2017년도
대한악안면성형재건외과학회
춘계학술워크숍

Main Theme : Contemporary Treatment Of Dentofacial Deformity

일시 : 2017년 5월 27일(토) 오후 2시~6시 10분
장소 : 서울대학교 치과병원 8층 강당

대 한 악 안 면 성 형 재 건 외 과 학 회
THE KOREAN ASSOCIATION OF MAXILLOFACIAL PLASTIC AND RECONSTRUCTIVE SURGEONS

2017년 춘계학술 워크숍에 오신 것을 환영합니다.

대한악안면성형재건외과학회
학회장 오 희 균

회원여러분 안녕하십니까?

2017년 대한악안면성형재건외과학회의 춘계학술워크숍에 여러분을 초대합니다. 올해에는 서울대학교 치과대학병원에서 펼쳐져 회원 여러분을 뵙게 되어 매우 기쁩니다.

대한악안면성형재건외과학회의 춘계학술워크숍은 매년 내실있는 임상프로그램을 제공하여 뜨거운 호응을 받아왔습니다.

'Contemporary Treatment Of Dentofacial Deformity '를 주제로 열리는 이번 춘계학술워크숍에서는 6명의 연자를 모시고 강연과 토론이 펼쳐질 예정입니다. 패션도 흐름이 있듯이 학술, 임상분야도 흐름이 있습니다. 이에 우리학회 미래의 주역이 되실 젊고 전도가 유망한 교수님들을 모시고 여러 회원님들에게 새로운 임상 경향을 소개해 드리고 의견을 나눌 수 있는 자리를 마련하였습니다.

연세대학교 정휘동 교수가 TOVRO(IVRO)에 대한 모든 것에 대한 강연을, 서울대학교 양훈주 교수는 Sagittal Split Ramus Osteotomy 술후안정성에 대하여, 중앙대학교 이의룡 교수는 Malarplasty, 전남대학교 국민석 교수는 Mandibular angle resection, 경희대학교 이덕원 교수는 Advancing and Lengthening Genioplasty for Receded and Short Chin, 마지막으로 SF치과 황현식 원장의 선수술후 불안정교합 매니지먼트(Management of unstable occlusion after surgery-first orthognathic surgery)으로 심도 있는 강의를 해 주실 것으로 기대합니다.

많은 청중들의 호응이 있을 때 강연도 빛을 냅니다. 회원 여러분의 적극인 참여로 활력 넘치는 토론의 장이 되기를 연자님들과 함께 기대합니다.

이번 학술 워크숍을 준비해주신 김선종 학술이사와 이부규 총무이사 외 여러 임원님들 그리고 현장에서 수고해 주신 여러분께도 깊은 감사를 드립니다.

봄날의 마지막 자락인 5월의 화창한 주말을 젊음의 거리 대학로에서 느껴보시는 여유로운 시간도 가져 보시길 바랍니다.

2017년 5월 27일

대한악안면성형재건외과학회장 오 희 균

목차 및 일정표

– 학술행사 진행; 김 선종 학술이사
이 부규 총무이사

13 : 50 ~ 14 : 00	Registration and Opening Remark	오 희 균 학회장
Session I		**좌장 박영욱 교수**
14 : 00 ~ 14 : 30	TOVRO(IVRO) : A to Z	정휘동 교수 – 연세대학교
14 : 30 ~ 15 : 00	Postoperative Stability after Sagittal Split Ramus Osteotomy	양훈주 교수 – 서울대학교
15 : 00 ~ 15 : 30	Malarplasty	이의룡 교수 – 중앙대학교
15 : 30 ~ 16 : 00	Coffee Break	
Session II		**좌장 이재훈 교수**
16 : 00 ~ 16 : 30	Mandibular angle resection	국민석 교수 – 전남대학교
16 : 30 ~ 17 : 00	Advancing and Lengthening Genioplasty for Receded and Short Chin	이덕원 교수 – 경희대학교
17 : 00 ~ 17 : 40	선수술후 불안정교합 매니지먼트 Management of unstable occlusion after surgery-first orthognathic surgery	황현식 원장 – SF 치과
17 : 40 ~ 18 : 10	Comprehensive Discussion	Audience and Co–chair
18: 10 ~	Closing Remark	오 희 균 학회장

연제 1

TOVRO(IVRO) : A to Z

연세대학교 치과대학 구강악안면외과학교실
정휘동 교수

◆ **Education**

D.D.S. Degree	Yonsei University, College of Dentistry,	2004.2.
M.S.D. Degree	Graduate School of Yonsei University, College of Dentistry,	2008.2.
Ph.D. Degree	Graduate School of Yonsei University, College of Dentistry,	2015.8.

◆ **Professional Affiliations**

2004.3.~2008.2. Internship & Resident, Department of Oral & Maxillofacial Surgery, Yonsei University Dental Hospital, Seoul, Korea

2011.5.~2012.2. Instructor, Department of Oral & Maxillofacial Surgery, Yonsei Univesity, College of Dentistry, Seoul, Korea

2012.3.~2014.2. Clinical Assistant Professor, Department of Oral & Maxillofacial Surgery, Yonsei Univesity, College of Dentistry, Seoul, Korea

2014.3.~ Assistant Professor, Department of Oral & Maxillofacial Surgery, Yonsei Univesity, College of Dentistry, Seoul, Korea

TOVRO(IVRO) : A to Z

Abstract

Transoral (Intraoral) Vertical Ramus Osteotomy (TOVRO, IVRO) was originated from subcondylar osteotomy by Dr. Moose, who described a method of performing an osteotomy from the subsigmoid notch to the posterior border of the ramus from the medial aspect of the ascending ramus. Thereafter, IVRO technique was enhanced through the use of an oscillating saw, an approach from the intraoral buccal aspect, and the double slide osteotomy. Additional refinements were implemented to minimize postoperative complications.

IVRO technique has proved to have several advantages over the sagittal split ramus osteotomy. First, IVRO requires less time owing to its technical simplicity. Second, IVRO very rarely results in an unfavorable osteotomy. Third, IVRO yields a significantly lower incidence of neurovascular bundle damage. Fourth, IVRO displaces the condyles to an anterio-inferior direction, relieving pressure on the articular disk, facilitating a more physiologically balanced condyle-disk relationship, and potentially addressing temporomandibular joint disorders. And fifth, It shows excellent stability following mandibular setback, thus overcorrection is not indicated.

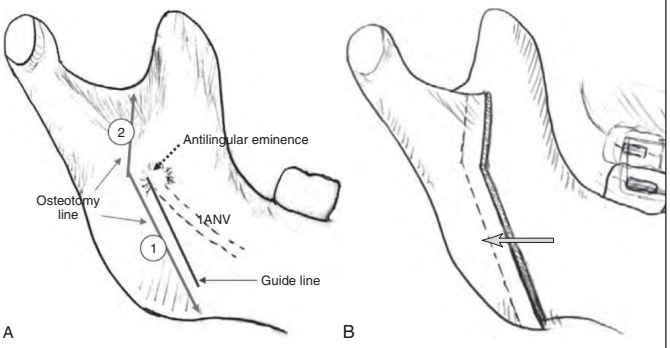
The subjects of this lecture is the indications, surgical technique, and complications about IVRO, and we will discuss the pros and cons of IVRO and how to apply the IVRO to patients.

IVRO
A to Z

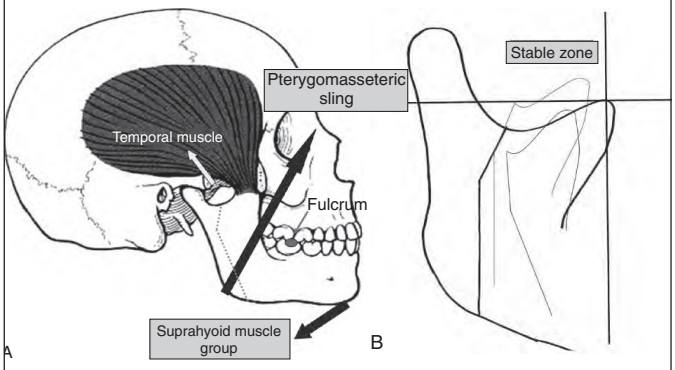
Hwi-Dong Jung
Assistant Prof.

Yonsei Univ. College of Dentistry

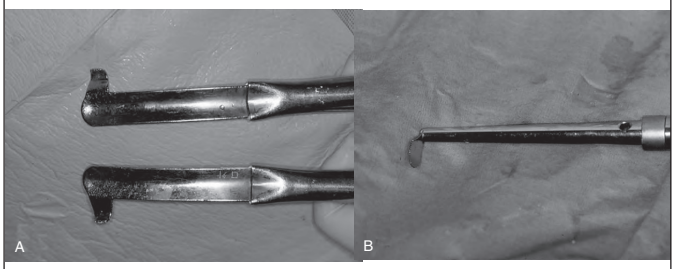
IVRO



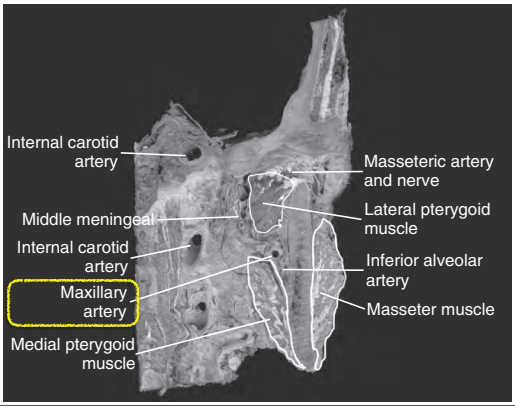
Stable zone



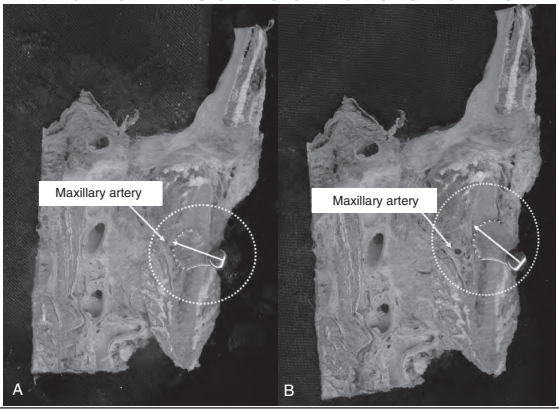
Instruments for IVRO

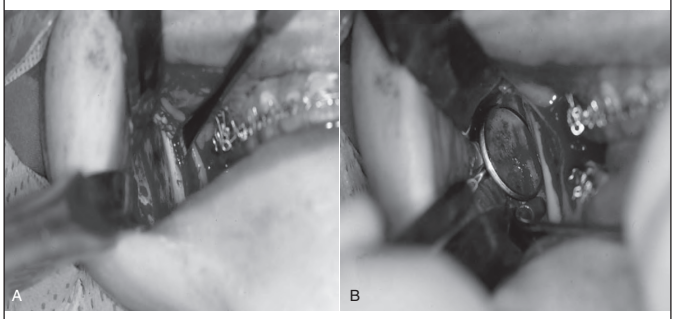


Anatomical consideration



Anatomical consideration





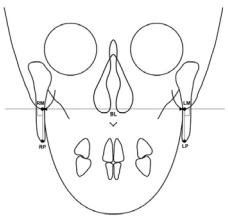
Advantages of IVRO

- Short operation time (Nordin et al., 1987)
- Little risk for inferior alveolar nerve damage (Astrand and Ridell, 1973; Hall and McKenna, 1987)
- Facilitates esthetic improvement through continuous remodeling of mandible (Jung et al., 2010)
- Improving TMJ disorders (Jung et al., 2009)
- Shows good and predictable stability (Jung et al., 2013)

Facilitates esthetic improvement through continuous remodeling of mandible

Changes of transverse mandibular width after intraoral vertical ramus osteotomy

Young-Soo Jung, DDS, PhD,[a] Sang Yoon Kim, DMD, MD,[b] Sung-Yeon Park, DDS,[c] Young-Dal Choi, DDS,[c] and Hyung-Sik Park, DDS, PhD,[d] Seoul, Korea, and Boston, MA
YONSEI UNIVERSITY AND MASSACHUSETTS GENERAL HOSPITAL



The results show that mandibular setback using **BIVRO did not significantly influence the transverse mandibular width changes** in soft tissue. Therefore, IVRO technique can be safely used **without compromising esthetic results** through soft tissue transverse mandibular width increase.

Facilitates esthetic improvement through continuous remodeling of mandible

Remodelling pattern of the ramus on submentovertex cephalographs after intraoral vertical ramus osteotomy

Young Soo Choi [a,1], Hwi-Dong Jung [a,1], Sang Yoon Kim [b,2], Hyung-Sik Park [a], Young-Soo Jung [a,*]

[a] *Department of Oral & Maxillofacial Surgery, Oral Science Research Center, Yonsei University College of Dentistry, Seoul, Republic of Korea*
[b] *Private Practice, Vienna, VA, USA*

British Journal of Oral and Maxillofacial Surgery 51 (2013) e259–e262

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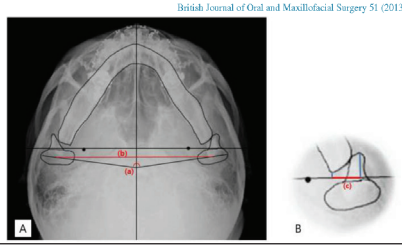


Facilitates esthetic improvement through continuous remodeling of mandible

Table 1. Chronologic changes of condylar angle on transverse plane

Time	Horizontal condylar angle (mean ± SD)	Changes
Preop	69.88° ±8.65	
7 days Postop	84.93° ±11.31	+ 15.05°
1 mo Postop	78.87° ±9.77	- 6.06°
3 mo Postop	76.50° ±9.25	- 2.37°
6 mo Postop	75.22° ±9.28	- 1.28°
12 mo Postop	74.41° ±9.11	- 0.81°

Abbreviations: Preop, Pre-operative; Postop, Post-operative

Table 3. Chronologic changes of horizontal overlapping length

time	Horizontal overlapping length (mean ± SD)	Changes
7 days Postop	9.05 mm ± 2.85	
1 mo Postop	8.33 mm ± 2.56	- 0.72 mm
3 mo Postop	7.18 mm ± 2.39	- 1.15 mm
6 mo Postop	5.94 mm ± 2.38	- 1.24 mm
12 mo Postop	4.73 mm ± 2.43	- 1.21 mm

Abbreviations: Postop, Post-operative

Immediate **15.05 lateral rotation** of the condyles

Approximately 4.53 lateral rotation remained on one year post-operative.

Horizontal overlapping was **decreased by 47.71%** at one year post-operative.

Improving TMJ disorders

The Chronologic Prevalence of Temporomandibular Joint Disorders Associated With Bilateral Intraoral Vertical Ramus Osteotomy

Hwi-Dong Jung, DDS, MSD, Young-Soo Jung, DDS, MSD, PhD,† and Hyung-Sik Park, DDS, MSD, PhD‡*

J Oral Maxillofac Surg 67:797-803, 2009

BIVRO can be used as a method of choice for **relieving** undesirable

TMJ symptoms such as sound and pain, as well as for repositioning

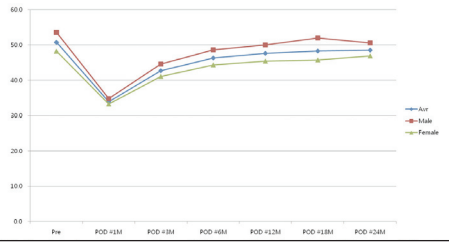
the **condylar head to its physiologic position**

Improving TMJ disorders

Recovery Pattern of Mandibular Movement by Active Physical Therapy After Bilateral Transoral Vertical Ramus Osteotomy

Hwi-Dong Jung, DDS, MSD, Young-Soo Jung, DDS, PhD, Jin Hoo Park, DDS, and Hyung-Sik Park, DDS, PhD

J Oral Maxillofac Surg 70:e431-e437, 2012



Shows good stability and predictable

Postoperative stability following bilateral intraoral vertical ramus osteotomy based on amount of setback

Hwi-Dong Jung [a], Young-Soo Jung [a], Sang Yoon Kim [b,c], Dong Wook Kim [a], Hyung-Sik Park [a,*]

[a] *Department of Oral and Maxillofacial Surgery, Yonsei University College of Dentistry, Seoul, Republic of Korea*
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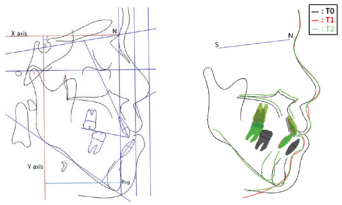
Accepted 4 February 2013



Shows good stability and predictable

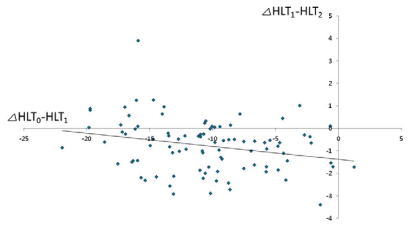


Fig. 3. Simple linear regression analysis on horizontal movement (HL). As the amount of setback ($\Delta HLT_0 - HLT_1$) increases, the amount of posterior relapse ($\Delta HLT_1 - HLT_2$) decreased, but $R^2 = 0.07$ showing poor linear relations and predictability. ($\Delta HLT_1 - HLT_2 = -0.06 \times \Delta HLT_0 - HLT_1 - 1.38$) ($T_0$ = preoperatively; T_1 = 7 days postoperatively, and T_2 = 12 months postoperatively).

