Scripps

Maxillomandibular Advancement (MMA)

for Obstructive Sleep Apnea

Ravi Garg, MD, FACS
Director, Plastic and Cranio/Maxillofacial Surgery
Director, Head and Neck Microvascular Surgery
Department of Advanced Head and Neck, CMF Surgery
Scripps Mercy Hospital
Scripps Prebys Cancer Center

Disclaimer

- The information provided in these slides, including all pre-operative and post-operative care instructions, is for educational and informational purposes only. It is not intended to be a substitute for professional medical advice, diagnosis, or treatment.

- Consult Your Surgeon
  Always seek the direct advice of your surgeon or another qualified healthcare provider with any questions you may have regarding a medical condition, surgical procedure, or recovery plan. Never disregard professional medical advice or delay seeking it because of something you have read in these slides or on this website.

- Emergency Situations
  If you are a patient experiencing a medical emergency, severe pain, heavy bleeding, or sudden complications, do not rely on these slides or on this website. Please call 911, or go to the nearest emergency room immediately.

What's at stake?

- An estimated 13% of adult men and 6% of adult women have moderate to severe sleep disordered breathing

Young T. Rationale, design and findings from the Wisconsin Sleep Cohort Study: Toward understanding the total societal burden of sleep disordered breathing. Sleep Med Clin 2009;4(1):37-46.

What's at stake?

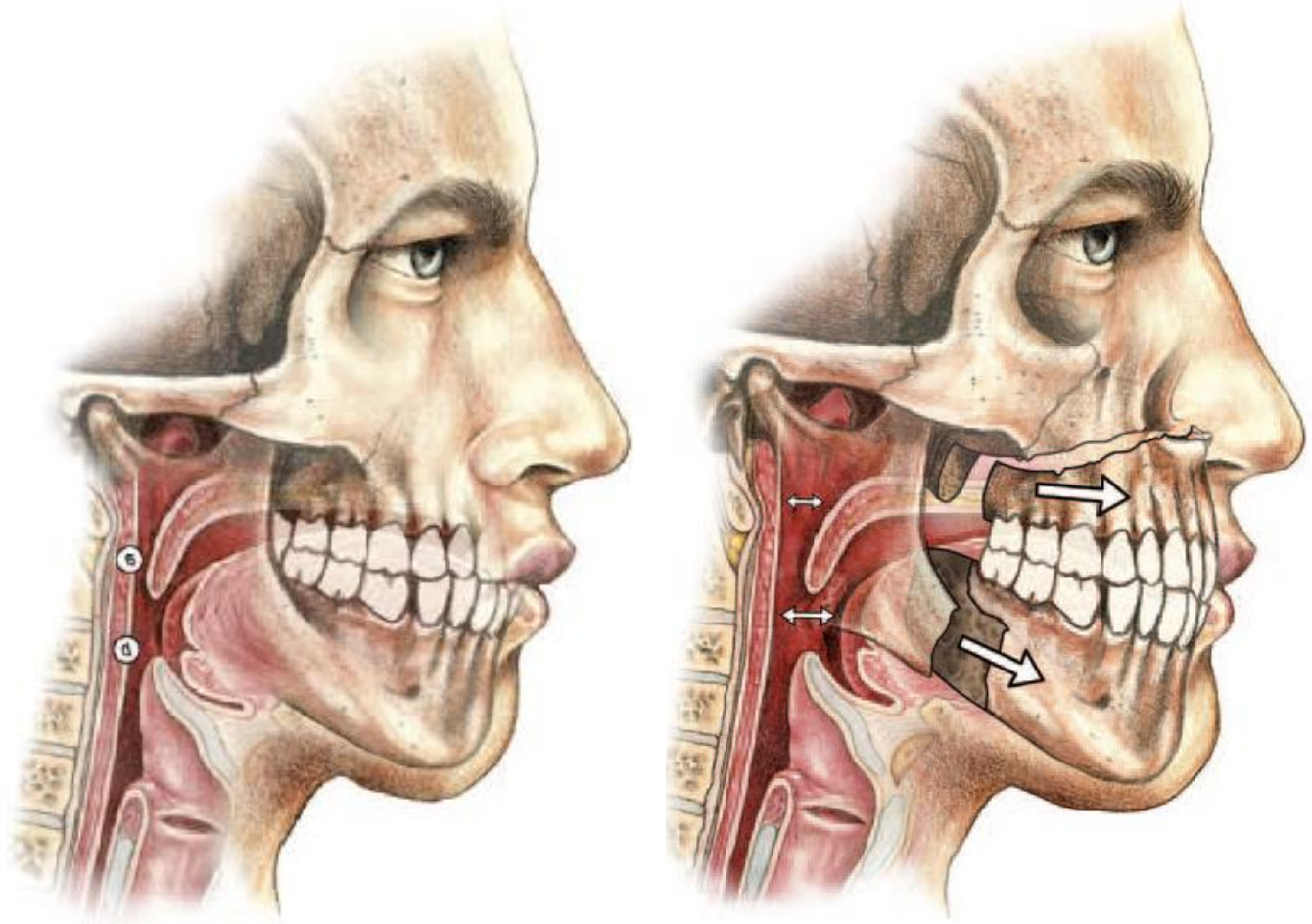
- Daytime somnolence, fatigue
- Hyperactivity, neurocognitive impairment
- Pulmonary hypertension and right ventricular hypertrophy, stroke and cardiometabolic disease
- Hypertension
  - 2.9x greater in patients with AHI > 15 compared to <5 over a 4 year period
- Mortality
  - 3x increase in patients with AHI >30 compared to patients without SDB

Young T. Rationale, design and findings from the Wisconsin Sleep Cohort Study: Toward understanding the total societal burden of sleep disordered breathing. Sleep Med Clin 2009;4(1):37-46.

What is the role of jaw surgery?

(a.k.a. maxillomandibular advancement)

