SNORING & OSAHS SURGERY

International Workshop

MAXILLO-MANDIBULAR ADVANCEMENT

>15°
MAXILLO-MANDIBULAR ADVANCEMENT (MMA)

Basic Procedures: Maxillary Area

**LE FORT I**

MAXILLARY ADVANCEMENT

OSTEOTOMY
Basic Procedures: Mandibular Area

OBWEGESER-DAL PONT
SAGITTAL MANDIBLE SPLIT TECHNIQUE OSTEOTOMY
Addictional Procedures: GenioGlossus Muscle Advancement

GENIOGLOSSUS ADVANCEMENT Anterior Mandibular Osteotomy (AMO) 
Addictional Procedures:
Forward Sliding
Genioplasty

Anterior Sliding Osteotomy
Mentoplasty
Prinsell J.R.
Chest 116:1519-1529, 1999
MM Advancement

Rationale & Biomechanics

Tongue

Base (anterior wall)

Lateral Pharyngeal Wall
Lateral wall: osteo-muscular structures (pre-op)

MAXILLO–MANDIBULAR ADVANCEMENT

Anterior wall: osteo-muscular structures (pre-op)

MAXILLO-MANDIBULAR ADVANCEMENT

Anterior wall: osteo-muscular structures Tensioning (post-op) Riley & Coll., 1985

>10mm
Patients Selection: Candidates to Phase II - MMA

- Severe & Obese OSAHS patients
- TS<2/4
- Failed Phase I patients
- Disproportionate maxillofacial features patients

Contraindications

- Inadequate facial bone framework (age, osteoporosis, etc.)
- Pathologic conditions in osteotomy areas (impacted teeth, granulomas, cysts, implants)
- Hypodontulia (relative)
- Biprotrusive facial profile (relative)
- High surgical & anesthesiological risk
- Psychologically not stable patients
Pre Op Work Up

- Physical Ex
- Endoscopy
- PSG
- Lateral Cephalogram
- Panorex
- Virtual Profile
- Surgical Splints
Virtual Project
Kays Power Goo®

NORMAL OCCLUSION SPLINT
MANDIBULAR ADVANCEMENT SPLINT

MAXILLARY ADVANCEMENT SPLINT
COMPLETE SET of SPLINTS

Traditional intubation (20%)
Fiberoptic Intubation
(80%)

my long way to MMA...
### MMA: our personal technical options

<table>
<thead>
<tr>
<th>problem</th>
<th>solution</th>
<th>remarks</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAyws Safety</td>
<td>Trch</td>
<td>RDI&gt;50 LOS&lt;50%, BMI&gt;30, &gt;NC, FSD</td>
<td>⊗ &lt;1 week</td>
</tr>
<tr>
<td>Planned Adv</td>
<td>12 mm</td>
<td>int.splint</td>
<td>Ø</td>
</tr>
<tr>
<td>Mand Split</td>
<td>Obl.MSSRO</td>
<td>Lindemann® rec saw/osteotomes</td>
<td>difficult+++</td>
</tr>
<tr>
<td>Max Osteotomy</td>
<td>Trad. low/Le Fort I</td>
<td>Saws + osteotomes</td>
<td>var diff.</td>
</tr>
<tr>
<td>IRF mand</td>
<td>Bicortical screws</td>
<td>transgiugal+endoral</td>
<td>very stable</td>
</tr>
<tr>
<td>IMF</td>
<td>IMF Leibinger®</td>
<td>Very quick</td>
<td>very stable</td>
</tr>
<tr>
<td>Main steps seq.</td>
<td>MSSRO &gt; LeFortI</td>
<td>easier</td>
<td>quicker</td>
</tr>
</tbody>
</table>

### MMA Technique

avanzamento maxillo-mandibolare a scopo roncochirurgico
Zeiss® Alogen Loupe

Routine Tracheostomy (100%)
Mandible split -> maxillary Le Fort I
12 mm standard advancement
Post op 1&2 days

3-5 days
Elastic Maxillary Fixation

Elastomeric Morphine Release
5-7 days

7° day discharge
1-2 months at home

1 month post op
PANOREX (6 months)

E.N.T. - FORLI ’ SERIES
(Head: Prof. Claudio Vicini)
march 2009

1388 patients
• 1096 in GA:
  222 (21.2%) operations on 1 site
  529 (50.5%) on 2 sites *
  330 (26.7%) on 3 sites *
  13 (1.4%) on 4 sites*
• 300 in LA

3160 overall procedures

* In the same time in the same patient
SDB syndromes relative % in our series

MAXILLO – MANDIBULAR ADVANCEMENT (MMA)

MMA: OVERALL TIME & SINGLE STEPS TIMES

OR time (minutes)

6.6 hours

Surgery
IM fix
Trch
intubation

case 1 6 11 16 case

Results

27/42

* CONTROLS: sex, age, severity matched OSAHS patients treated by nCPAP and studied without nCPAP during PSG