Shows good stability and predictable

The amount of setback has minimal effects on anterior relapse

The risk of anterior relapse is low

Overcorrection is not indicated with the IVRO

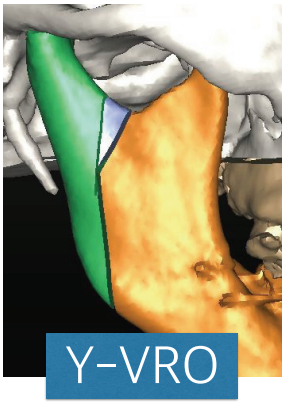
Active physical therapy

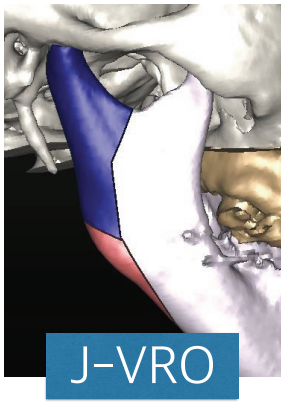
1. Open your mouth as large as possible. (x3)
   1.1. while opening, check mandibular mid line
   1.2. while closing, check the gap between splint and lower tooth
2. Move your lower jaw anteriorly. (x3)
3. Move your lower jaw to left side (x3)
4. Move your lower jaw to right side (x3)
5. The above instructions constitute 1 cycle. Follow this sequence.
6. Repeat the above physical therapy protocol for 1 hour.
7. Nexk, fix the lower jaw to the upper jaw for 2 hours.
8. During physical therapy, the training elastics must be kept at the indicated site.
9. Please avoid relatively hard food and take care not to break splint

The splint will be removed after 1 to 2 weeks of physical therapy, depending on the prognosis. Although this therapy is difficult, please persevere until it is finished.

Follow this physical therapy for about 1 month for stable, functional results.

Modification of IVRO





연제 2

Postoperative Stability after Sagittal Split Ramus Osteotomy

서울대학교 치과대학병원 턱교정수술센터
양훈주 교수

2007.2	DDS, School of Dentistry, Seoul National University
2009.9~2014.8	MSD, Ph.D, Department of Oral and Maxillofacial Surgery, School of Dentistry, Seoul National University
2007.3~2008.2	Internship, Seoul National University Dental Hospital
2008.3~2011.2	Residency, Department of Oral and Maxillofacial Surgery, Seoul National University Dental Hospital
2011.3~2012.2 / 2013.3~2014.12	Clinical Fellow, Department of Oral and Maxillofacial Surgery, Seoul National University Dental Hospital
2012.3~2013.2	Researcher, Dental Research Institute, Seoul National University
2015.1~Present	Clinical Professor, Orthognathic Surgery Center, Seoul National University Dental Hospital

Postoperative Stability after Sagittal Split Ramus Osteotomy

Abstract

하악지 시상분할골절단술을 이용한 하악골 악교정 수술 후, 술 전 위치로의 회귀 현상은 다양한 정도로 발생된다. 특히 하악골 후퇴 수술은 국내 악교정 수술의 대부분을 차지하고 있지만 수술 이동 방향 중에는 다소 안정성이 떨어지는 것으로 보고되고 있다. 이러한 술 후 회귀현상은 한 가지 원인에 의해 발생하는 것이 아니라 다양한 기여요인이 복합적으로 작용하여 나타나게 되며, 고정 방법, 과두 변위, 수술 교합, 근심골편의 회전, 수술량, 수술 이동 방향 및 주변 근육의 작용 등이 거론되고 있다. 장기적으로 안정적인 수술 결과를 위하여 이러한 기여요인에 대해 이해하고 수술 과정에 고려하는 것이 요구된다. 본 연제에서는 하악골 악교정 수술 후 회귀현상의 기여요인에 대해서 골격성 III급 부정교합 환자의 하악골 후퇴 수술에 국한하여 문헌고찰과 함께 토론하고자 한다.

Proffit 등에 따르면 하악골 후퇴 수술은 악교정 수술 중에서 안정성이 떨어지는 수술 이동 방향으로 분류된다. 하악지 시상분할 골절단술을 이용한 하악골 후퇴 수술 후 대부분의 회귀현상은 술 후 6개월 동안에 대부분 발생하며 장기적으로는 3년까지도 변화가 관찰될 수 있다. 회귀현상의 기여요인으로 고정방법, 하악과두 변위, 술 후 교합, 근심골편의 회전, 수술 이동량, 수술이동 방향, 주변 근육의 작용 등이 거론되고 있으며 각각을 고찰해보고자 한다.

1. Method of fixation

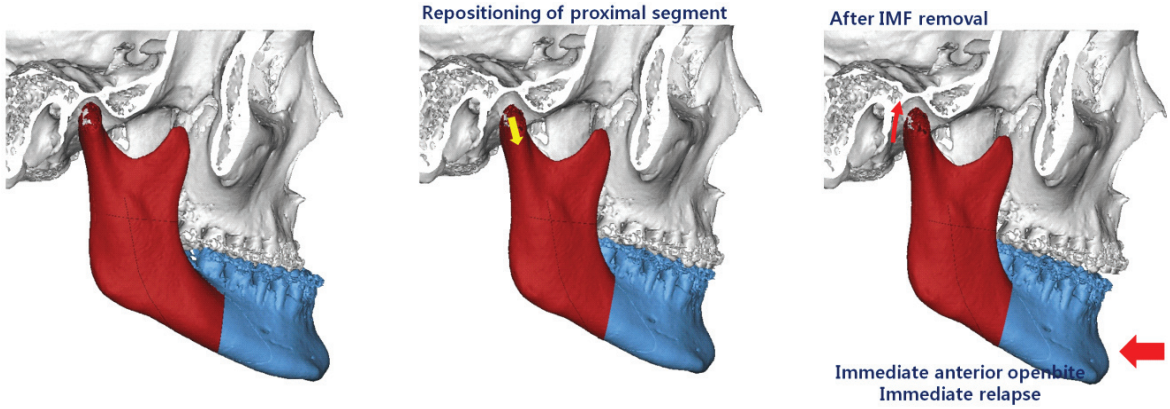
고정력: bicortical screw ≥ miniplate + position screw > miniplate

술 후 안정성은 고정력의 강도와는 관련이 없으며, 고정 방법에 따라 안정성이 차이를 보이지는 않는다. Bicortical screw를 사용하여 고정력이 크게 작용된 경우에는 proximal segment가 근육 작용에 의해 술 후에 회전된다면 이와 더불어 distal segment의 회귀현상이 나타날 수 있으므로 proximal segment의 술 전 위치로의 고정이 더욱 요구될 수 있다.

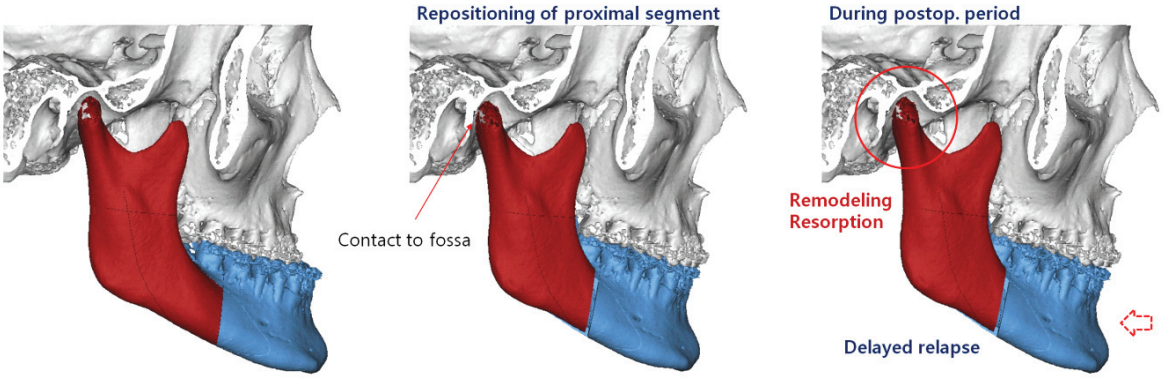
2. Condylar displacement

<Reyneke JP and Ferretti C, Br J Oral Maxillofac Surg 2002>

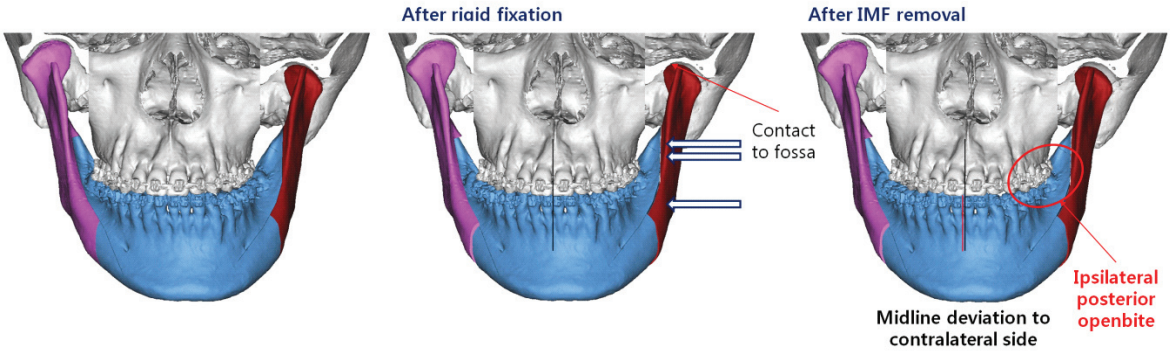
1) Central condylar sag



2) Peripheral condylar sag – type I



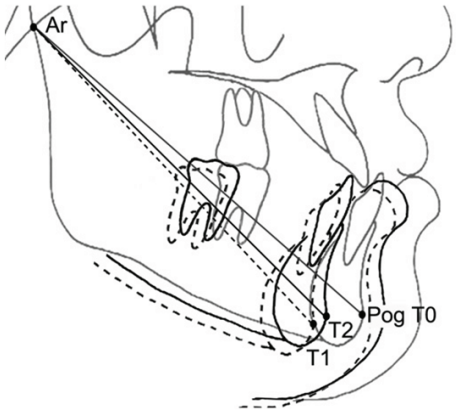
3) Peripheral condylar sag – type II



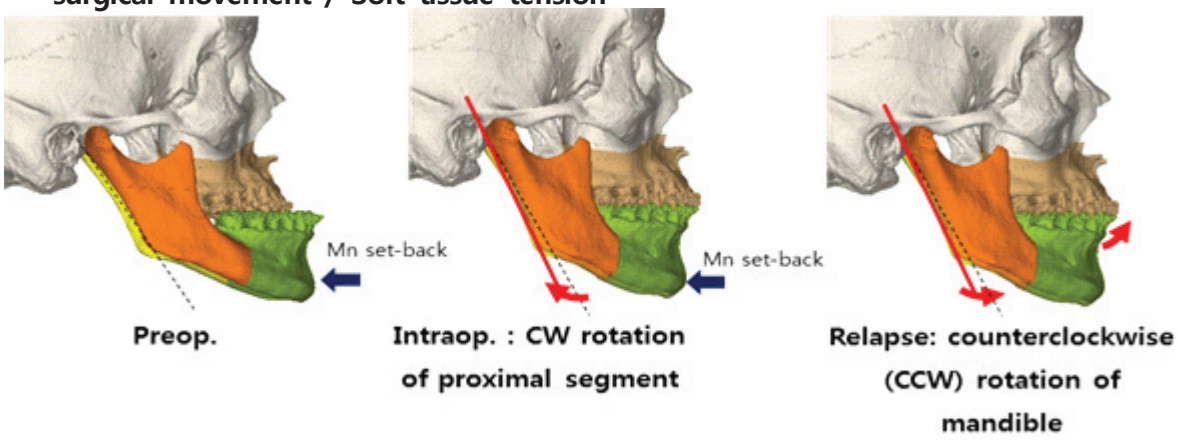
위 3가지 하악과두 변위 중 central type, peripheral type II는 수술 중 교합 변화로 인지가 가능하고 재고정을 하게 된다. 하지만 peripheral type I의 경우에는 수술 중에 안정적인 교합 상태를 보이므로 미처 인지하지 못하는 경우가 발생하고 수술 직후에 CT 촬영을 하였을 때 파악되는 경우가 많다. 장기적으로는 하악과두의 remodeling 혹은 resorption이 발생하며 안정성에 영향을 미치게 된다. 근원심 골편간의 간섭을 최소화함으로써 하악과두가 변위되지 않도록 하는 것이 중요하다.

3. Final occlusion

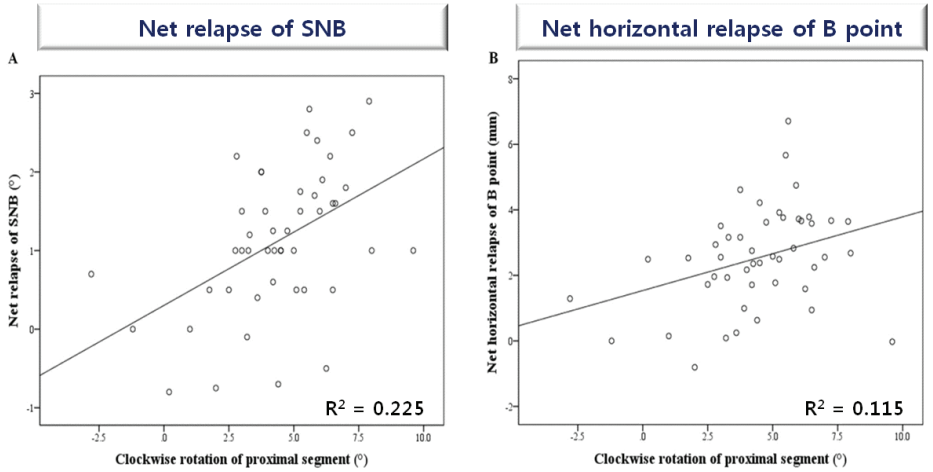
과거와 달리 선수술로 악교정 수술이 진행되는 비중이 늘고 있다. 선수술의 경우에는 교합 간섭이 남아있는 상태로 수술이 진행되므로 악간거리가 늘어난 상태로 수술 교합이 설정되는 경우가 많다. 수술 후에 교정치료가 진행되면서 하악골의 반시계방향으로의 autorotation이 일어나게 된다. Autorotation에 의한 하악골의 전돌 양상이 회귀현상과 혼동되어 나타날 수 있으며, autorotation 되는 양을 고려하여 chin의 전후방적 위치를 설정하는 것이 필요하다.



4. **Rotation of the proximal segment / Amount of surgical movement / Direction of surgical movement / Soft tissue tension**



하악지 시상분할골절단술을 이용한 하악골 후퇴 수술 시에 근심골편이 시계방향으로 회전하고, 술후에 반시계방향으로 회전되면서 회귀 현상을 발생시킨다는 사실은 잘 알려져 있다.