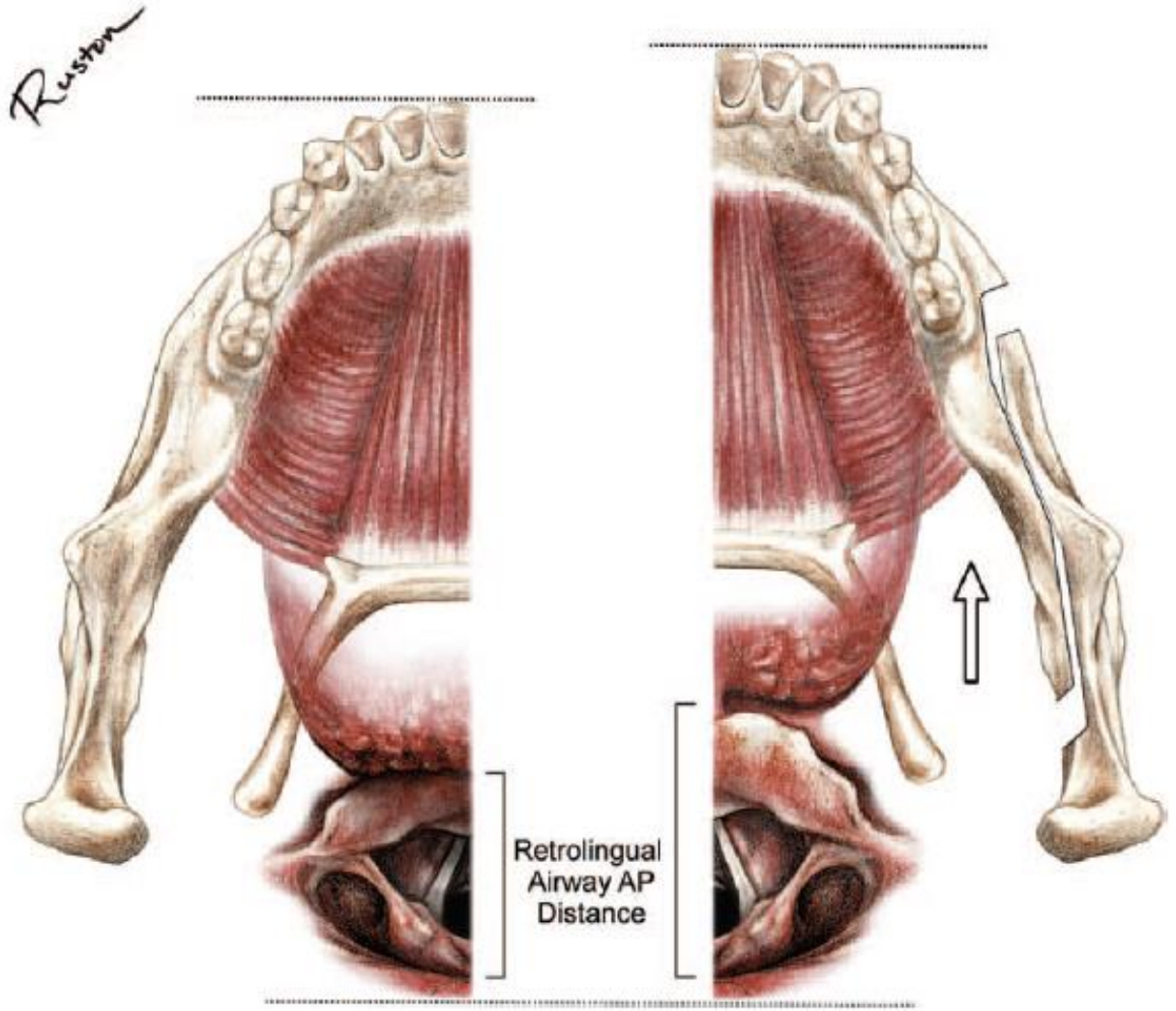
What is maxillomandibular advancement?



- Multilevel airway expansion
- Maxillary advancement
- Mandibular Advancement

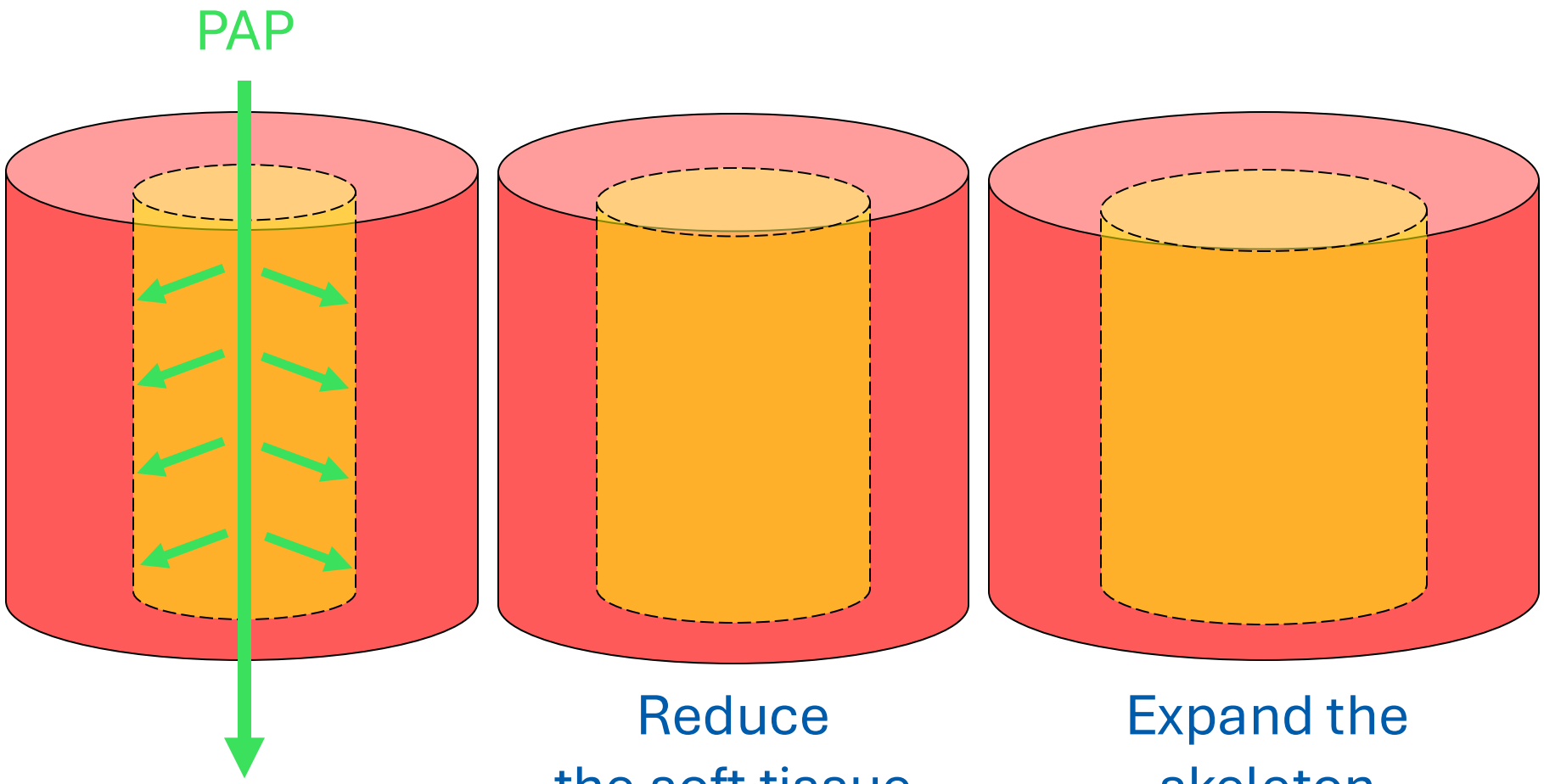
Garg RK et al. Obstructive Sleep Apnea in Adults. Plast Reconstr Surg. 138:889, 2016.

Mandibular Advancement



Garg RK et al. Obstructive Sleep Apnea in Adults. Plast Reconstr Surg. 138:889, 2016.