Observations
n.Cases MMA controls*
M/F 24/3 15/3
Age(mean) 48.6 51.3

AHI
58.3 -> 5.8 p<0.001
57.4 -> 5.6 ns
57.4 -> 56.9 p<0.001

ESS
11.6 -> 7.3 p<0.005
not available

BMI
32.4 -> 30.6 ns
29.9 -> 28.2 ns

AHI<10
24/27 (88%)
0%

ESS<10
26/27 (96%)
NA
MMA success rate vs preop RDI

MMA success rate vs preop BMI
PHASE I* OUTCOMES vs preop RDI + BMI

- SUCCESS
- cured
- cvp
- improved
- unchanged
- worsened

RDI<30
BMI<30
n = 31

RDI>30
BMI<30
n = 31

RDI<30
BMI>30
n = 5

RDI>30
BMI>30
n = 8

* PHASE I = nose + palate + hyoid

35 patients
3 females
32 males
Mean age = 48.9 yrs

1 year 2 year 4 year 5 year
Results

1) EPWORTH SLEEPINESS SCALE (ESS):
Oshas $p < 0.0001$ Controls $p = 0.006$

2) CENTER FOR EPIDEMIOLOGICAL STUDIES DEPRESSION SCALE (CES-D):
Oshas $p < 0.0001$ Controls $p = 0.008$

3) PERCEIVED STRESS QUESTIONNAIRE (PSQ):
Oshas $p < 0.0001$ Controls: non significant

4) ELECTRONIC NEUROPSYCHOLOGICAL TESTING:
   a) vigilance
   Oshas $p < 0.0001$ Controls $p = 0.054$
   b) selective attention
   Oshas $p < 0.0001$ Controls: non significant
Results

5) Daily cigarettes:
   - Oshas: $p < 0.0001$
   - Controls: $p = 0.021$

6) Daily coffee:
   - Oshas: $p < 0.0001$
   - Controls: $p = 0.011$

7) Self-perceived manual dexterity:
   - Oshas: $p < 0.0001$
   - Controls: non significant

8) Self-Perceived Social Problems:
   - Oshas: $p < 0.0001$
   - Controls: non significant

9) Self-Perceived Family's problems:
   - Oshas: $p < 0.0001$
   - Controls: non significant

10) Self-Perceived Sexual problems:
     - Oshas: $p < 0.0001$
     - Controls: non significant

SF 36 .( severe OSAHS, pre & post MMA)
MMA Scientific Validation - personal contribution

**Surgery vs ventilation in adult severe obstructive sleep apnea syndrome**

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**Study Design**

- **Patient selection**: (AHI ≥ 30, No treatment Contraindications)
- **Randomization**
- **Maxillomandibular advancement**
- **If fails**
- **CPAP**
Participants

SAMPLE SIZE
- CPAP arm: n = 25
- MMA arm: n = 25

OSAHS SEVERITY
- AHI > 30

AYRWAYS OBSTRUCTION INCLUSION/EXCLUSION CRITERIA
- Excluded epiglottic obstruction at Sleep Endoscopy

Duration (months)
- SURGICAL ARM: mean follow up 13 +/- 2.5 SD
- VENTILATORY ARM: mean follow up 13 +/- 2.5 SD

- 3 CPAP patients dropped out -> MMA
Intervention: Surgery
Maxillo-Mandibular Advancement (I)
our technique

Le Fort I Osteotomy
Titanium Plating x4

Maxillo-Mandibular Advancement (II)
our technique

Standard 11mm Advancement
Obwegeser-Da Pont Osteotomy
Bicortical Screws
Intervention: ventilation autoCPAP

- Same Medical Doctor (ADV) in all the cases
- Trained Operator (Dottorato in Medicina del Sonno, Clinica Neuro Università di Bologna)
- One week assistance
- Autotitration according Masa & Coll., 2004

autoCPAP BREAS® MedicAir

Outcomes according Sundaram & Coll., The Cochrane Collaboration, 2007

PRIMARY
- AHI (Apnoea Hypopnea Index)
- ESS (Epworth Sleepiness Scale)

SECONDARY
- Visual Analogue Scale-VAS (satisfaction)
- Complications (type & rate)
- Withdrawals
- Postoperative Morbidity
- Postoperative Mortality
- One Year Mortality
No statistically significant difference has been observed between the AHI improvement in MMA group and AHI improvement in the CPAP group (p=0.21).

No statistically significant difference has been demonstrated between the ESS improvement in the MMA group and the improvement in the CPAP group (p=0.20).

CONCLUSIONS

- MMA has been shown to be the most effective surgical procedure for the management of OSA (Li & Powell, 2003)

- This surgical procedure is used much more infrequently than Phase I because success rates in Phase I have been reasonable (Powell & Riley, 1994)

- A staged surgical protocol is suggested to avoid unnecessary surgical or overaggressive intervention (Riley & Powell, 1995)
THANK YOU FOR YOUR ATTENTION ... and