1) 근심골편의 시계방향 회전의 기여요인

	Gonial angle	VBS	Surgical change				
			SNB	B - horizontal	MPA	U1 - vertical	U6 - vertical
Cr of prox. segment	.361	.707	-.409	-.368	-.041	.444	.492
p value	.013	.000	.004	.011	.787	.002	.000

Pearson`s correlation coefficient

Gonial angle이 큰 환자일수록 수술 중 근심골편이 시계방향으로 더 많이 회전될 수 있으며, 하악골 후퇴량이 큰 경우 상악골이 하방으로 이동한 경우에도 근심골편 회전량이 많았다. 가장 큰 상관관계를 보인 요인은 vertical bone step인다. (vertical bone step (VBS): distal segment가 수술 교합 상태로 이동했을 때 수술 전 proximal segment의 하연과의 높이차)

2) vertical bone step이 증가하는 기여요인

	Gonial angle	Surgical change				
		SNB	B - horizontal	MPA	U1 - X axis	U6 - X axis
VBS	.335	-.355	-.280	.062	.473	.664
p value	.021	.014	.056	.678	.001	.000

Pearson`s correlation coefficient

Gonial angle이 큰 환자일수록, 하악골 후퇴량이 큰 경우, 상악골이 하방으로 이동한 경우에도 VBS가 커지게 된다. VBS가 큰 경우 proximal segment가 시계방향으로 회전될 가능성이 높으므로 수술 계획 상에서 posterior impaction을 시행하는 등 VBS을 줄이는 방향으로 수술 계획의 고려가 필요하다.

수술 이동 방향이 VBS을 완전히 해소하지 못하는 경우라면 수술 중에 근원심 골편 하연을 편평하게 맞추어 고정하는 것이 아니라 근심골편을 수술 전 위치 그대로 유지하는 것이 필요하다.

이를 고려하지 않아 근심골편이 시계방향으로 회전된다면 이에 부착되어 있는 교근 및 측두근의 신장이 불가피하며 술후에 근심골편을 반시계방향으로 회전하는데 영향을 미칠 것으로 생각된다.

연제 3

Malarplasty

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이의룡 교수

◆ **Education**

Mar. 1995~Feb. 1997	Predentistry Education Course, College of Liberal Arts & Science, Seoul National University, Seoul, Korea
Mar. 1997~Feb. 2002	College of Dentistry, Seoul National University (D.D.S.)
Mar. 2003~Feb. 2006	Postgraduate School, Seoul National University (Master of Dental Science)
Sep. 2009~Aug. 2011	Postgraduate School, Seoul National University

◆ **Professional Experiences**

Mar. 2002~Feb. 2003	Internship, Seoul National University Dental Hospital, Seoul, Korea
Mar. 2003~Feb. 2006	Residency in Oral & Maxillofacial Surgery, Seoul National University Dental Hospital, Seoul, Korea
May. 2006~Nov. 2008	International Cooperative Doctor Program Federal Police Hospital, Addis Ababa, Ethiopia
Nov. 2008~April. 2009	Public Health Doctor in Oral Oncology National Cancer Center, Ilsan, Korea
May. 2009~Feb. 2010	Clinical Fellowship in Oral and Maxillofacial Surgery Seoul National University Dental Hospital, Seoul, Korea
Apr. 2010~May. 2011	Clinical Fellowship in Oral and Maxillofacial Surgery Hangang Sacred Heart Hospital, Seoul, Korea
Jun. 2011~Present	Clinical Assistant Professor, Department of Oral and Maxillofacial Surgery, Chungang University Hospital, Seoul, Korea

Malarplasty

Abstract

한국인을 비롯한 동양인들은 주로 중두개형(mesochphaly)의 두개골을 많이 가지고 있어 얼굴이 편평하고 폭이 넓고 길이가 짧으며 관골부위가 돌출되고 하악각이 후하방으로 돌출되어 사각형의 안모를 가지고 있는 경우가 많다. 관골은 안면부의 양측에 대칭적으로 돌출되어 있는 조직으로 정면 및 측면 모두에서 타원형 안모 형태를 이루는데 중요한 역할을 하는 부위이다.

얼굴형은 얼굴뼈의 모양에 따라 결정되게 된다. 얼굴뼈의 모양을 고쳐서 얼굴형을 개선하고자 하는 수술을 안면윤곽수술이라고 하는데 관골성형술은 한국에서 가장 빈번히 이루어지고 있는 수술이다. 관골부가 돌출된 사람들은 얼굴이 더 넓게 보일 뿐만 아니라 고집이 세게 보이고 나이 들어 보이는 인상을 주게 된다. 특히 관골부가 돌출된 여자들은 남성적 이미지와 "팔자가 세 보인다"는 이유로 국내에서는 돌출된 관골을 축소시키는 관골축소술(reduction malarplasty)을 원하는 경우가 많다.

뼈를 잘라내는 하악각성형술과는 다르게 관골성형술은 관골을 골절단하고 재위치시키고 고정시키는 고난도의 수술이다. 관골은 골수가 적은 피질골로 이루어져 있으므로 첫 수술시 긴밀한 골접촉이 이루어지지 못하면 불유합이 되기 쉽다. 그리고 관골에는 교근이 기시하는 부위이므로 저작시 지속적으로 힘을 받는 부분이므로 견고한 고정이 중요하다.

관골성형술은 악교정수술과 달리 역사가 짧고 아시아 국가들에서 주로 이루어지고 있으며 술자마다 방법이 다양하여 아직까지 최고의 결과를 내는 수술방법에 대한 consensus가 없다.

본 발표를 통하여 언급할 내용은 다음과 같다.

1. 관골수술의 국내 트랜드
2. 정확한 골절단 방법
3. 견고한 고정방법
4. 관골수술의 효과
5. 관골수술의 부작용
6. 관골수술 후 불유합된 관골의 재건수술

Malarplasty

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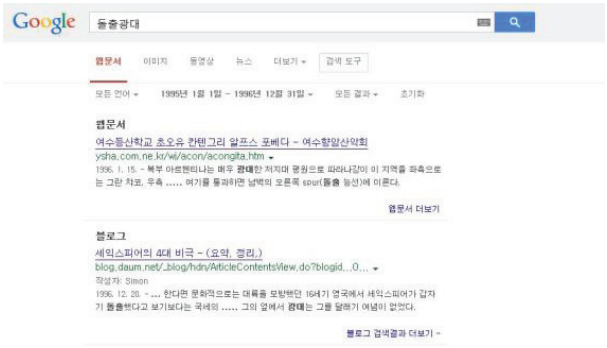
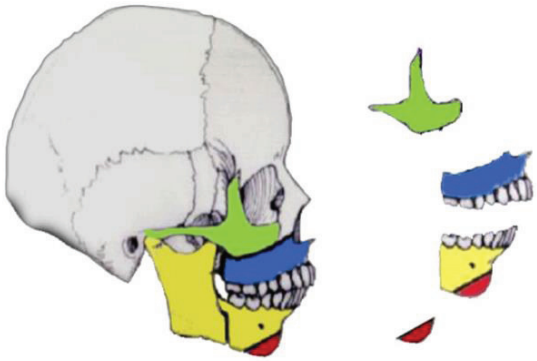
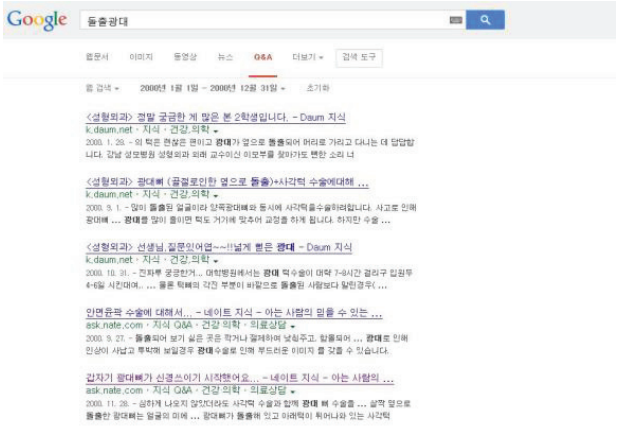
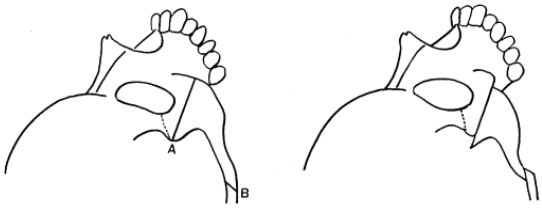
이의룡, 최영준

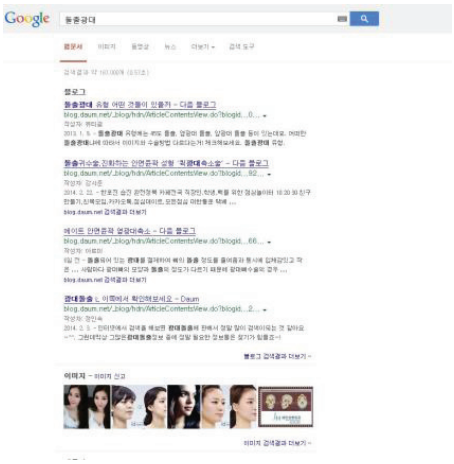




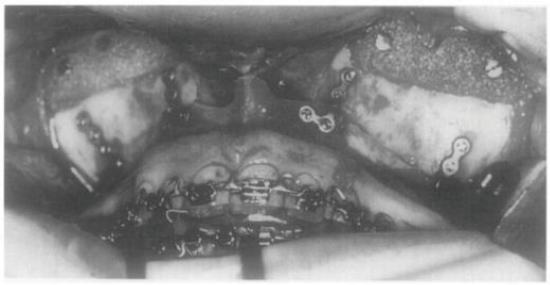


Reduction malarplasty using sliding setback osteotomy
J Craniofac Surg 1998 May 9(3) 275-9

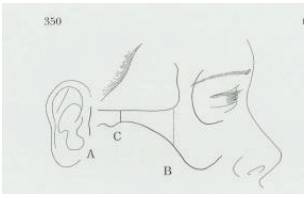


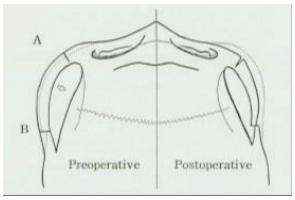


Simultaneous Malaroplasty withPorous Polyethylene Implants and Orthognathic Surgery for Correction of Malar Deficiency
J Oral Maxillofac Surg 1998 Jun 56(6) 734-41

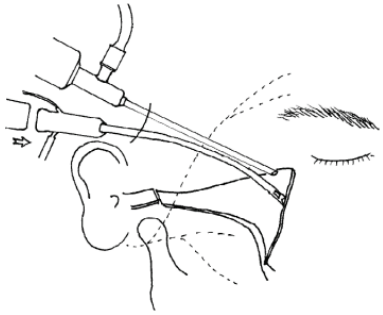


A simple method of reduction malarplasty
Plast Reconstr Surg 1997 Feb 99(2) 348-55

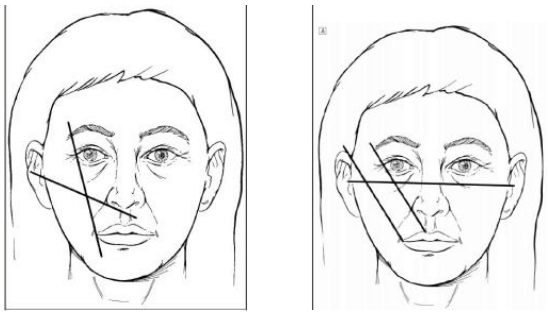




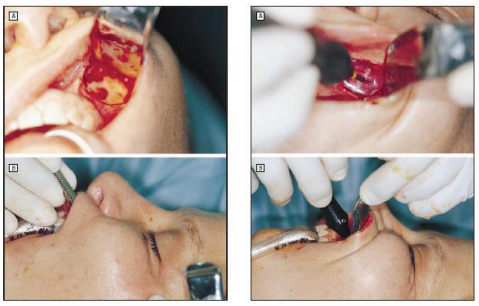
Laser-Assisted Endoscopic Reduction Malarplasty in Asians: Quick Combined Surgery
Aesth Plast Surg 1998 Jul-Aug 22(4) 289-97



Malar augmentation
Arch Otolaryngol Head Neck Surg 1999 Sep 125(9) 980-7

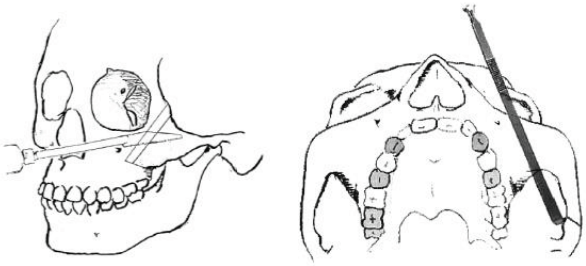


Malar Augmentation With Self-drilling Single-Screw Fixation
Arch Fac Plast Surg 2000 Jul-Sep 2(3) 222-5

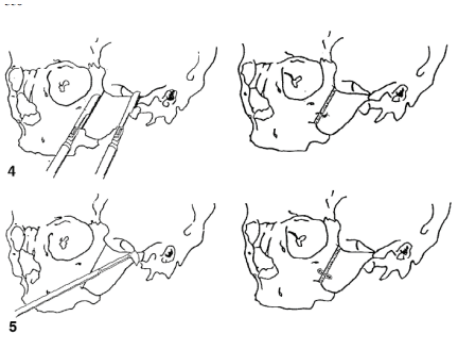


Malar augmentation
Arch Otolaryngol Head Neck Surg 1999 Sep 125(9) 980-7

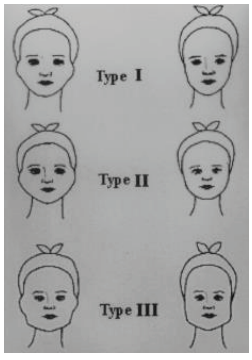
Reduction Malarplasty through an Intraoral Incision: A New Method
Plast Reconstr Surg 2000 Dec 106(7) 1514-9



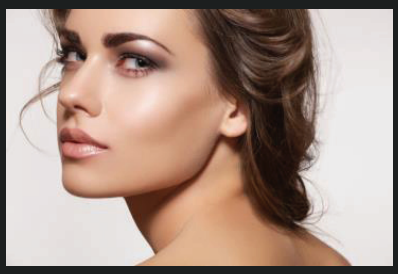
True Intraoral Reduction Malarplasty with a Minimally Invasive Technique
Aesth Plast Surg 1999 Sep-Oct 23(5) p354-60

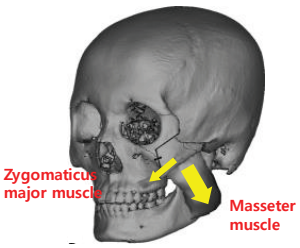


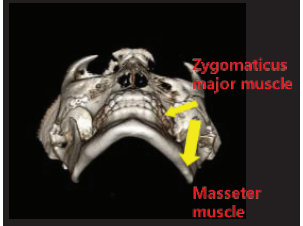
Intraoral Approach for Reduction Malarplasty: A Simple Method
Plast Reconstr Surg 2003 Jan 111(1) 453-60

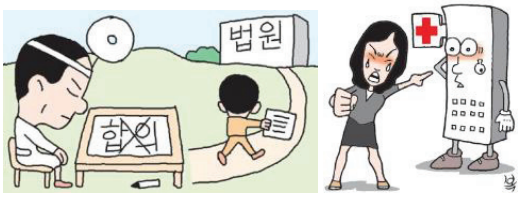


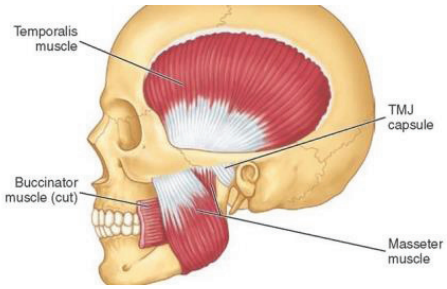
"Significance for OMF surgeon"