Treatment Concept



Case Example

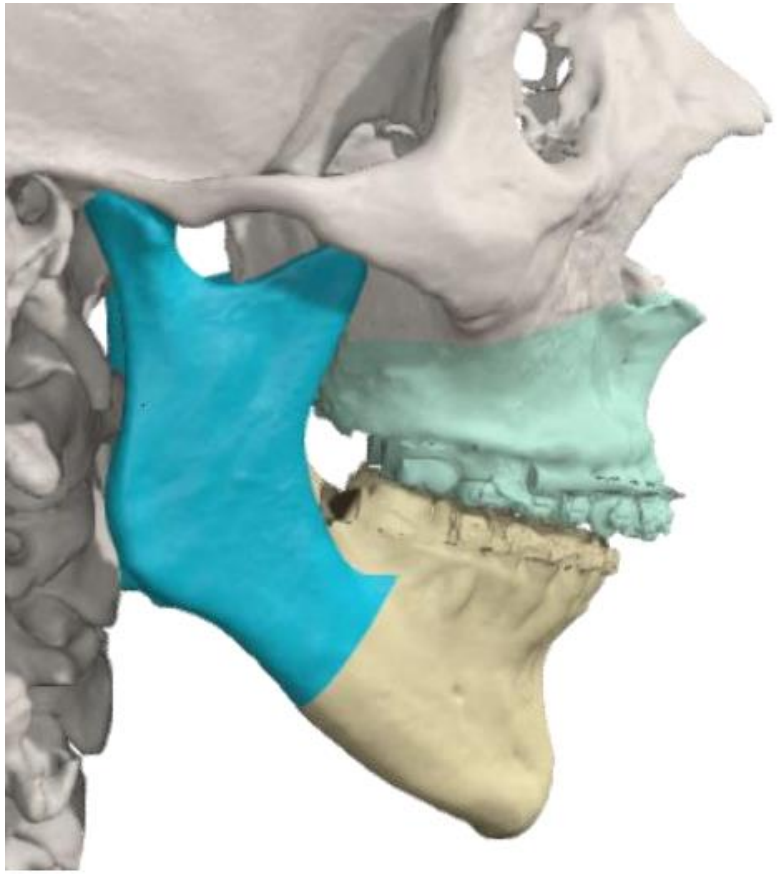
- 31 year old male with OSA, AHI 46, lowest O2 sat 84%
- Failed to tolerate CPAP

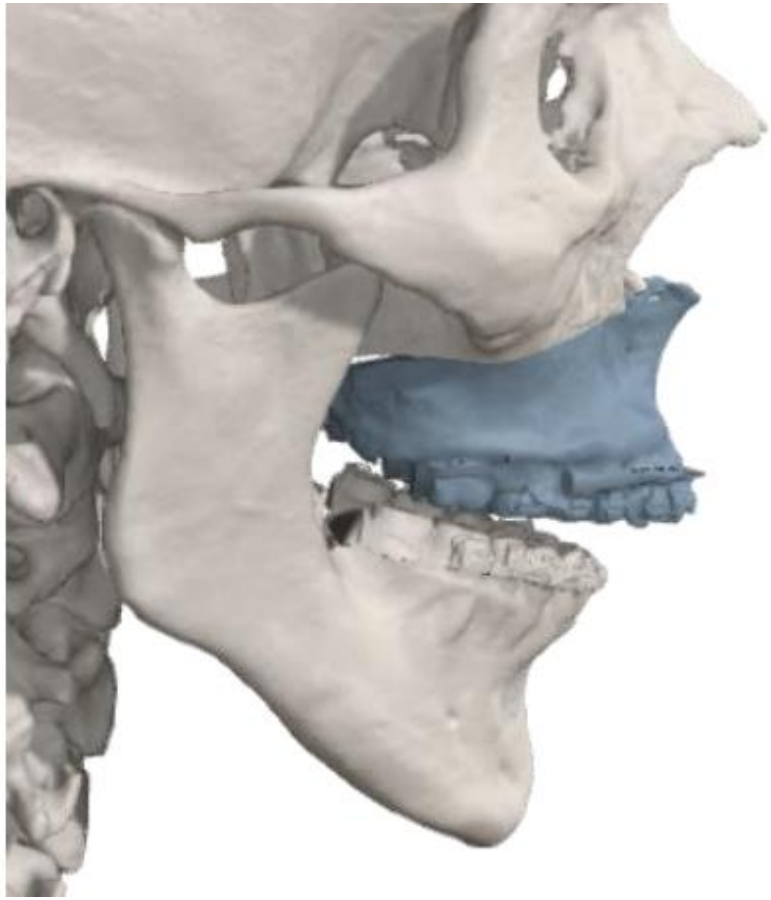
Maxillofacial Assessment

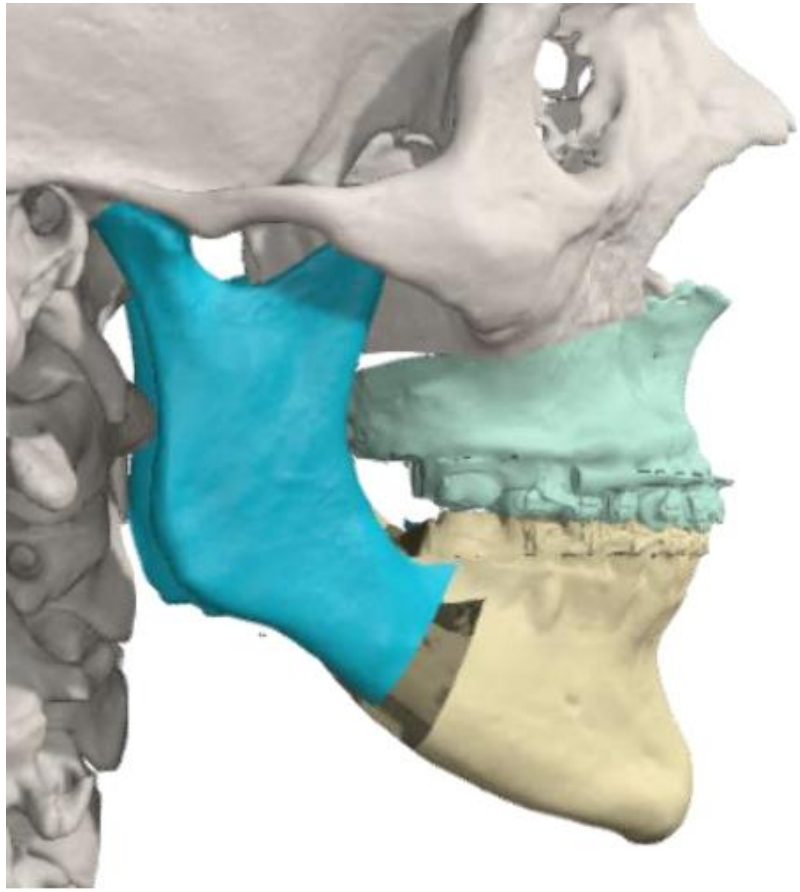
- Small jaw (micrognathic)
- Flat neck line
- Overbite

Garg RK et al. Obstructive Sleep Apnea in Adults. Plast Reconstr Surg. 138:889, 2016.

