Reanimation of the Smile using Contiguous Muscle Transfer in Facial Paralysis

A Review of 365 Patients

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The human face: Confidence, dignity, socialization

So much is lost when the face is paralyzed!
Goals defined
Complete and Partial Paralysis

• Motion
• Support
• Symmetry
• “Emotional smile”
• Relaxation of structures
Anatomy of the Facial Nerve

- Cerebral and Mid Brain
Anatomy of the Facial Nerve

- Cerebral and Mid Brain
- Fallopian Canal
Anatomy of the Facial Nerve

- Cerebral and Mid Brain
- Fallopian Canal
- Peripheral Branches
What determines a smile?

- Direction muscle takes to orbicularis
- Strength or development of groups
- Variations in lip width or length
- Bone variations of the jaws
- Tooth structure variations
- Depth of nasal labial fold
- Pathological conditions
Facial Reanimation

Goals

- Symmetric facial motion
- Spontaneous smile
- Improved cheek contour
- Eyelid closure
- Chew on the paralyzed side
Anatomy of a Smile

Its importance in the treatment of facial paralysis

Teacher, mentor, and friend

*His greatest accomplishment was the reanimation of the paralyzed face*
Anatomy of a Smile

- Mona Lisa: Zygomaticus
Anatomy of a Smile

• Mona Lisa: Zygomaticus
• Canine: Levator
Anatomy of a Smile

- Mona Lisa: Zygomaticus
- Canine: Levator
- Full denture: elevators and depressors
Mona Lisa Smile

67%
Canine Smile

31%
Full Denture Smile

2%
Nasal Labial Fold

“keystone”
Landmarks

- Symmetric facial motion
- Lip contour and height
- Nasal labial fold depth
- Cheek contour
- Equal show of teeth
Complete Unilateral Paralysis
Hypoglossal to Facial Nerve Transfer
Hypoglossal to Facial Nerve Transfer

- Requires functioning facial muscles
- Peripheral facial nerve intact
- Facial muscle tone in 4-6 months
- Tongue deformity
- Partial transfer-babysitting

XII to VII nerve transfer
XII-VII tongue deformity

Severe ipsilateral

Z plasty correction
XII to VII Transfer

- Complete left paralysis
- Etiology: acoustic
- Surgery at 1 month
- Excellent tone at 6 months
- Use in other procedures
XII to VII Transfer

Quality and balance of the smile?
Cross Face Nerve Grafting

- Facial nerve for reinnervation
- Synchronous emotional smile
- Synkinetic motion can occur
- Setting the tension
- Two stages
Cross Face Nerve Grafting
Second stage gracilis
Second stage-muscle transfer
Cross Face Nerve Grafting
Cross Face Nerve Graft
Gracilis to Masseter Nerve
Reanimation of the Smile using Contiguous Muscle Transfer in Facial Paralysis

A Review of 365 Patients
Temporals & Masseter Muscles
Complete Facial Paralysis

- Contiguous muscle transfer
- Upper lid gold weight
- Lower eyelid static sling
- Alloderm ipsilateral lower lip
- Soft implant to temporal donor site
- Occasional static sling addition
Operative Procedure

complete unilateral paralysis
temporalis dissection
preparation of fascia
cheek dissection
setting the tension
commissure overcorrection
temporal fossa hollow
temporal fossa hollow
additional procedures
Corneal Exposure

- Upper lid retraction
- Lower lid ptosis
- Anatomy of cheekbone (zygoma)
Insertion Gold Weight
Lower Lid Slings
Must Address Upper and Lower Eyelids
4 months after transfer

Pre op

4 months
1 Year Post Transfer

Pre op

1 year-relaxed
Partial Facial Paralysis
Levator labii superioris
Zygomaticus major & minor
Partial Facial Nerve Paralysis

- EMG Studies
- Plication vs. Muscle Transfer
- Analysis of Benefit
partial paralysis:
local muscle plication
Segmental tightening
partial paralysis support
Will it hold up??

- Dynamic excursion, not static
- Secondary tightening 26% in 3 years
- Tertiary tightening 6%
18 years post reanimation
25 Years post reanimation
28 Years post reanimation
Moebius Syndrome

Bilateral Facial Diplegia
Contiguous muscle transfers
Analysis of Patients 1957-2014

• Number of patients: 365
  – 69% female
  – 31% male
Analysis of Patients 1957-2014

• Number of patients: 365
  – 72% female
  – 28% male

• Age: 8 yrs - 82 yrs.
  – mean age 41.6 years
Analysis of Patients 1957-2014

• Causes of Paralysis
  – Tumor 60%
    • Acoustic neuroma 86%
    • Meningioma 5%
    • Hemangioma 5%
    • Cholesteotoma 4%
Analysis of Patients 1957-2014