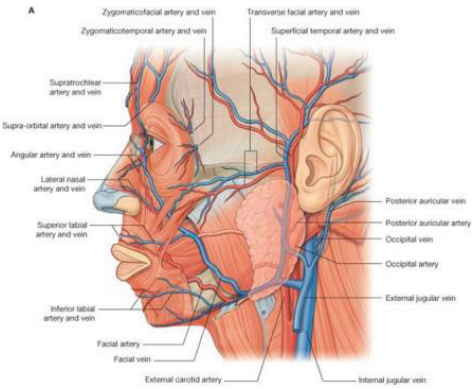


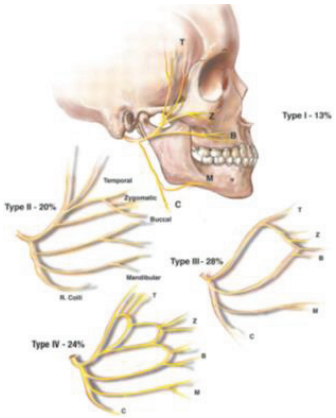


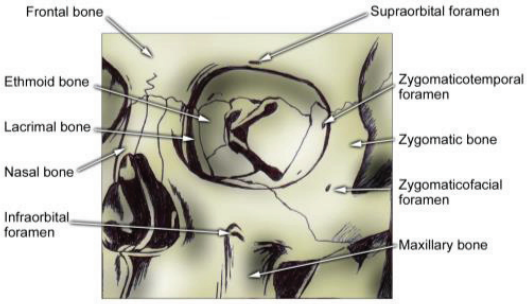


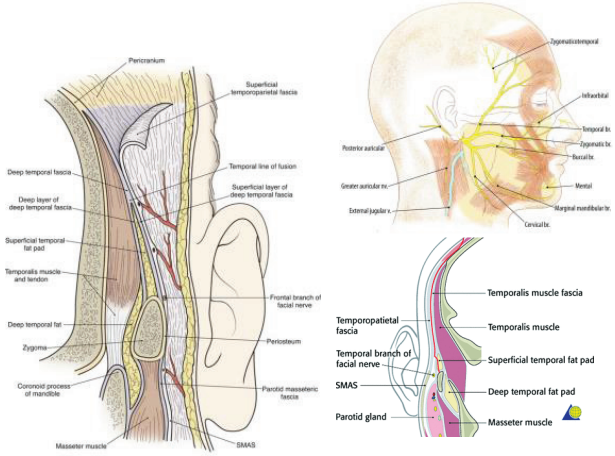




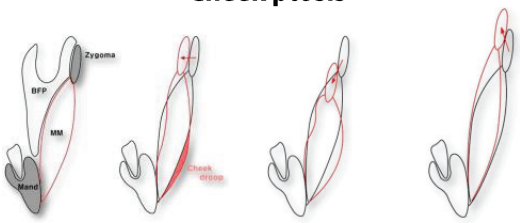








"Cheek ptosis"



Three-dimensional assessment of zygomatic malunion using computed tomography in patients with cheek ptosis caused by reduction malarplasty
Journal of Plastic, Reconstructive & Aesthetic Surgery (2012)65, 448-455

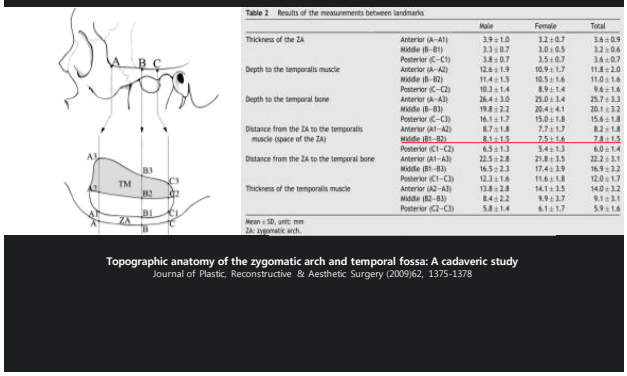
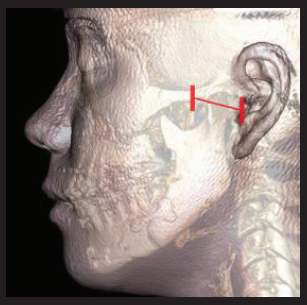


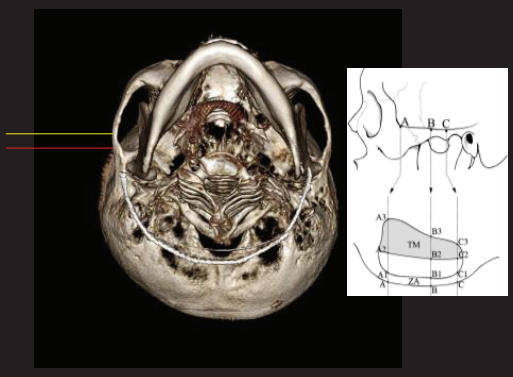
Table 2 Results of the measurements between landmarks

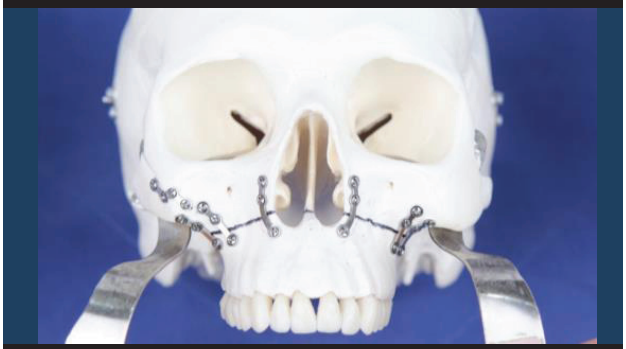
		Male	Female	Total
Thickness of the ZA	Anterior (A–A1)	3.9 ± 1.0	3.2 ± 0.7	3.6 ± 0.9
	Middle (B–B1)	3.3 ± 0.7	3.0 ± 0.5	3.2 ± 0.6
	Posterior (C–C1)	3.8 ± 0.7	3.5 ± 0.7	3.6 ± 0.7
Depth to the temporalis muscle	Anterior (A–A2)	12.6 ± 1.9	10.9 ± 1.7	11.8 ± 2.0
	Middle (B–B2)	11.4 ± 1.5	10.5 ± 1.6	11.0 ± 1.6
	Posterior (C–C2)	10.3 ± 1.4	8.9 ± 1.4	9.6 ± 1.6
Depth to the temporal bone	Anterior (A–A3)	26.4 ± 3.0	25.0 ± 3.4	25.7 ± 3.3
	Middle (B–B3)	19.8 ± 2.2	20.4 ± 4.1	20.1 ± 3.2
	Posterior (C–C3)	16.1 ± 1.7	15.0 ± 1.8	15.6 ± 1.8
Distance from the ZA to the temporalis muscle (space of the ZA)	Anterior (A1–A2)	8.7 ± 1.8	7.7 ± 1.7	8.2 ± 1.8
	Middle (B1–B2)	8.1 ± 1.5	7.5 ± 1.6	7.8 ± 1.5
	Posterior (C1–C2)	6.5 ± 1.3	5.4 ± 1.3	6.0 ± 1.4
Distance from the ZA to the temporal bone	Anterior (A1–A3)	22.5 ± 2.8	21.8 ± 3.5	22.2 ± 3.1
	Middle (B1–B3)	16.5 ± 2.3	17.4 ± 3.9	16.9 ± 3.2
	Posterior (C1–C3)	12.3 ± 1.6	11.6 ± 1.8	12.0 ± 1.7
Thickness of the temporalis muscle	Anterior (A2–A3)	13.8 ± 2.8	14.1 ± 3.5	14.0 ± 3.2
	Middle (B2–B3)	8.4 ± 2.2	9.9 ± 3.7	9.1 ± 3.1
	Posterior (C2–C3)	5.8 ± 1.4	6.1 ± 1.7	5.9 ± 1.6

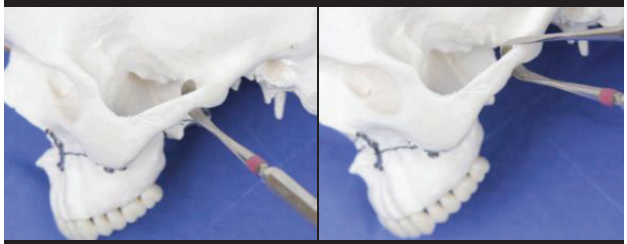
Mean ± SD, unit: mm
ZA: zygomatic arch.

Topographic anatomy of the zygomatic arch and temporal fossa: A cadaveric study
Journal of Plastic, Reconstructive & Aesthetic Surgery (2009)62, 1375-1378



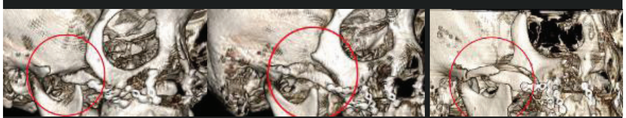






<< Basic procedure >>

1. Skin incision and blunt dissection
2. Posterior osteotomy
3. Oral incision and clear flap reflection (do not invade BFP)
4. Anterior osteotomy
   ① Upper: bi-cortical sawing, toward orbit, uppermost
   ② Middle: mono-cortical
   ③ Lower: bi-cortical
   ④ Decision: cutting depth, double cut or grinding
5. Posterior fixation (L-shaped 2H or S-shaped 3H): 개구운동
6. Anterior fixation (Z-shaped 4H or double 3H)



Oral & Maxillofacial Surgery

Technical Note
Cosmetic Surgery

A three-dimensional planned osteotomy on the zygomatic arch for reduction malarplasty

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Abstract. During a reduction malarplasty, precise sectioning of the zygomatic arch according to the plan formulated in the diagnostic stage is very important, because differences in the locations of the osteotomies in the left and right zygomatic arch will result in facial asymmetry, and arch osteotomies that are placed at locations other than those specified during planning elicit unwanted results. A method for the precise planning and sectioning of the zygomatic arch involving the use of computed tomography (CT) and a viewer program is presented herein. Furthermore, a case in which this method was applied during reduction malarplasty via a combined intraoral and external incision is described.

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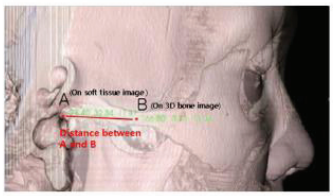

Fig. 1. 'A' is the point chosen on the soft tissue image and 'B' is the point selected for zygomatic arch sectioning on the 3D bone image. The distance between the two points is measured.

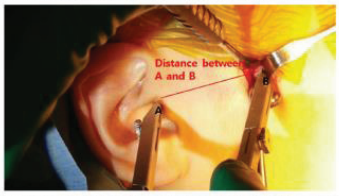

Fig. 2. applying the device with the measured value setting obtained during surgical planning to the operation field through an external incision.

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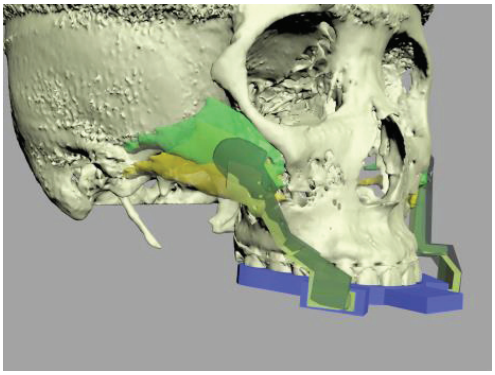
Occlusion-fit zygoma guide



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- A simple method of reduction malarplasty Plast Reconstr Surg 1997 Feb 99(2) 348-55

연제 4

Mandibular angle resection

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Mandibular angle resection

Abstract

일반적으로 사각형의 얼굴 형태는 얼굴이 커 보이며 고집이 세고 딱딱한 인상을 주게 되어 우리나라를 비롯한 동양에서는 계란형의 얼굴을 심미적으로 선호하여 왔다. 사각형의 얼굴형태는 다양한 패턴의 관골축소술과 하악각 그리고 하악골 경계부 성형을 통해 개선될 수 있다. 사각턱의 원인은 돌출된 하악각, 교근의 비대, 이악물기, 이갈이 등을 꼽을 수 있다.

이러한 얼굴형태의 교정 수술을 위하여 술 전 분석이 우선 시행되어지는데 시각적으로 보이는 이미지와 natural head position 상태에서 촬영한 clinical photo를 통하여 안면 비대칭 및 모양을 판단한다. 다음으로 cephalometric PA, lateral 및 facial CT 촬영을 통하여 골격적 비대칭을 검사한다. 추가적으로 비대칭에 대한 구조적 판단을 위해 3D 분석 프로그램 또는 RP model을 제작하여 삼차원적으로 분석할 수 있으며, 마지막으로 환자의 요구사항을 중점적으로 분석 사항에 반영해야 한다.

하안면의 contouring surgery 대상은 하악각, 하악체 그리고 하악지, 하악골 하연, 전방의 턱 부위이며 축소 수술 및 증대 수술을 고려할 수 있다. 이때 주의해야할 해부학적 구조물로는 하치조신경 및 혈관, 이신경, 설신경 등이 있다.

돌출된 하악골 축소를 위하여 주로 시행되는 수술로 하악각절제술과 하악골피질골절제술이 있다. 하악각절제술은 하악골 하방 1/3의 폭을 줄이기 위해서 또는 하악각 부위의 각을 증가시키기 위하여 시행한다. 이 때 하악각에서 귓불 부위의 길이가 2cm 정도 유지가 되어야 하며, 2cm 이하이면서 하악각이 작다면 이부의 길이를 증가시켜주는 것을 고려해야 한다.

기존에는 oscillating saw 또는 reciprocating saw를 사용하였으며, 하악지의 전방경계 하방 하연에서 시작하여 교합면의 연장선이 하악지의 후방경계와 만나는 지점까지 골절단술을 시행한다. 이 때 숙련된 술자는 환자의 기대치를 반영하여 수술을 시행하며, 하치조신경 및 혈관을 손상 시키지 않도록 주의를 기울여야 한다.

최근에는 수술의 정확도를 높이기 위해 3D RP model을 이용한 acrylic surgical stent를 제작하거나 3D 분석 프로그램을 통하여 양측의 비대칭 정도를 확인할 수 있으며, 또한 모의 수술 시행 후의 모습 예측이 가능하다.

하악외측피질골절제술은 협측 피질골을 절제하면 전방에서 바라봤을 때 bigonial width를 줄여주는 수술이다. 통상적으로 coronoid notch 하방 10 mm가 최상방 경계, 그리고 mental foramen으로부터 10 mm 후방을 최전방 경계로 시행한다.

하악하연골절단술은 하악각절제술이나 하악외측피질골절단술 등을 시행한 후에 이들을 보완하여 비대칭을 해소하고 작은 하안모를 만들어주기 위하여 병행하는 경우가 많다.

최근에는 전방 턱 부위가 넓은 경우, 하악 전방부 장안모와 사각턱을 동시에 가지는 경우 하악우각부에서 턱끝까지 좌우로 이어지는 경우 하악골의 길이와 폭을 동시에 줄이기 위해 genioplasty를 동시에 시행하거나, 하악하연골절단술의 범위를 전방부위로 연장할 수 있다.

이번 강연에서는 이러한 돌출된 하악골 축소를 위한 진단, 해부학적 고려사항, 수술 기법, 합병증 등에 대하여 증례보고와 문헌고찰을 통하여 정보를 공유하고자 한다.