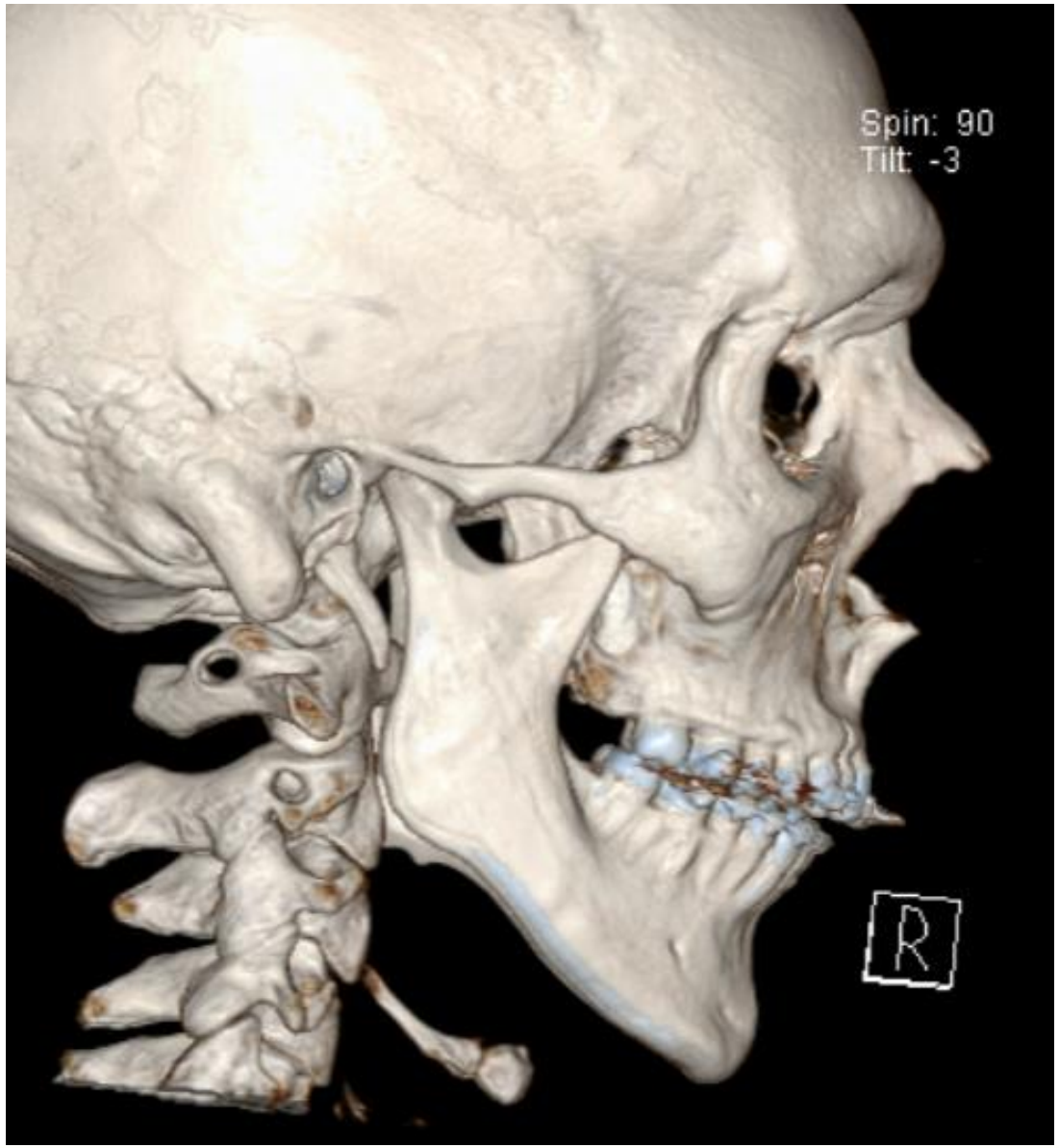
Jaw Surgery Plan

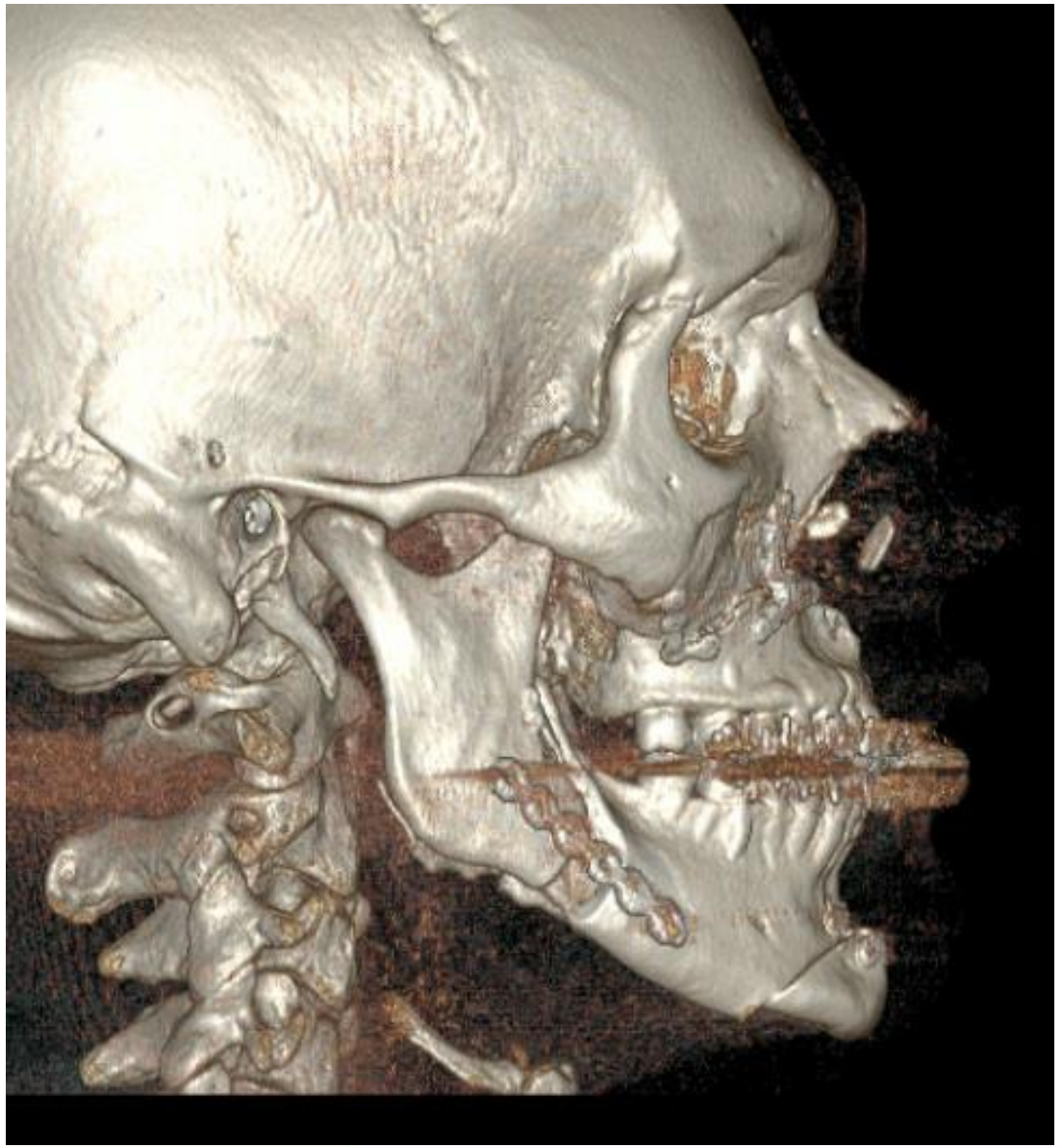


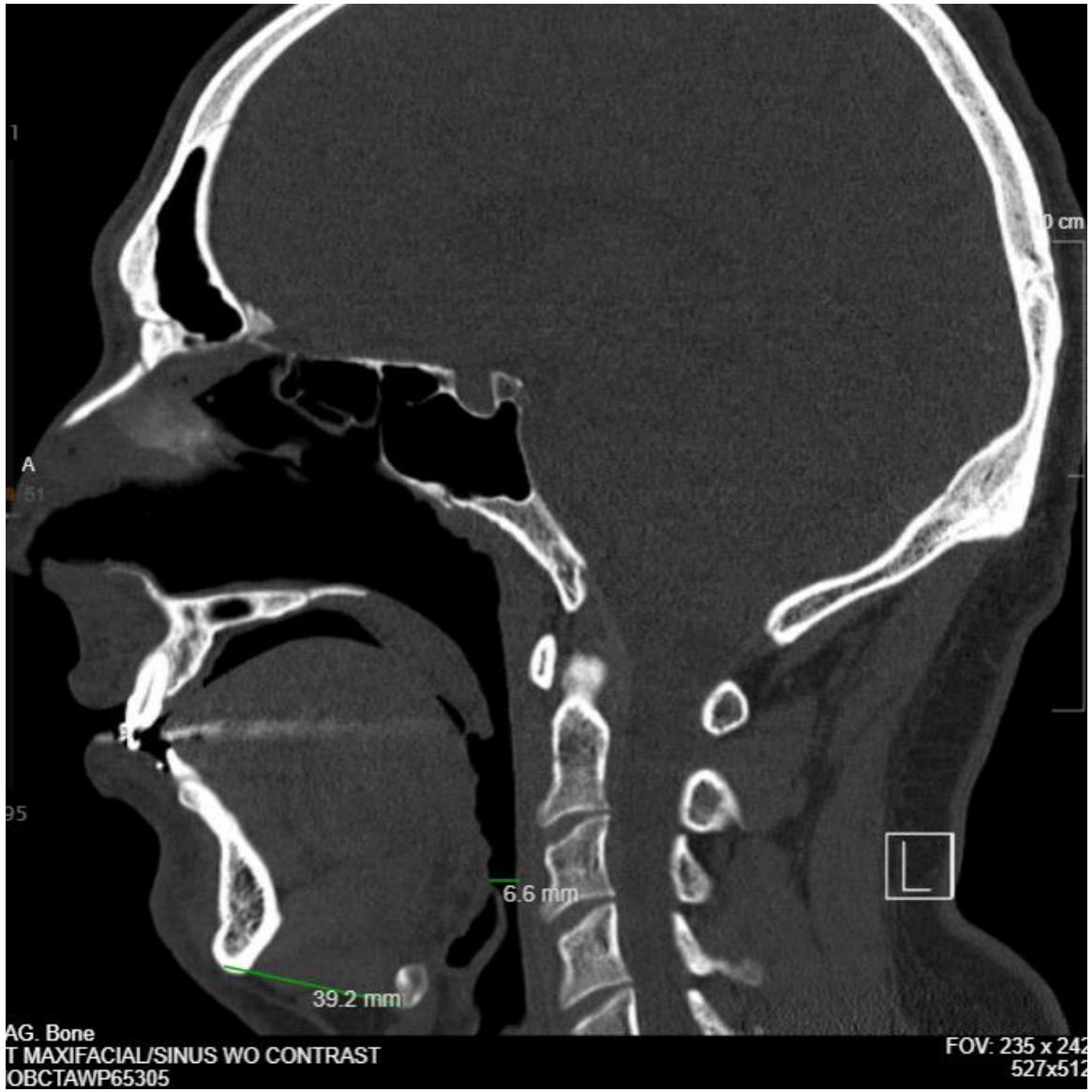


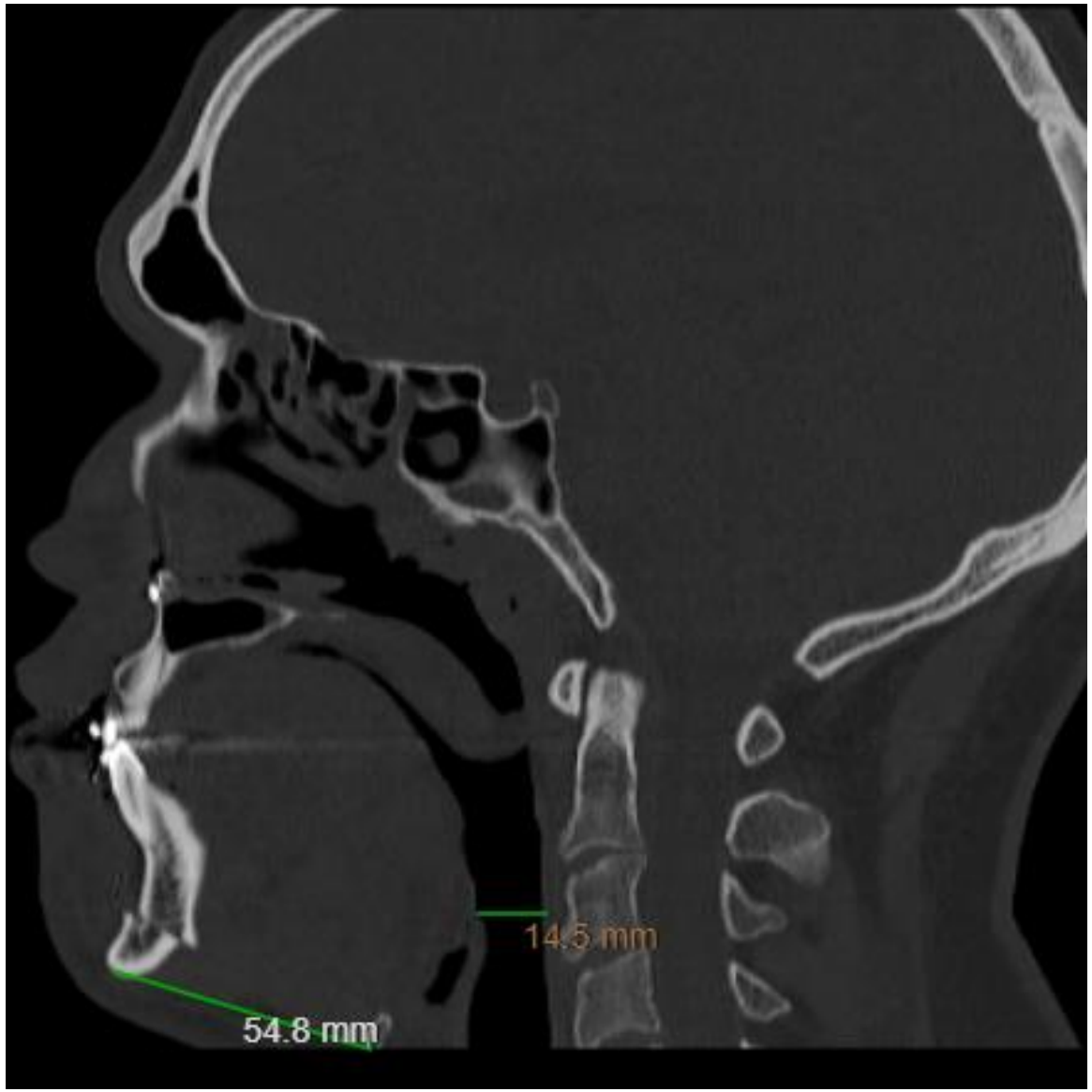


- Multilevel expansion of the upper airway


Spin: 90
Tilt: -3
R



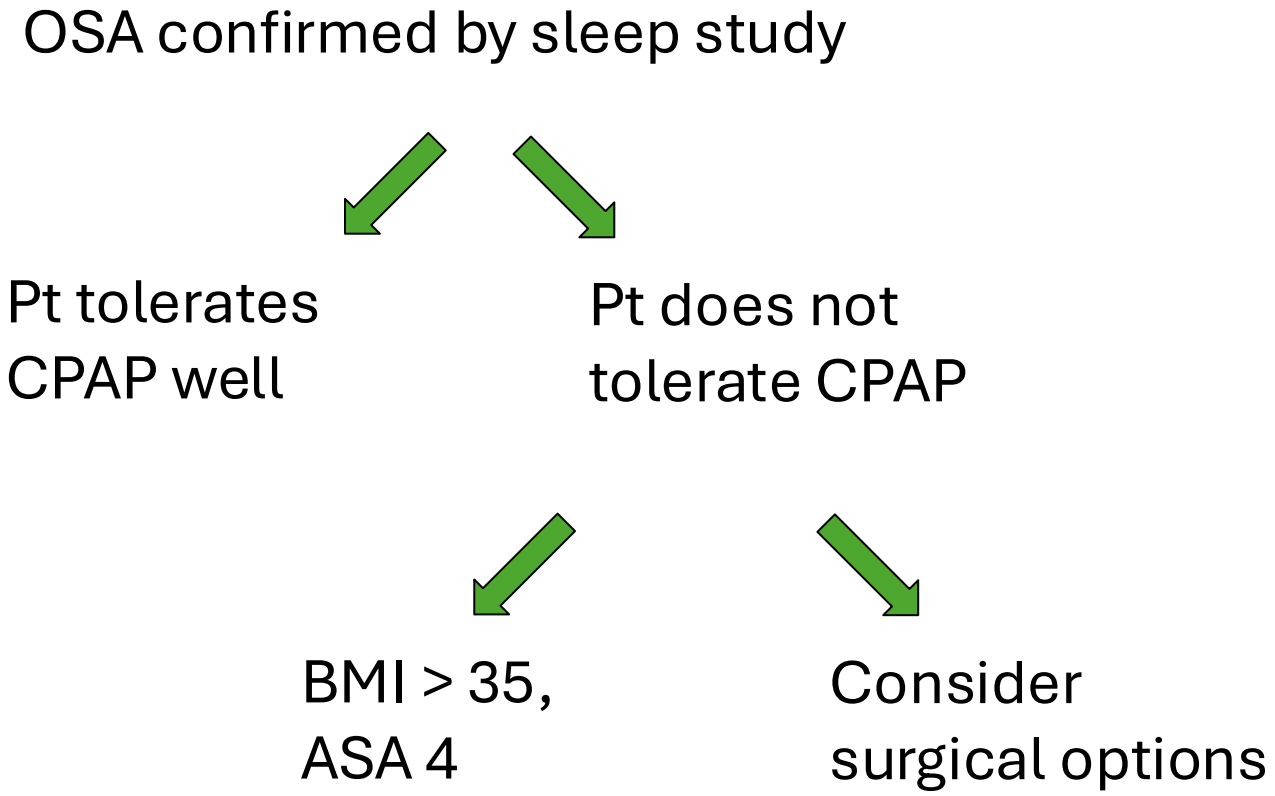

6.6 mm
39.2 mm
AG. Bone
T MAXIFACIAL/SINUS WO CONTRAST
OBCTAWP65305
FOV: 235 x 242
527x512


14.5 mm
54.8 mm

- Preop (left) AHI 46, Postop (right) AHI 1.9

- Preop (left) AHI 46, Postop (right) AHI 1.9

Surgery Algorithm



SLEEP, Vol. 33, No. 10, 2010

Surgical Modifications of the Upper Airway for Obstructive Sleep Apnea in Adults: A Systematic Review and Meta-Analysis

Sean M. Caples, DO[1]; James A. Rowley, MD[2]; Jeffrey R. Prinsell, DMD, MD[3]; John F. Pallanch, MD[4]; Mohamed B. Elamin, MBBS[5]; Sheri G. Katz, DDS[6]; John D. Harwick, MD[7]

[1]Center for Sleep Medicine, Division of Pulmonary and Critical Care Medicine, Mayo Clinic, Rochester MN; [2]Division of Pulmonary, Critical Care, and Sleep Medicine, Harper University Hospital, Detroit MI; [3]Marietta, GA; [4]Department of Otorhinolaryngology, Mayo Clinic, Rochester MN; [5]Knowledge and Encounter Research Unit, Mayo Clinic, Rochester MN; [6]Atlanta, GA; [7]Department of Otolaryngology, University of Florida, Gainesville FL