• Causes of Paralysis
  – Tumor 60%
  – Bell’s Palsy 20%
Analysis of Patients 1957-2014

• Causes of Paralysis
  – Tumor 60%
  – Bell’s Palsy 20%
  – Trauma / Peripheral tumor 8.5%
Analysis of Patients 1957-2014

• Causes of Paralysis
  – Tumor 60%
  – Bell’s Palsy 20%
  – Trauma / Peripheral tumor 8.5%
  – Congenital 9.5%
Analysis of Patients 1957-2014

• Causes of Paralysis
  – Tumor 60%
  – Bell’s Palsy 20%
  – Trauma / Peripheral tumor 8.5%
  – Congenital 9.5%
  – Moebius bilateral 2%
Analysis of Results
1957-2014: 365 Patients

• Photo review
• Surgeon comment
• Patient follow up
Analysis of Results
1957-2014: Criteria

- Commissural position
- Upper lip symmetry and lift
- Tooth exposure symmetry
- Closure on relaxation

Comparison to normal side post surgery
Facial Paralysis Grading System Table

<table>
<thead>
<tr>
<th>TYPE OF SMILE</th>
<th>ZYGOMATICUS MAJOR</th>
<th>CANINE</th>
<th>FULL DENTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEETH SHOW – UPPER TEETH COUNTED</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PARALYZED SIDE PRE-OP TEETH SHOW –</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PARALYZED SIDE POST-OP TEETH SHOW –</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NORMAL SIDE POST-OP TEETH SHOW –</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHANGE IN TEETH SHOW ON PARALYZED SIDE –</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(PARALYZED SIDE PRE-OP – PARALYZED SIDE POST-OP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TEETH-SHOW SYMMETRY –</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(NORMAL SIDE POST-OP – PARALYZED SIDE POST-OP) POINTS</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LOWER LIP POST-OP DEPRESSION –</strong></td>
<td>SYMMETRICAL</td>
<td>PARTIAL</td>
<td>ABSENT</td>
</tr>
<tr>
<td>(POSITION OF LOWER LIP AS COMPARED TO NORMAL SIDE)</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td><strong>NASAL LABIAL FOLD (NLF) CHARACTERISTICS</strong> (COMPARISON OF NORMAL SIDE TO RECONSTRUCTED SIDE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NLF SYMMETRY –</td>
<td>VERY</td>
<td>FAIRLY</td>
<td>NO</td>
</tr>
<tr>
<td>(POST-OP CONTOUR)</td>
<td>SYMMETRICAL</td>
<td>SYMMETRICAL</td>
<td>SYMMETRY</td>
</tr>
<tr>
<td>POINTS</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>NLF DEPTH –</td>
<td>DEEPER</td>
<td>SYMMETRICAL DEPTH</td>
<td>SHALLOWER</td>
</tr>
<tr>
<td>(POST-OP)</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>NLF RELAXATION –</td>
<td>COMPLETE</td>
<td>PARTIAL</td>
<td>NONE</td>
</tr>
</tbody>
</table>

**GRADES**

| EXCELLENT | 86 – 100 |
| GOOD | 64 - 85 |
| FAIR | 44 - 63 |
| POOR | 2 - 43 |

Teeth Show Symmetry Points

0 = 5 points
+/- 1 = 4 points
+/- 2 = 3 points
+/- 3 = 2 points
+/- 4 = 1 point
+/- 5* = 0 points

0.5 Tooth Receives 0.5 Points
Lower Lip Position
Symmetrical
Nasal Labial Fold Depth
Shallower on corrected side

Complete Relaxation in Resting Face
FINAL SCORE = 96
EXCELLENT
Facial Paralysis Grading System

<table>
<thead>
<tr>
<th>Grades</th>
<th>Score Range</th>
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<tbody>
<tr>
<td>Excellent</td>
<td>86 – 100</td>
</tr>
<tr>
<td>Good</td>
<td>64 - 85</td>
</tr>
<tr>
<td>Fair</td>
<td>44 - 63</td>
</tr>
<tr>
<td>Poor</td>
<td>2 - 43</td>
</tr>
</tbody>
</table>

- 84% received a grade of excellent or good
Excellent
Good
Analysis of Results
1957-2014: Categories

- Excellent 36%
- Good 48%
- Fair 12%
- Poor 4%
Analysis of Results 1957-2014

• Secondary procedures 26% (within 3 years)
  – Tension on temporalis
  – Deepen nasal labial fold

• Tertiary tightening 6%
Contiguous Facial Reanimation

- Reliable
- Reproducible
- Rapid results
- Low revision rate
- Long lasting
- High satisfaction