2017 대한악안면성형재건외과학회 춘계학술워크숍

Mandibular angle resection

Min-Suk Kook

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Introduction

- Squared-shaped face
  - Considered masculine, obstinate image
  - Melon seed-shaped or oval-shaped faces considered aesthetically favorable
  - Deal with diverse patterns of reduction malarplasty and mandibular angle & margin reshaping

CNUDH

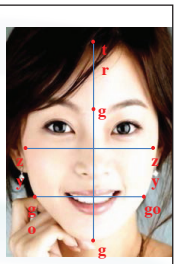
Introduction

- Causes of squared-shaped face
  - Prominent mandibular angle
  - Hypertrophy of Masseteric muscle
  - Clenching
  - Bruxism

CNUDH

Introduction

- Preoperative analysis
  - Clinical assessment
    - Visual exam
    - Photographs
      (facial frontal, 45°oblique, 90°lateral view)
      – Facial symmetry & shape
  - Radiographic examination
    - Cephalo PA & Lateral, Facial CT scan
  - 3D image, RP model
  - Patient's request



CNUDH

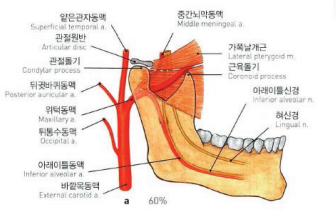
Introduction

- Contouring surgery of lower face
  - Angle
  - Body & ramus
  - Inferior border
    - Augmentation
    - Reduction
  - Chin
    - Augmentation
    - Reduction
    - Advancement
    - Setback

CNUDH

Introduction

- Anatomical structures
  - Inferior alveolar nerve and vessel
  - Mental nerve
  - Lingual nerve



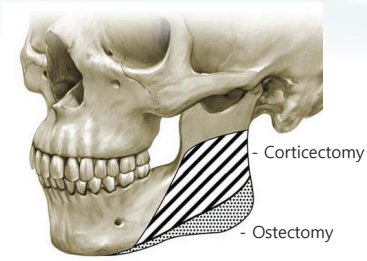
Atlas of Human Anatomy, 14th edition

CNUDH

Reduction mandibuloplasty

Mandibular contouring surgery

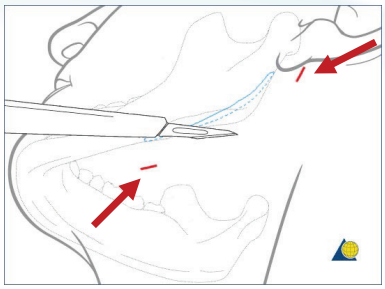
- To correct the prominent mandibular angle of squared-shaped face
  - Mandibular angle ostectomy
  - Ramus corticectomy



Lower face reduction with full-thickness marginal ostectomy of mandibular corpus-angle followed by corticectomy -Toshitsugu et al

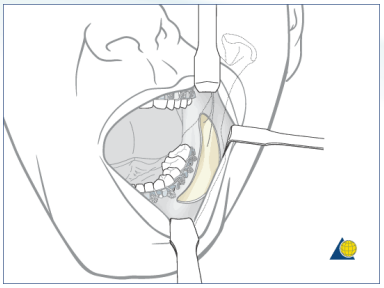
Mandibular contouring surgery

- Approach
  - Extraoral
    - Submandibular / retromandibular



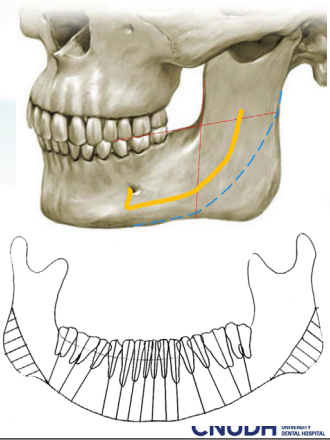
Mandibular contouring surgery

- Approach
  - Intraoral



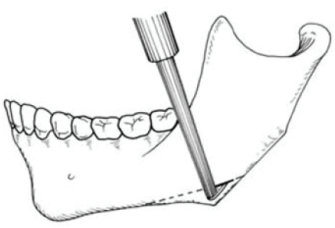
Mandibular angle ostectomy

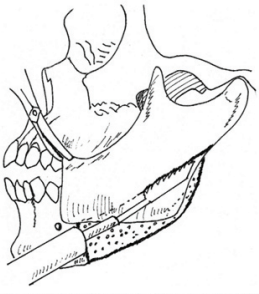
- Reduction of width of inferior 1/3 mandible
- Increase of mandibular angle
- Maximal extent
  - 2 cm from earlobe to mandibular angle
  - Should consider vertical augmentation when the distance lower than 2 cm



Mandibular angle ostectomy

- Conventional method
  - Oscillating saw
  - Reciprocating saw

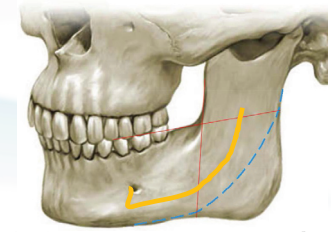


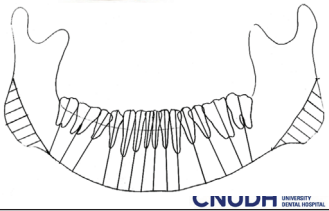


Kim et al. BSSRO and Mandible Prognathism Correction. J Oral Maxillofac Surg 2007.

Mandibular angle ostectomy

- Osteotomy line
  - Inferior border below the anterior border of ramus
  - Posterior border on the occlusal plane
  - Experience of operator, expectation of patient, & inferior alveolar nerve & vessels





Mandibular angle ostectomy

- Alternative method
  - Acrylic surgical stent using 3D RP model
    - To be more accurate

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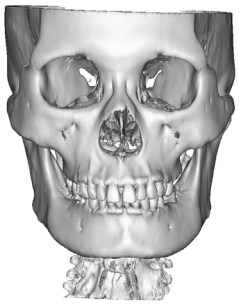
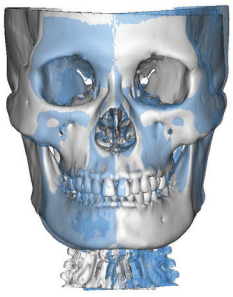
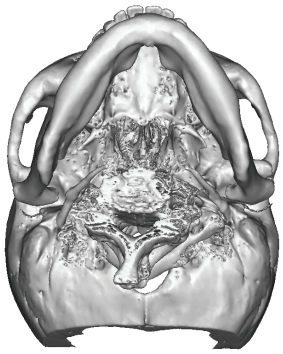
Mandibular angle ostectomy

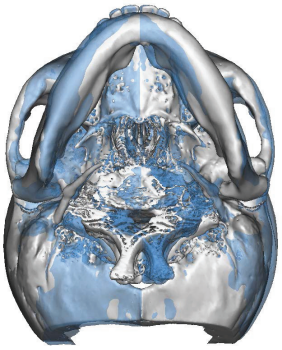
- Alternative method
  - 3D analysis software
    - To compare both sides and predict the amount of reduction



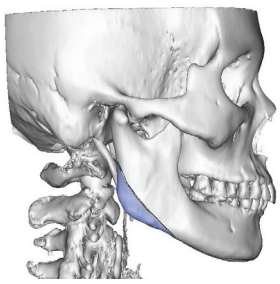


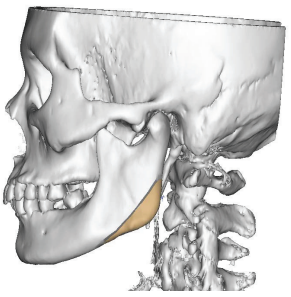
Mandibular angle ostectomy





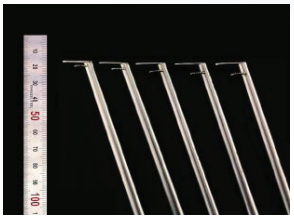
Mandibular angle ostectomy

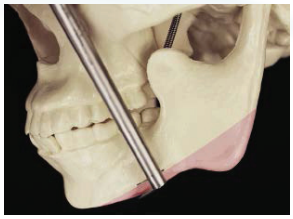




Mandibular angle ostectomy

- Alternative method
  - 'Guarded' oscillating saw
    - To avoid over-resection and nerve injury

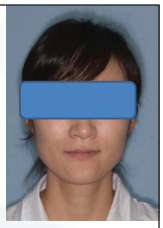


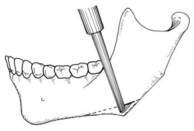


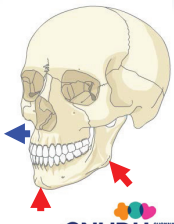
Standardization of surgical techniques used in facial bone contouring -Lee

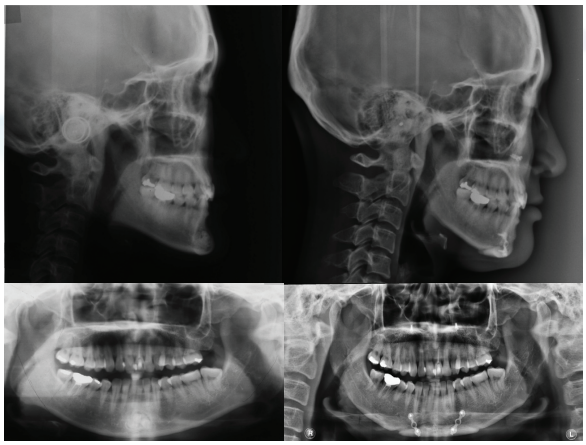
Case Presentation

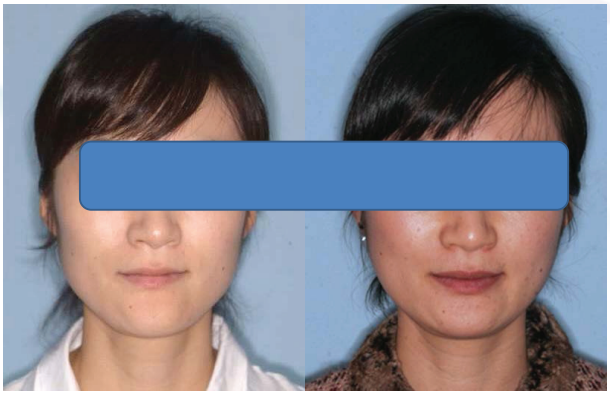
- Patient (31 yrs / F)
- Problem list
  - Prominent chin
  - Prominent Mn angle
- Op plan
  - Genioplasty
  - Both Mn angle reduction
  - Both paranasal augmentation





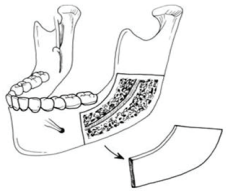


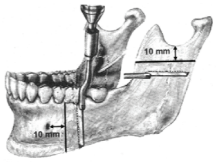




Mandibular corticectomy

- Removal of the buccal cortex
- Reduction of the mandibular width
- Maximal extent
  - 10 mm below the coronoid notch
  - 10 mm posterior to the mental foramen





Article review

Lower face reduction with full-thickness marginal ostectomy of mandibular corpus-angle followed by corticectomy

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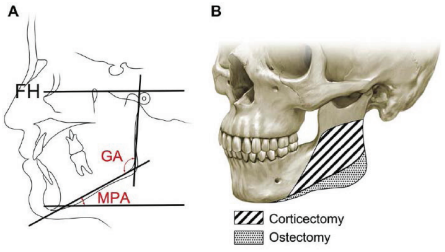
Received 10 March 2009; accepted 19 July 2009

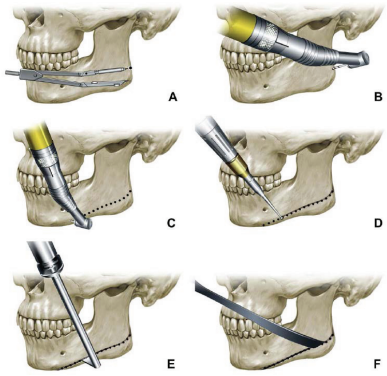
Article review

- Prominent mandibular angle considered as unappealing feature in Asians
- Mandibular angle ostectomy introduced in 1989



Lower face reduction with full-thickness marginal ostectomy of mandibular corpus-angle followed by corticectomy -Toshitsugu et al

Article review



Lower face reduction with full-thickness marginal ostectomy of mandibular corpus-angle followed by corticectomy -Toshitsugu et al

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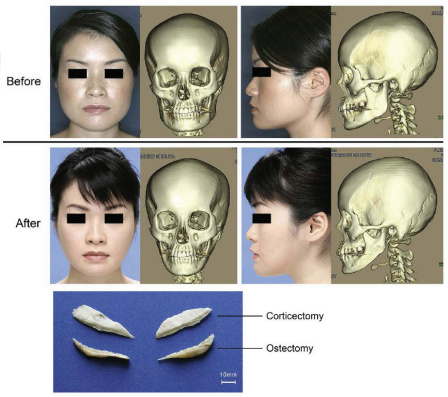
Article review



Lower face reduction with full-thickness marginal ostectomy of mandibular corpus-angle followed by corticectomy -Toshitsugu et al

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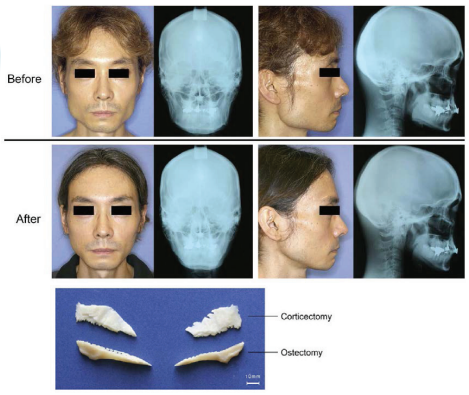
Article review



Lower face reduction with full-thickness marginal ostectomy of mandibular corpus-angle followed by corticectomy -Toshitsugu et al

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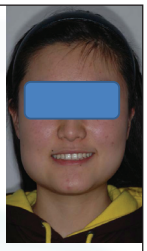
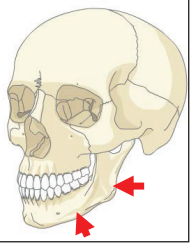
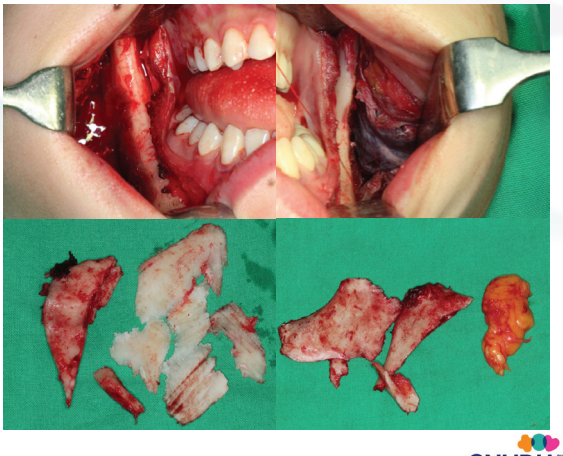
Case Presentation

- Patient (20 yrs / F)
- Problem list
  - Prominent Mn angle
- Op plan
  - Both Mn angle ostectomy
  - Both Mn ramus corticectomy







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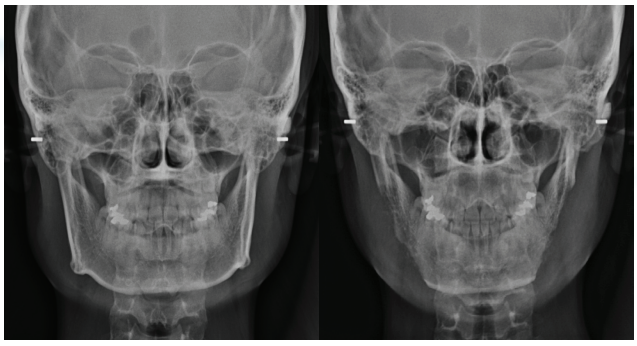

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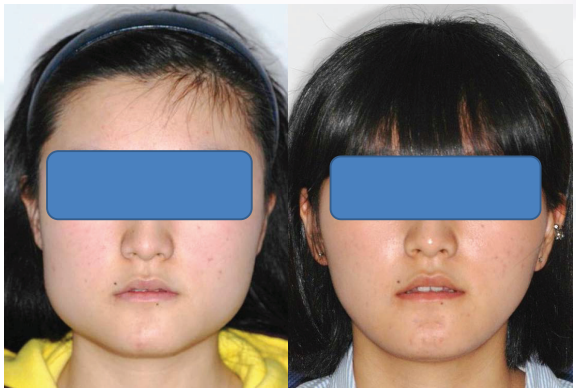
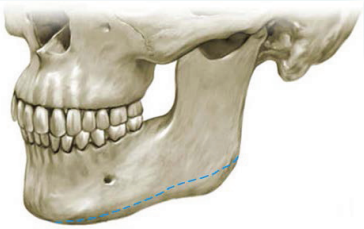


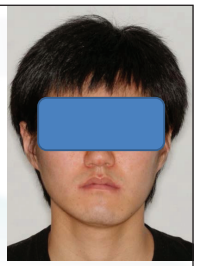
Mandibular inferior border ostectomy

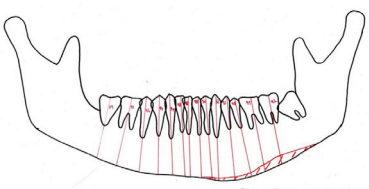
- For correction of asymmetry
- To make lower face slender