Table 1—Evidence table

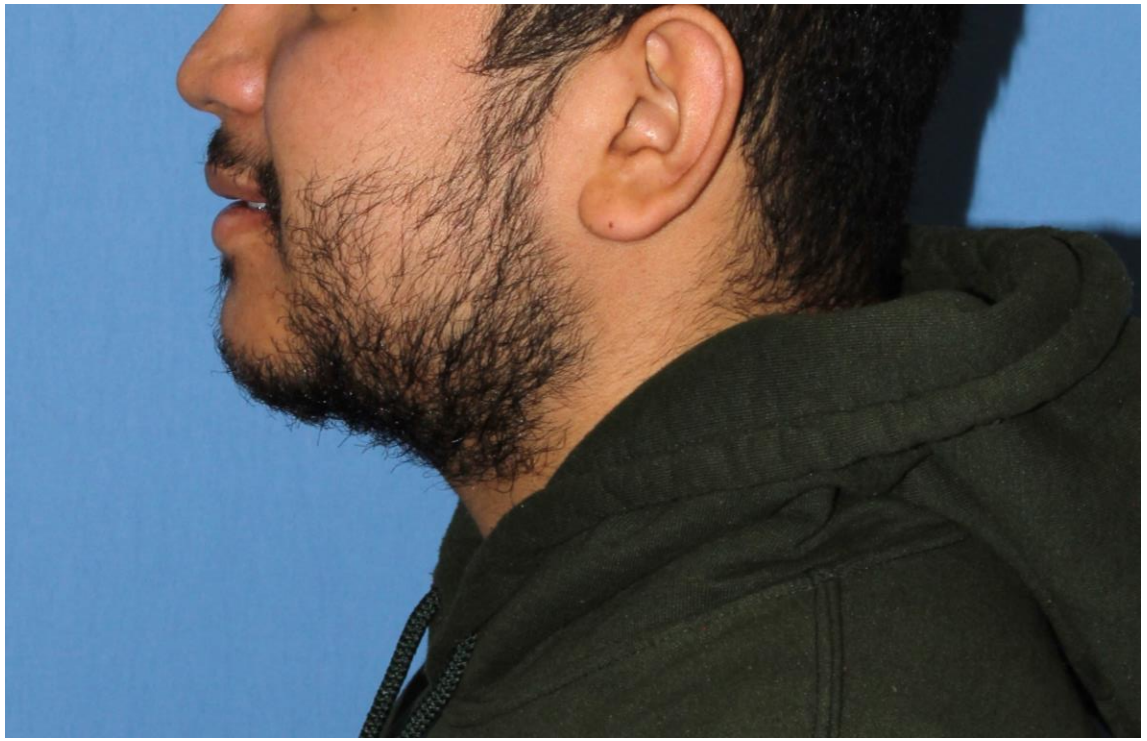
	Quality assessment			Summary of findings			
				No of patients			
Type of Surgery	No. of studies	Study Design	Limitations	Intervention	Control	% reduction in AHI (95% CI)	Quality
MMA	9	Observational	Serious	234	NA	87% (80 to 92)	⊗○○○ Very low
UPPP	15	Observational	Serious	950	NA	33% (23 to 42)	⊗○○○ Very low
LAUP[a]	2	Randomized trial	No serious limitations	34	36	18% (35 to -3)[b]	⊗⊗○○ Low
RFA[c]	8	Observational	Serious	175	NA	34% (19-46)	⊗○○○ Very low
Implants[d]	2	Observational	Serious	69	NA	26% (9-29)	⊗○○○ Very low

MMA Outcomes Meta-Analysis

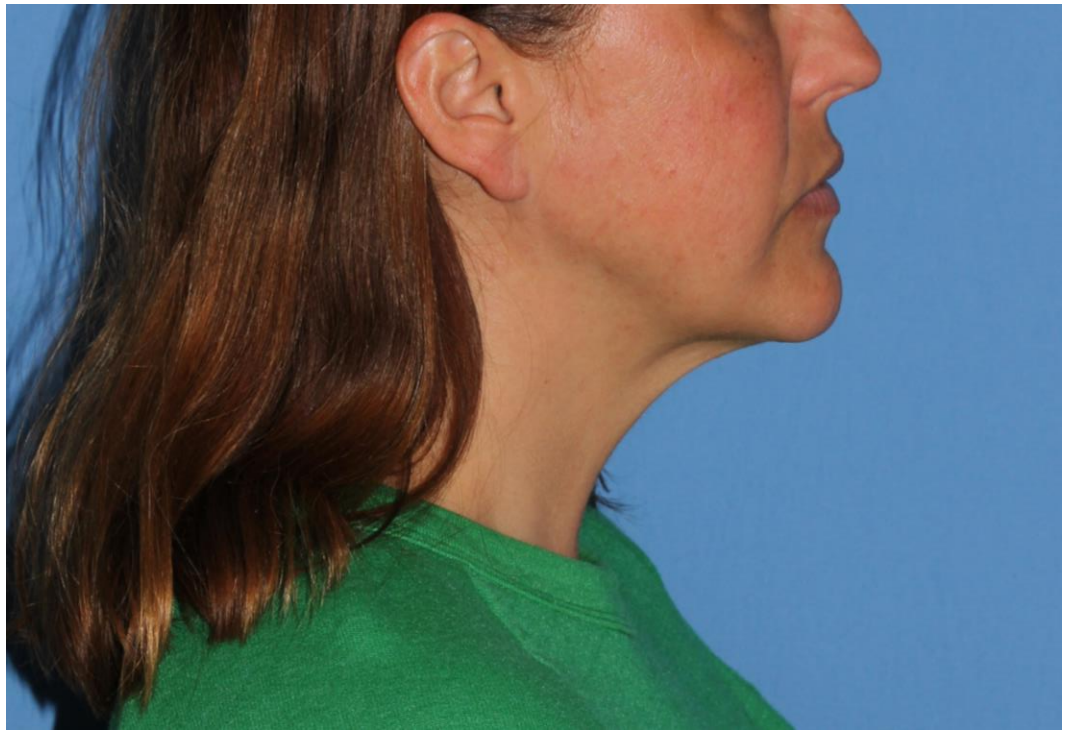
- 45 studies, 518 patients/interventions
- 197/268 (73.5%) of patients had undergone a prior OSA procedure
- 512/518 (98.8%) of patients showed improvement
- Mean 80.1% reduction in AHI, 64.6% reduction in RDI
- Mean oxygen nadir improved from 70.1% (15.6%) to 87.0% (5.2%)
- Epworth Sleepiness Scale score improved from 13.5 (5.2) to 3.2 (3.2)
- Surgical success 85.5% (389/455 patients with AHI data)
- Surgical cure 38.5% (175/455 patients with AHI data)
- Preop AHI < 60 was associated with a greater likelihood of cure
- Patients with preop AHI > 60 experienced large and substantial net improvements in AHI

Zaghi S et al. Maxillomandibular Advancement for Treatment of Obstructive Sleep Apnea: A Meta-analysis. JAMA Otolaryngol Head Neck Surg. 2016;142(1):58-66.

