>16 EMG biofeedback, 13 physiotherapy</td>
<td>EMG biofeedback effective</td>
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<tr>
<td>Toffola 2012</td>
<td>Sunnybrook scale</td>
<td>Facial palsy</td>
<td>34 EMG biofeedback, 36 mirror biofeedback</td>
<td>Both of them effective without significant difference</td>
</tr>
<tr>
<td>Ross 1981</td>
<td>Linear measurement of facial movement</td>
<td>Bell's palsy</td>
<td>18 EMG biofeedback, 7 mirror biofeedback</td>
<td>EMG biofeedback effective</td>
</tr>
<tr>
<td>Toffola 2005</td>
<td>Sunnybrook and House-Brackmann scale</td>
<td>Bell's palsy</td>
<td>28 stretch + active movement biofeedback</td>
<td>EMG biofeedback effective</td>
</tr>
</tbody>
</table>


Multimodality Management

- Physical Therapy
- Medical Therapy
- Surgical Therapy
Botulinum Toxin (Botox®) for the Paralyzed Face

- Botulinum Toxin (Botox®) works at the neuromuscular junction, to partially paralyze the muscles that are synkinetic.
- Most common muscles: obicularis oculi, mentalis, depressor anguli oris and platysma.
- Weakening the contralateral side of the face can also be used to achieve facial symmetry: frontalis and depressor labii inferior.
- Effects last an average of 3-6 months.

Timing of Botox

- Can be as early as 6 months after development of synkinesis.
- Ideally after ~3 months after commitment to facial rehab program.
  - variable among clinicians
- Chronic synkinesis.
Botox to the Oculi

Initial

Post PT and botox

Oculi
Initial
Mentalis
Platysma

Botox® Research

  - Improved synkinesis scores using SAQ and improved Sunnybrook FGS score
Results

- Statistical significant improvement in the Sunnybrook Facial Grading Scale score of patients with chronic facial palsy/synkinesis;
- Long term benefit with continued self management

Surgical Reanimation
Smile Reanimation: Nerve to Native Muscle

- Contralateral cross facial nerve graft / sural nerve (CFNG)
- Masseteric nerve to the facial nerve (Direct V to VII)
Smile Reanimation: Nerve to Free Muscle

- Gracilis by contralateral facial nerve (Gracilis by CFNG)
- Gracilis by masseteric nerve (Gracilis by V)
- Dually innervated gracilis

Free Muscle Transfer: gracilis

This surgery takes place 7-9 months after the cross-face nerve grafting.
Direct 5 to 7 nerve transfer video

Surgical outcome data

- Dey and colleagues showed improved affect, more attractive (although not normal) following surgery in FP (Dey and Ishii in JAMA Facial Plas Surg 2017)
- Improved quality of life following gracilis surgery (Lindsay, Bhama, Hadlock in JAMA Facial Plas Surg 2014)
Case Studies

Rehabilitation for Facial Paresis: Facilitation Category

- **History**
  - 16 year old female with congenital left facial paresis; first started at the FNC age 8
  - Excellent student, avid horseback rider

- **Chief Complaint (per mother)**
  - Corneal health
  - Asymmetrical smile
  - Asymmetrical articulation
  - Sunnybrook FGS Score: 24/100 (-) synkinesis, unable to initiate / initiate slightly (1-2) in all zones

- **Treatment category**
  - Facilitation

- **Functional Goals**
  - Improve FGS
  - Complete eye closure, symmetrical smile, and teach compensatory strategies for articulation
Facilitation

Interventions

- Education
- Effleurage massage
- Neuromuscular reeducation in front of a mirror - slow, controlled, graded facial expressions to generate symmetry between the sides of the face
- Typically, no synkinesis in congenital FP

Goal:

Improve ocular health:
Eyelid Stretch to Levator Palpebrae Superior
2-3 reps
2x/day
Facilitation for Paresis

Goal:
Symmetrical lip motion & smile
- AAROM, progressive to AROM with mirror feedback
- Biofeedback
  - EMG
  - Stickers

Facilitation for Paresis

Oral Motor Exercises
- Bubbles, straw, lollipops, tongue twisters, musical recorder, pinwheel, iPad games
Sunnybrook FGS Score: 42/100
Improved confidence, improved ocular health (complete eye closure) and improved symmetry

Sunnybrook FGS Score: 24/100 (-) synkinesis, unable to initiate/ initiate slightly (1-2) in all zones

Facial Rehab

Free gracilis
Driven by the Cross face nerve graft
Rehabilitation for Movement Control/Relaxation

62-year-old female, diagnosed with Bell’s palsy 4 years ago
Incomplete recovery: Sunnybrook FGS 41/100, including severe periocular, mentalis, and platysmal synkinesis; FaCE 54/100

Chief Complaint
- asymmetrical smile
- involuntary eye closure
- facial pain and spasms

Treatment category
- Movement control/relaxation

Problem List
- Soft tissue tightness
- Synkinesis

Functional Goals
- Improve FGS and FaCE score
- Minimize synkinesis
- Independent with home exercise program

Therapy Techniques

Chronic Facial Paresis and Synkinesis

- Patient education
- Relaxation techniques
- Soft Tissue Mobilization
- Botox
Neuromuscular Re-education

With and without mirror feedback

» Small movements with conscious control over their synkinesis.
» Repetition, repetition, repetition!
» Neuroplasticity

Video

Rehabilitation for Movement Control/Relaxation

**Functional Goals**
- Improved FGS: less synkinesis, improved symmetry
- Improved FACE: less facial discomfort, improved self confidence with eating in public
Alone we can do so little, together we can do so much.
- Helen Keller

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- www.facialnervecenter.org
- www.bellspalsy.ws
- www.facialpalsuk.org
- www.sircharlesbell.com