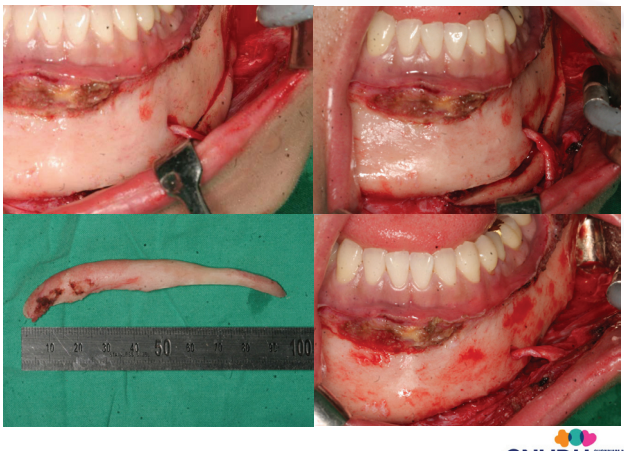


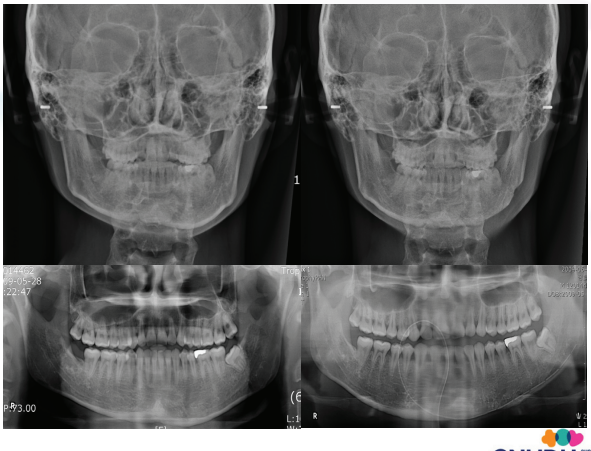
Case Presentation

- Patient (23 yrs / M)
- Problem list
  - Asymmetric inferior border of mandible
- Op plan
  - Lt Mn inferior border ostectomy









Article review

The Effect of Different Reduction Mandibuloplasty Types on Lower Face Width and Morphology

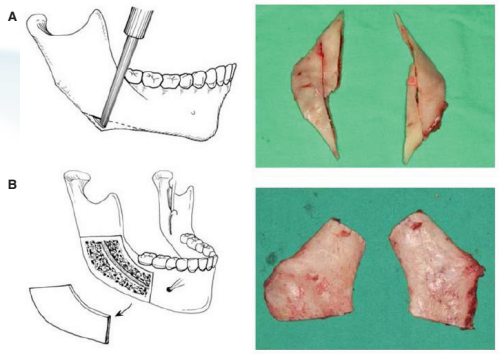
J. Cui · S. Zhu · J. Hu · J. Li · E. Luo

- Mandibular angle ostectomy (MAO) and mandibular angle-splitting ostectomy (MASO) can effectively reduce lower face width
- However, brings about different esthetic results

Article review

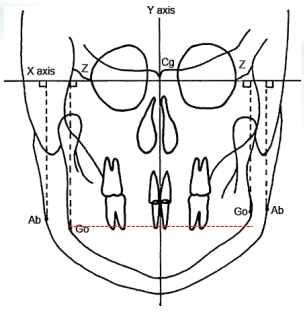
- Surgical procedure
  - Width of mandibular angle resection: 13-22 mm
  - Maximum resectable area in lateral cortex: 10 mm below the sigmoid notch and 10 mm lateral to the mental foramen
  - Outer cortex and prominent edges at mandibular body shaved using rotatory burr

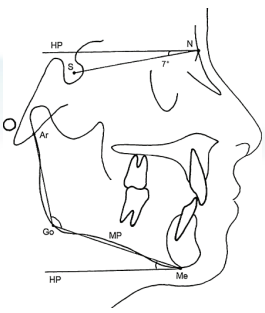
Article review



Article review

- Radiographic exams





Article review

The Effect of Different Reduction Mandibuloplasty Types on Lower Face Width and Morphology -J.Cui et al

Article review

The Effect of Different Reduction Mandibuloplasty Types on Lower Face Width and Morphology -J.Cui et al

Article review

Parameter	MAO (n = 22)			MASO (n = 20)			Difference between groups *p* Value
	Pre-OP	Post-OP changes		Pre-OP	Post-OP changes		
Go-Go (mm)	110.2 ± 5.8	99.8 ± 5.9	10.4 ± 2.8[a]	105.8 ± 3.0	99.6 ± 2.7	6.2 ± 2.0[a]	<0.01
Ab-Ab (mm)	141.0 ± 7.1	125.7 ± 7.4	15.4 ± 3.1[a]	135.1 ± 3.3	127.5 ± 3.7	7.6 ± 2.8[a]	<0.01
Ar-Go-Me (°)	114.0 ± 3.4	127.3 ± 3.4	13.3 ± 1.6[a]	116.4 ± 2.8	117.9 ± 2.4	1.6 ± 3.5	<0.01
MP-HP (°)	18.5 ± 3.5	28.5 ± 3.6	10.0 ± 1.9[a]	24.4 ± 2.8	25.9 ± 2.4	1.5 ± 3.2	<0.01

MAO, mandibular angle ostectomy; MASO, mandibular angle–splitting ostectomy; OP, operation

Note: Values are given as mean ± standard deviation

[a] $p < 0.01$

- Changes in the lower face after MAO and MASO observed on the basis of radiographic analysis
- Average decrease of 15.4 mm in MAO patients, but only 7.6 mm in MASO patients

The Effect of Different Reduction Mandibuloplasty Types on Lower Face Width and Morphology -J.Cui et al

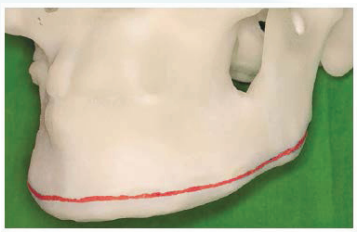
Article review

- In this study, most patients (19/22 cases) underwent mandibular angle resections
- MASO preferred because it can make face look thinner in case of patients who had normal gonial angle (about 120° in normal Chinese)

The Effect of Different Reduction Mandibuloplasty Types on Lower Face Width and Morphology -J.Cui et al

Total inferior border ostectomy

- For broad anterior chin
- Combining with genioplasty or extending inferior border ostectomy



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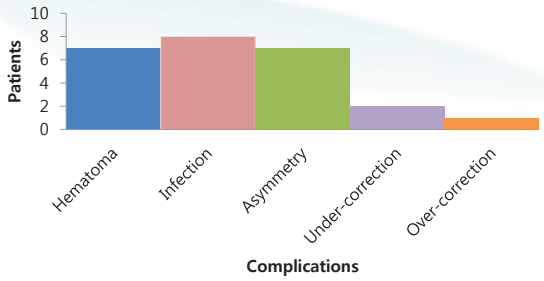
Complications

- Hematoma
- Infection
- Irregularity of mandible contour
- Over- or under-correction
- Post-operative asymmetry
- Soft-tissue sagging
- Nerve injury
- TMJ symptoms

Standardization of surgical techniques used in facial bone contouring -Lee

Complications

- **Among 888 patients who underwent mandibular angloplasty with or without combined genioplasty,**



Standardization of surgical techniques used in facial bone contouring -Lee

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Summary

- **Contouring mandibuloplasty & geninoplasty**
  - Figure out the expectation of the patient
    - Exclude unrealistic expectation
  - Contouring surgery cannot substitute the orthognathic surgery
    - Put priority on occlusion
  - Keep safety margin from important anatomical structure
  - Lower mandibular plane angle (<110°) or Mn-FH angle (<20°)
    - ➢ Mandibular angle ostectomy
  - Broad bigonial width and flared Mandibular ramus
    - ➢ Mandibular corticectomy
  - Recently, total inferior border ostectomy or combined narrowing genioplasty can be considered

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Thank You For Your Kind Attention!

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연제 5

Advancing and Lengthening Genioplasty for Receded and Short Chin

강동경희대학교 치과병원 구강악안면외과
이덕원 교수

경희대 치대 졸업

경희대 치의학 석사

경희대 치의학 박사

◆ **경력사항**

경희대학교 부속치과병원 구강악안면외과 인턴, 레지던트(2004)

강동경희대치과병원 구강악안면외과 임상강사, 임상조교수, 조교수

강동경희대치과병원 구강악안면외과 부교수(현)

대한구강악안면외과학회 정회원

전문의대한악안면성형재건외과학회 정회원, 인정의

Advancing and Lengthening Genioplasty for Receded and Short Chin

Abstract

Advancing and Lengthening Of Genioplasty

As a prominent part of the lower face, any chin deformity could bring about facial unbalance and inharmony. Recently, the chin has come to be considered as an essential component in lower face contouring, and the operative range has extended to the chin area from its former limitation to the angle area. For the patient seeking an aesthetically harmonized lower face, vertical length should be regarded as another important point. The chin deformity has various manifestations like receding chin, short chin, and broad chin, etc. To rectify chin deformities, some preferred chin implant insertion, and it is a relatively simple technique and easier to be accepted by patients. But after years' follow-up, chin implant insertion is not such a stable operation compared with osseous genioplasty. Bone erosion was found in many patients who performed chin implant insertion. Therefore, alloplastic chin implant is an appropriate surgical solution, just only, for the patient presenting with a mild sagittal deficiency. But when the degree of chin deformity is not olny big but also small big, osseous genioplasty will be much more recommended. Osseous chin, as the bone terminal, is easy to move toward multidirection after being truncated from mandible and the disposal of free bone segment is diversiform. Hence, there are wide ranges of approaches of genioplasty, such as sliding genioplasty, lengthening genioplasty, narrowing genioplasty, and advancing genioplasty, etc. For the chin deformity caused by chin microsomia and mandibular retrognathism, it is noteworthy that advancing and lengthening genioplasty was paid much attention. To produce better results for the short chin, vertical elongation can be regarded as a crucial step. For vertical elongation of the chin, bone grafts or allografts have been recommended. However, bone grafts have several disadvantages including donor morbidity, technical difficulty, and the possibility of bony absorption. For patients with receding and short chin, advancing and lengthening genioplasty would be a reliable therapy to obtain harmonious lower face.

Key Words:

chin deformity, genioplasty, chin microsomia

대한악안면성형재건외과학회
2017년 춘계학술워크숍

Advancing and Lengthening Genioplasty for Receded and Short Chin

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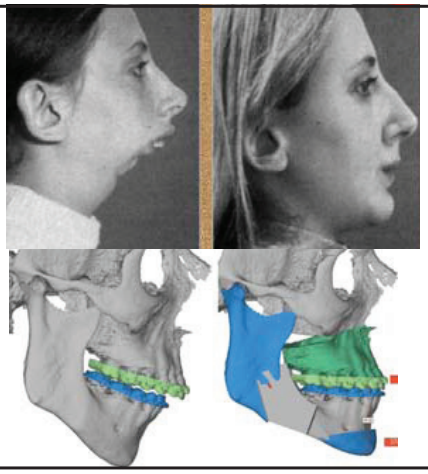
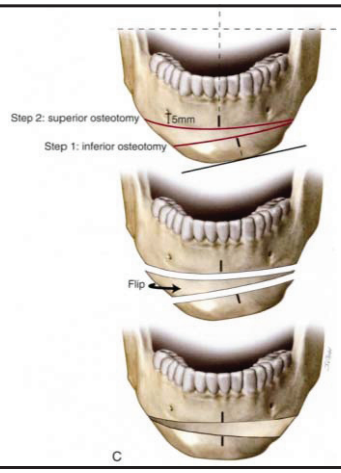
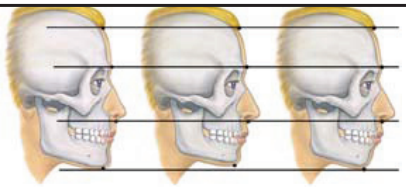
E-mail: **verycutebear@hanmail.net** / verycutebear@khu.ac.kr



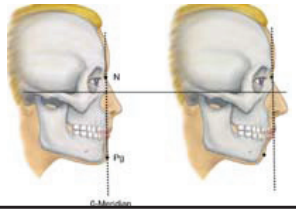


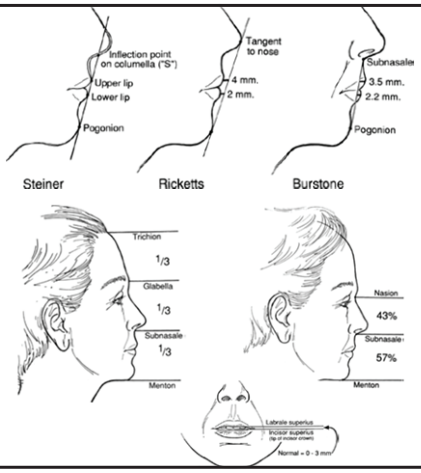
Indications

- primarily used for esthetic reasons
- Establish proportionate facial morphology
- Proportion = Esthetics

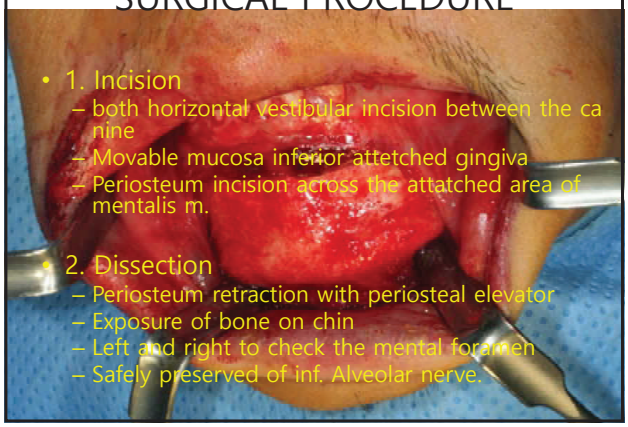


Microgenia / Retrogenia / Pseudoretrogenia
Size / Shape / Position /Proportion



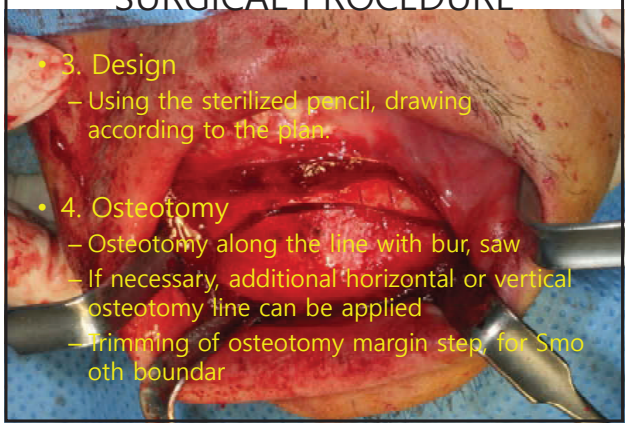


SURGICAL PROCEDURE



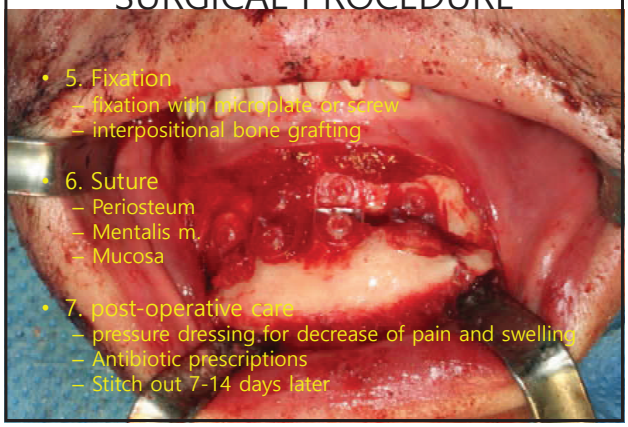
- 1. Incision
  - both horizontal vestibular incision between the ca nine
  - Movable mucosa inferior attetched gingiva
  - Periosteum incision across the attatched area of mentalis m.
- 2. Dissection
  - Periosteum retraction with periosteal elevator
  - Exposure of bone on chin
  - Left and right to check the mental foramen
  - Safely preserved of inf. Alveolar nerve.