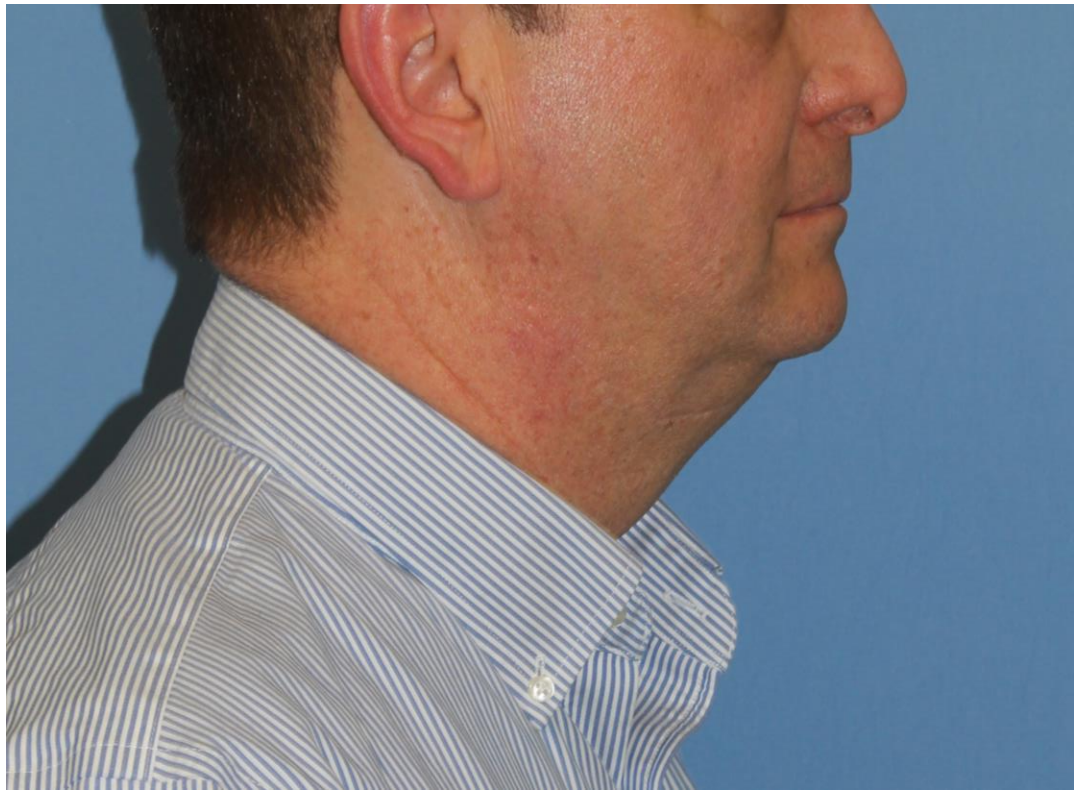
Case Examples

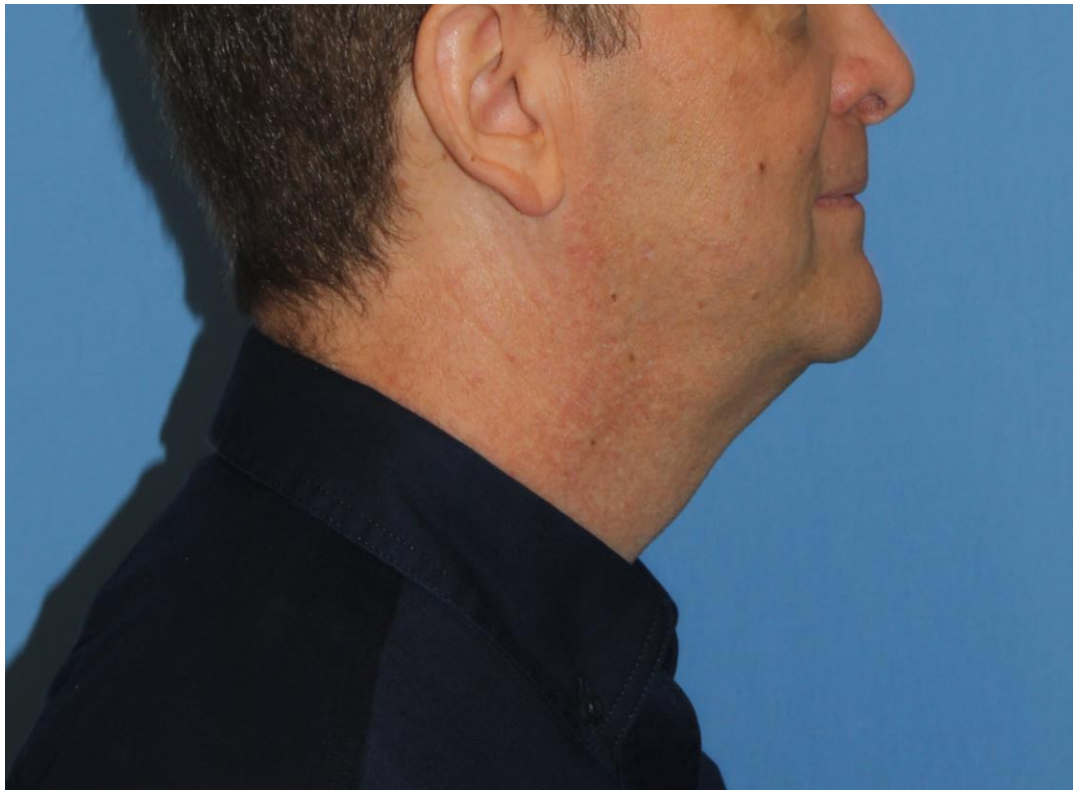


- 24 year old male failed to tolerate CPAP, BMI 32
- Preop AHI 49.8, Postop 14.7 (using 3% criteria)



- 45yF BMI 27, AHI 32.6, could not tolerate CPAP
- Postop AHI 8.7 (3%), 5.0 (4%), snoring resolved, breathing dramatically improved





- 61yM BMI 29, AHI 42.4, prior Inspire (3.1v), subsequent AHI 14, dislikes Inspire, tongue irritation and wakes him up, had a prior chin implant
- Postop MMA + Inspire (2.2v): AHI 3.2

- 37yM AHI 23.7, Lowest O2 sat 75%, DISE showed lateral/concentric pharyngeal collapse, poor Inspire candidate.
- Postop MMA: AHI 6.2 (3% criteria), 2.0 (4% criteria). lowest O2 sat 90%

- 31yM AHI 15.1, lowest O2 sat 85%
- Postop MMA: AHI 1.8; lowest O2 sat 94%

Surgery Overview

- Surgery with or without orthodontics
- Obtain insurance preauthorization
- Obtain maxillofacial CT scan and dental models 2-4 weeks before surgery for virtual surgical planning
- Procedure time: 5-6 hours
- General anesthesia
- 1-2 nights in the hospital (average)
- Postoperative follow-up every 1-2 weeks for the first 6 weeks

Recovery

- Facial swelling
- Facial numbness
- Dietary restrictions
  - Pureed/soft non-chew for 6 weeks
  - No hard or chewy foods for at least 3 months
- Multimodal pain control
  - NSAIDs very helpful
  - Usually off narcotics by one week postop
- If choosing to proceed without braces, may benefit from postoperative clear aligners (Invisalign) or braces

Surgical Risks

MALOCCLUSION/RELAPSE

LIP/FACIAL/ORAL/GUM NUMBNESS

RESIDUAL OSA

Additional, Less Common Surgical Risks

Major bleeding	Infection	Tooth injury or loss	Bone loss
Palatal fistula	Hardware failure	Tongue numbness	Nasal obstruction, sinus obstruction, septal perforation
Facial weakness	Jaw stiffness	Chronic facial pain	Eye injury
TMJ derangement/condylar resorption	Wound Healing problems: bone, soft tissue	Prolonged jaw wiring	Medical complications (ex. DVT, MI, stroke)

Who is a candidate for MMA?

- AHI 15 or greater
- Age 70 or less
- BMI 35 or less
- Nonsmoker, no vaping
- ASA 3 or less
    - They may have medical comorbidities
    - Comorbidities should be well controlled and not a constant threat to life.

These are general criteria, and there are exceptions.

Next Steps:

- Obtain insurance preauthorization
  - This may expire before surgery. There is no guarantee that surgery will be reauthorized after authorization has expired.
  - If and once the surgery is authorized, please call your insurance plan if you have questions about your financial responsibility.

Thank you!
Questions?

jaw@scrippshealth.org
sandiegoheadandneck.com