SURGICAL PROCEDURE



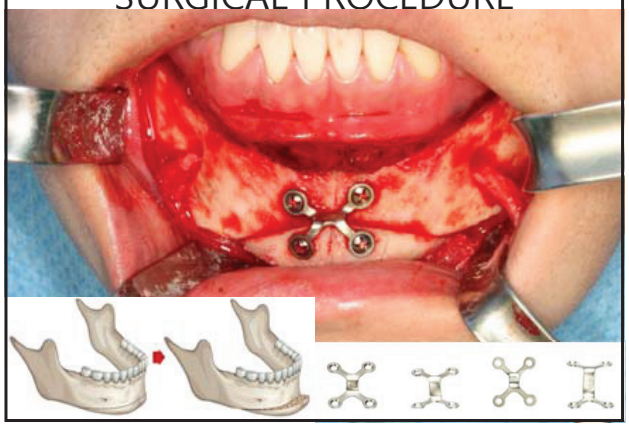
- 3. Design
  - Using the sterilized pencil, drawing according to the plan.
- 4. Osteotomy
  - Osteotomy along the line with bur, saw
  - If necessary, additional horizontal or vertical osteotomy line can be applied
  - Trimming of osteotomy margin step, for Smo oth boundar

SURGICAL PROCEDURE



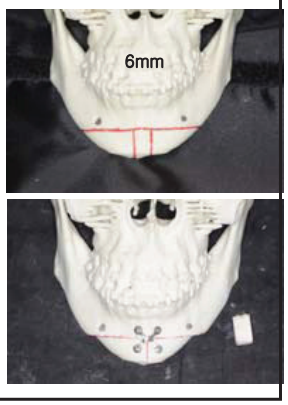
- 5. Fixation
  - fixation with microplate or screw
  - interpositional bone grafting
- 6. Suture
  - Periosteum
  - Mentalis m.
  - Mucosa
- 7. post-operative care
  - pressure dressing for decrease of pain and swelling
  - Antibiotic prescriptions
  - Stitch out 7-14 days later

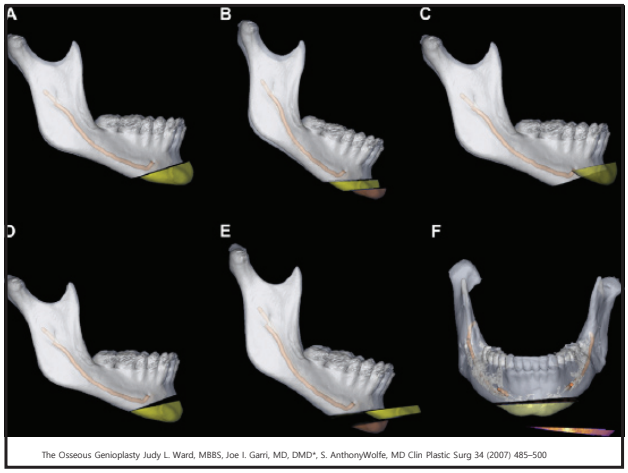
SURGICAL PROCEDURE



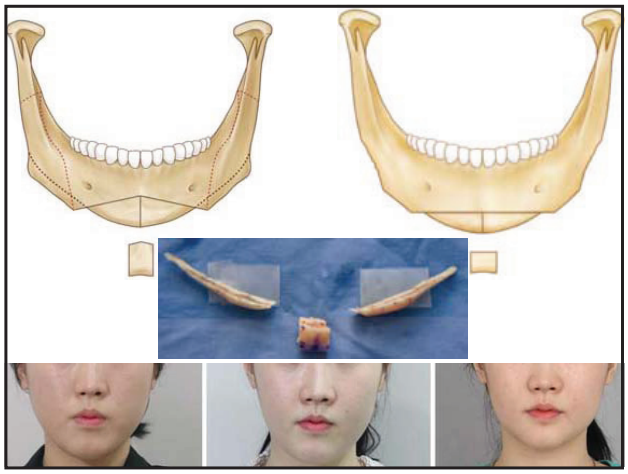
SURGICAL PROCEDURE

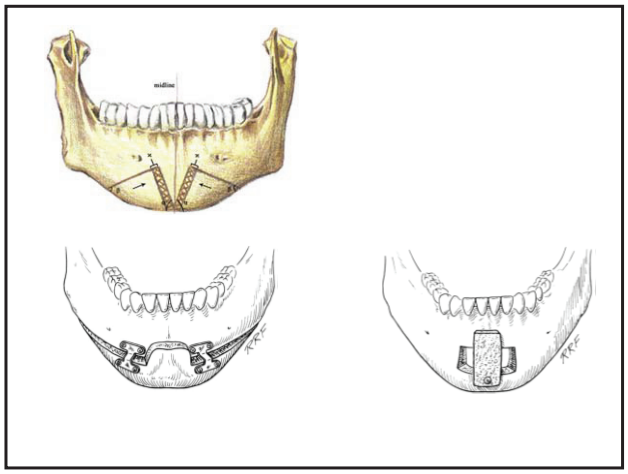
1. Incision
2. Subperiosteal flap elevation
3. Design osteotomy line
4. Vertical osteotomy
5. Horizontal osteotomy
6. Fixation with microplate
7. Contouring lower border
8. Layered suture





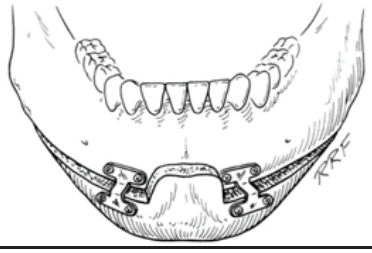
The Osseous Genioplasty Judy L. Ward, MBBS, Joe I. Garri, MD, DMD*, S. AnthonyWolfe, MD Clin Plastic Surg 34 (2007) 485–500





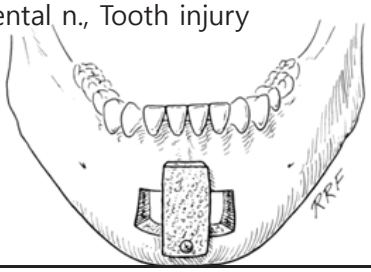
Inferior sagittal osteomomy(ISO)

- The fuctional genioplasty for Microgenia
- Disadvantage
  - Inferior border of mandible is disrupted



Anterior mandibular osteotomy

- Rectangular window surgery
- No change of mentum position
- Intact Mandibular inferior border
- Mental n., Tooth injury

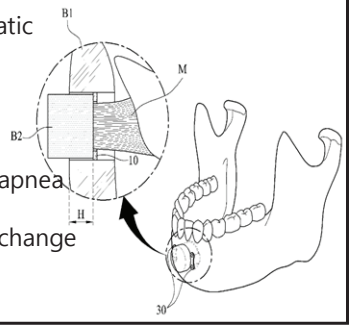


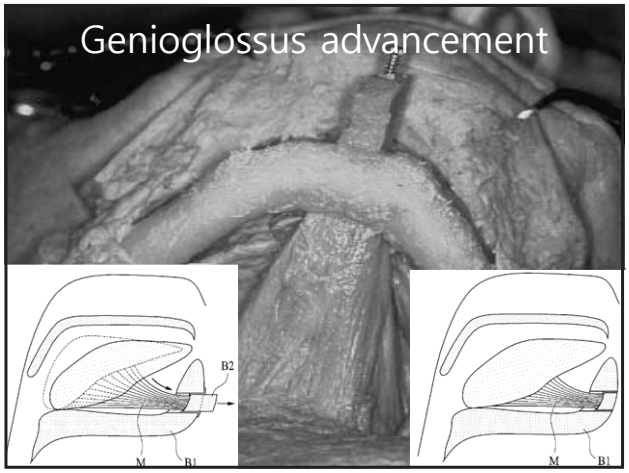
Trephine osteotomy approach

A simple and atraumatic technique of genioglossus muscle advancement

for obstructive sleep apnea

without facial profile change





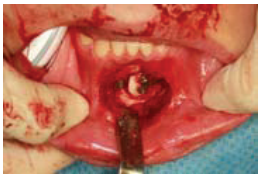
Procedure

A. guiding drill for indentation

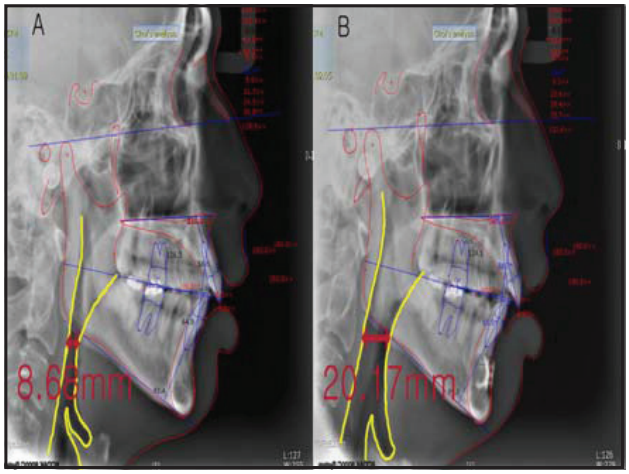
B.14 mm trephine drill for bicortical osteotomy,

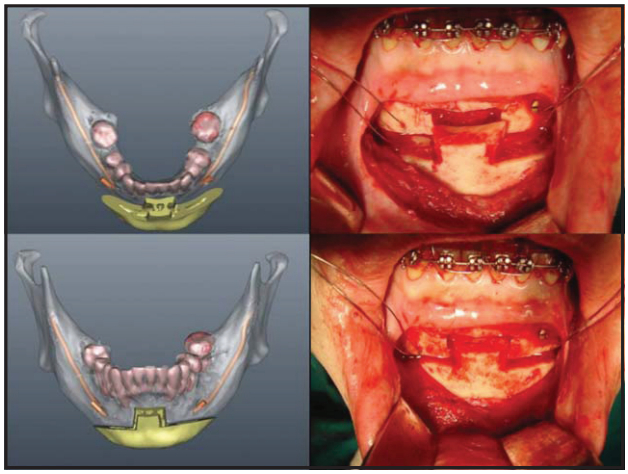
C. C-shaped plate designed to fix the advanced bone flap easily

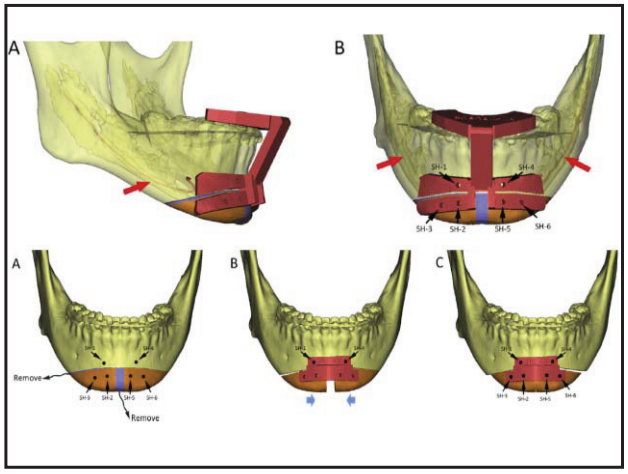
Procedure

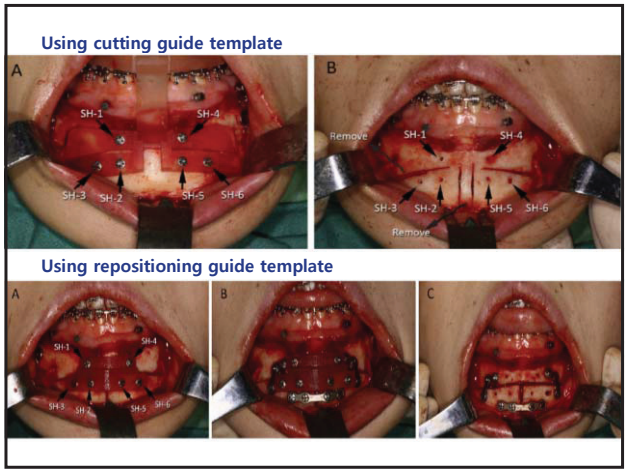


- advanced lingual bone segment was fixed by C-shape plate and 4 hole midplate
- The mucosal incision was closed without surgical drain.
- The procedure was completed within just 30 minutes.



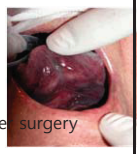


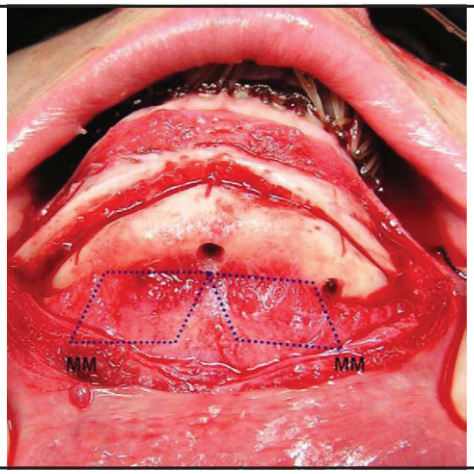


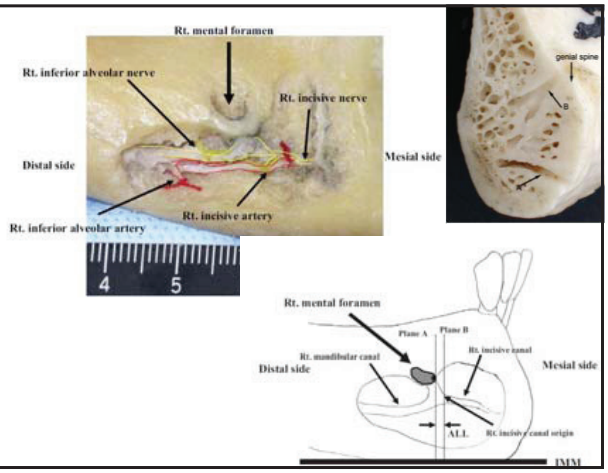


Complications

- Infection
- Hematoma & bleeding
- Nonunion or malunion
- Bone necrosis
- Displacement
- Permanent mental nerve paresthesia (0%-20%)
- Transient mental nerve paresthesia
- Thermal injury
- Scar, intraoral
- Iatrogenic asymmetry
- Bone resorption- 5mm of resorption at 48 months after surgery

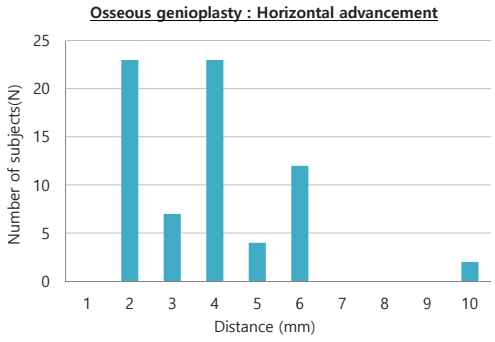


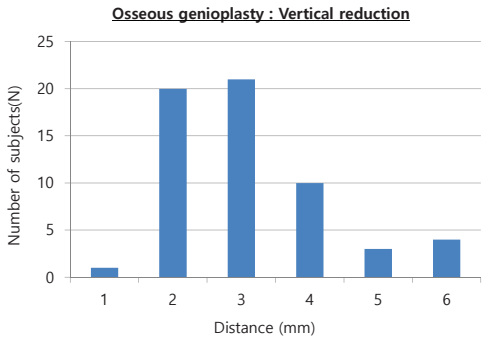


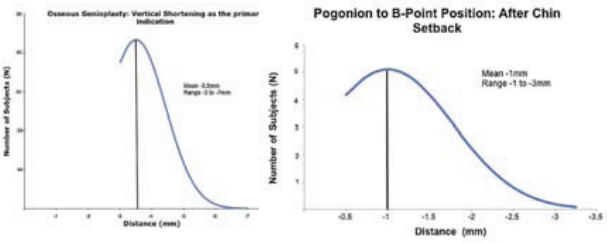


:: Summary of Cases	
Patient duration	2006. 7 ~ 2017. 2
Total number of patients (n)	394
Female (%) Male (%)	215 (54.29%) 179 (45.21%)
Mean age at operation (Range)	23.08 (15 ~ 71)
Number for genioplasty(%)	145(36.80%)

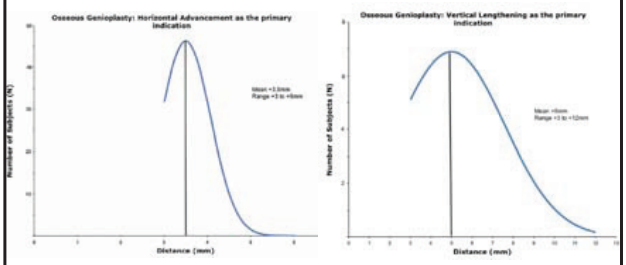
:: Osseous genioplasty	
Number of genioplasty	145
Number of horizontal advancement (n)	74 (51.03%)
Number of vertical Reduction (n)	82 (56.55%)
Horizontal advancement + Vertical reduction	23 (15.86%)







- Osseous genioplasty in conjunction with bimaxillary orthognathic surgery: a review of 262 consecutive cases J. C. Posnick, E. Choi, R. P. Chang Int. J. Oral Maxillofac. Surg. 2016; 45: 904–913



- Osseous genioplasty in conjunction with bimaxillary orthognathic surgery: a review of 262 consecutive cases J. C. Posnick, E. Choi, R. P. Chang Int. J. Oral Maxillofac. Surg. 2016; 45: 904–913

TABLE 1. Patients' Characteristics

	Value (%)
No. Patients	54
Age, yr	27.7 ± 3.9
Occlusion before orthognathic surgery	
Class I	12 (22.2)
Class II	2 (3.7)
Class III	40 (74.0)
History of facial bone surgery	
Two-jaw surgery	54 (100)
Advancement genioplasty	5 (9.2)

Secondary Genioplasties for the Treatment of Chin Deformities After Orthognathic Surgery in Asian Women Defining the Aesthetic Importance of Managing the Chin Shape in Orthognathic Surgery Sang Woo Lee, MD, PhD,* Seung Hyun Ahn, MD,* and Yujin Myung, MD† Annals of Plastic Surgery 2016;76: 301–305
Angloplasty Revision: Importance of Genioplasty for Narrowing of the Lower Face *Plast. Reconstr. Surg.* Sang Woo Lee, M.D., Ph.D. Seung Hyun Ahn, M.D. 132: 435, 2013.)

TABLE 2. Surgical Details of the Patients

		Amount of Correction (mm)	
Operative Method	No. Patients (%)*	Mean	Range
Genioplasty			
Narrowing	54 (100)	11.8	8–16
Advancement	14 (25.9)	2.3	2–3
Reduction	8 (14.8)	2.5	2–3
Lengthening	8 (14.8)	5.5	4–6
Contouring of mandibular lower border	54 (100)	N/A	

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Angloplasty Revision: Importance of Genioplasty for Narrowing of the Lower Face *Plast. Reconstr. Surg.* Sang Woo Lee, M.D., Ph.D. Seung Hyun Ahn, M.D. 132: 435, 2013.)

Table 1. Patient Demographics and Surgical Data

Characteristic	Value (%)
No. of patients	52
Mean ± SD age, yr	27.6 ± 3.5
History of facial bone surgery	
Angloplasty	52 (100)
Genioplasty	9 (17.3)
Orthognathic surgery	4 (8.0)
Genioplasty	
Narrowing only	29 (55.8)
Narrowing and lengthening	12 (23.1)
Narrowing and advancement	6 (11.5)
Narrowing and reduction	5 (9.6)
Contouring of mandibular lower border	52 (100)
Reduction malarplasty	11 (21.2)
Adjunctive laser-assisted liposuction	2 (3.8)

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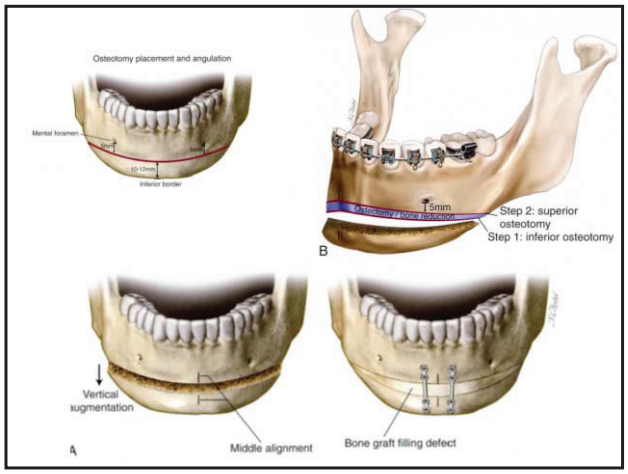
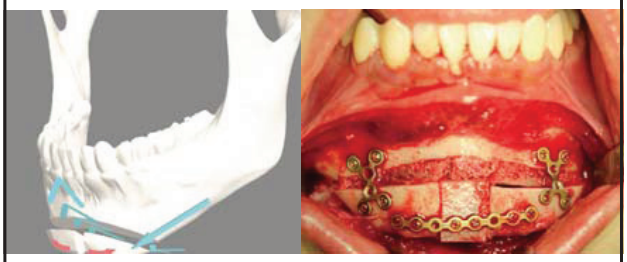
Augmentation of chin
1) Advancement
2) Vertical lengthening
3) Augmentation with graft material

alloplastic implant
: solid silicone(Silastic) , porous polyethylene(medpor) , mesh
polymers(Dacron, Mersilene, Supramid) ,
Polytetrafluoroethylene(Gore-tex) , hydroxyapatite

Stryker MEDPOR®
porous polyethylene implants

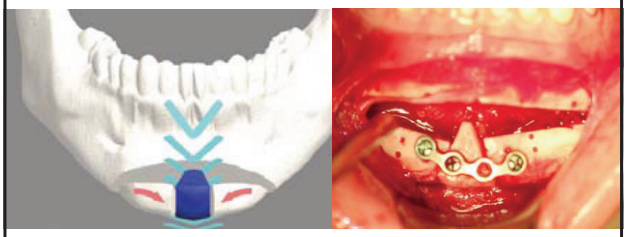


An iliac bone graft after T-shaped osteotomy



The Utility of a Three-Dimensional Approach with T-Shaped Osteotomy in Osseous Genioplasty Jung Jae Jegal, Seok Joo Kang, Jin Woo Kim, Hook Sun Arch Plast Surg 2013;40:433-439

An angle bone graft after T-shaped osteotomy.



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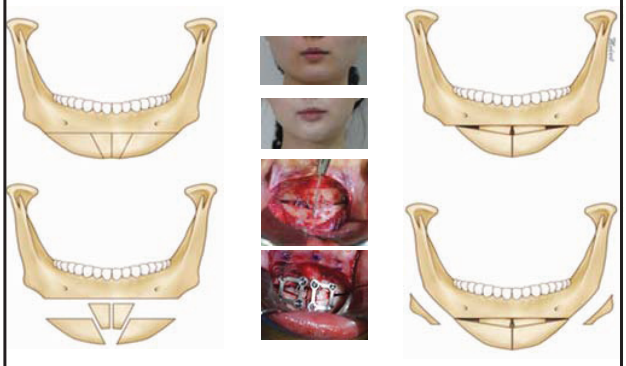
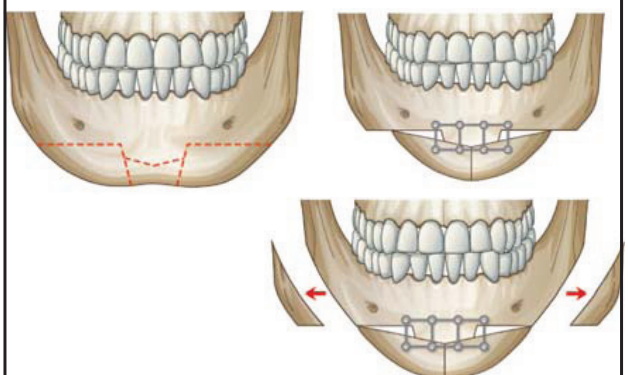


Narrowing and Lengthening Genioplasty with Pedicled Bone Graft in Contouring of the Short and Wide Lower Face Sangwoo Lee • Baek-kyu Kim • Rong-Min Baek •Jihyeon Han Aesth Plast Surg (2013) 37:139–143



Contouring of the Lower Face by a Novel Method of Narrowing and Lengthening GenioplastyTae Sung Lee, M.D. Hye Young Kim, M.D. Tak Ho Kim, M.D. Ji Hyuck Lee, M.D. Sanghoon Park, M.D., Ph.D. *Plast. Reconstr. Surg.* 133: 274e, 2014

연제 6

선수술후 불안정교합 매니지먼트

Management of unstable occlusion after surgery-first orthognathic surgery

SF 치과
황현식 대표원장

연세대학교 치과대학 졸업

연세대학교 치과병원 교정과 수련

◆ **경력사항**

미국 펜실베니아 치대 교정과 객원교수

미국 테네시치대 교정과 객원교수

전남대학교 치과대학 학장

대한선수술교정학회 명예회장

현, 미국 샌프란시스코 UOP치대 겸임교수

선수술후 불안정교합 매니지먼트

Management of unstable occlusion after surgery-first orthognathic surgery

Abstract

수술 먼저 하는 선수술! 빠른 외모 개선 및 치료기간 단축으로 환자들이 좋아하고, 수술 후 교정치료, 물 흐르듯 자연스럽게 되어 술자에게도 편한 치료입니다. 선수술교정치료를 경험한 선생님들은 한결같이 이야기합니다. 미래의 수술교정은 모두 선수술이 될 것이다라고. 그러나 일각에서는 아직도 선수술은 불안하다고 이야기 하고 있습니다. 할 수 있는 경우만 해야 한다고 하고 있습니다. 왜 그런가요?

의학 치의학의 모든 술식이 그러하듯이 진보에 진보를 거듭하고 있습니다. 특히 새로운 술식은 하루가 다르게 발전을 거듭하고 있으며 선수술도 마찬가지 입니다. 오늘날의 선수술은 이전의 선수술과 큰 차이를 보이고 있습니다.

1세대 선수술: 그냥 먼저 수술

2세대 선수술: 교정 시뮬레이션 후 수술

3세대 선수술: 구치부 교합고경 변화를 고려하여 수술교합 형성

4세대 선수술: 스플린트에 의한 불안정교합 매니지먼트

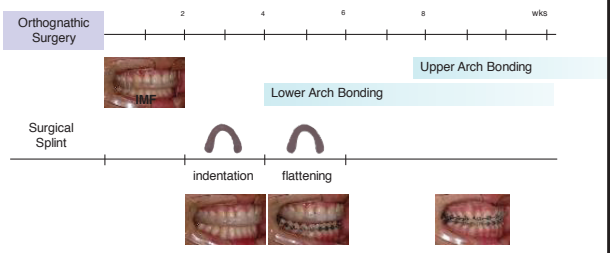
5세대 선수술: 3차원 영상분석에 의한 과두 및 골편 위치 매니지먼트

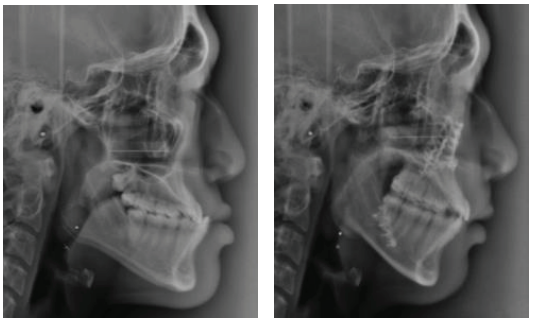
수술위치로 석고모형을 가이드하였을 때 교합이 비교적 안정적으로 보이면 수술 먼저 할 수 있습니다. 이는 누구나 할 수 있는, 그리고 먼 과거에도 그리 해왔던 선수술입니다. 이를 우리는 1세대 선수술이라 부르고 있습니다. 치아에 크라우딩 등이 있어 복잡한 교정치료가 필요한 경우 즉 교정치료를 시뮬레이션 하지 않고 정확한 상하악 수술위치를 정할 수 없는 경우 실제 술전교정 대신 교정시뮬레이션을 하고 악골의 수술위치를 결정할 수 있습니다. 이렇게 교정 시뮬레이션을 하고 선수술하는 경우 이를 2세대 선수술이라 하고 있습니다. 교정의사와의 협진이 필요하고 교정의사의 경험이나 능력에 의해 선수술 가능성이 결정될 수 있습니다. 술전 교정 하지 않고 수술을 할 경우, 구치부 interference에 의해 교합

고경이 증가하게 되고 이렇게 증가한 교합고경은 수술후 교정치료 기간 중 회복되고 이로 인해 하악골이 클로져되는 바 이러한 하악골의 클로져로 하악치아가 전상방으로 이동되는 것을 염두에 두고 수술교합을 형성할 때 우리는 이를 3세대 선수술이라 부르고 있습니다. 소위 compensatory setback으로 수술교합을 형성함으로 3급으로의 relapse를 원천적으로 차단할 수 있게 되었습니다. 과거에는 선수술후 불안정한 교합으로 하악골이 shifting 되는 것을 막기 위해 교합조정을 통해 수술후 교합이 안정적이게끔 한 후 수술을 하는 경우도 있었습니다. 그러나 과도한 치아 삭제로 인해 여러 가지 문제가 있어 이러한 불안정한 교합을 치아삭제 대신 스플린트 장착으로 대처하는 방법이 제시되었습니다. 상악이나 하악 어느 한 쪽에 CR splint를 장착함으로써 occlusal interference 로 인해 하악골이 shifting 되는 것을 막을 수 있게 되어 선수술의 외연이 크게 확장되었습니다. 특히 최근에는 별도로 새로운 스플린트를 제작하는 것이 아니라, IMF시 사용한 스플린트에 retention resin form을 형성하여 가철식으로 계속 끼게 함으로써 술자의 편의성 또한 크게 증진되었습니다. 나아가 바로 flat splint 로 조정하는 것이 아니라 스플린트에 있는 indentation을 어느 정도 유지하면서 스플린트를 장착할 경우 이로 인해 하악골의 orthognathic position이 유지되면서 수술로 인해 다소의 과두 변위가 있었다 하더라도 수술교합의 변화없이 다시 말해 원심골편의 변위 없이, 근심골편 및 과두가 제위치 될 수 있음이 증명되어 많은 외과의사들을 고무시키기도 하였습니다. 이전에는 선수술후 CR splint 로 바로 바꿈으로 인해 수술로 과두가 일정양 이상 변위된 경우 과두 및 근심골편이 제위치 되면서 원심골편 즉 수술교합의 변화가 불가피하게 나타난 반면, 새로운 술식에서는 스플린트 매니지먼트를 통해 과두 및 근심골편의 제위치는 허용하면서 원심골편 및 수술교합의 유지가 가능하게 되었습니다. 이러한 선수술 프로토콜을 5세대 선수술이라고 부르고 있습니다.

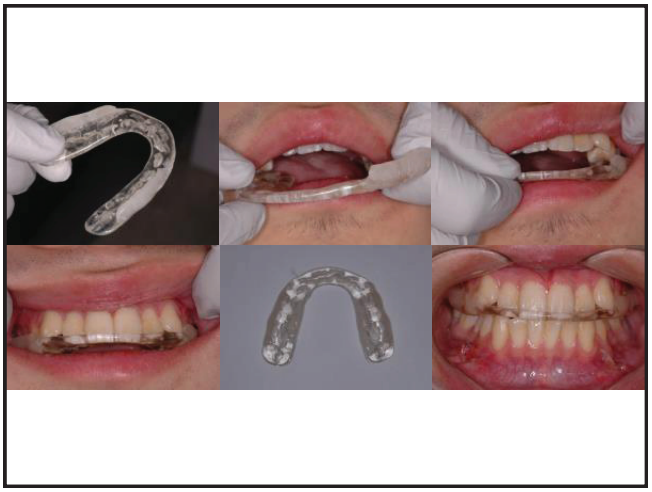
이러한 스플린트 계속장착으로 수술후 불안정 교합을 대처할 수 있을 뿐 아니라 수술시 있을 수 있는 과두 변위까지 매니지할 수 있게 되어, 그야말로 선수술은 종래의 술전교정시 보다 더욱 안정적인 술식으로 자리매김하게 되었습니다. 본 강의는 보다 많은 환자들이 선수술의 혜택을 받을 수 있도록 선수술교정의 최신 개념 특히 수술후 불안정교합 매니지먼트를 전형적인 증례와 함께 소개 하고자 합니다.

How can we manage the unstable occlusion ?

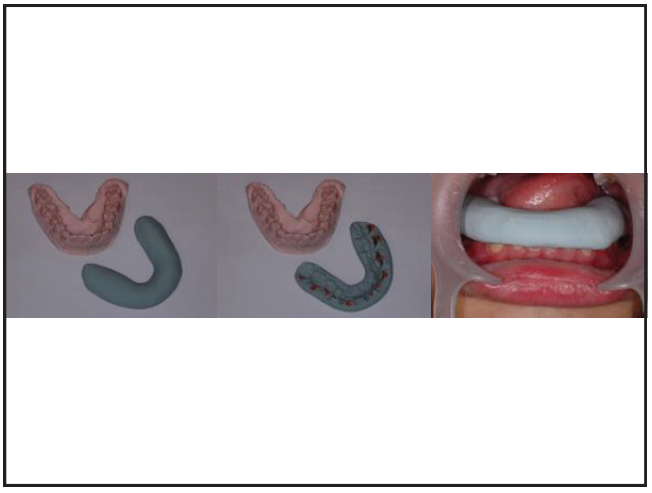


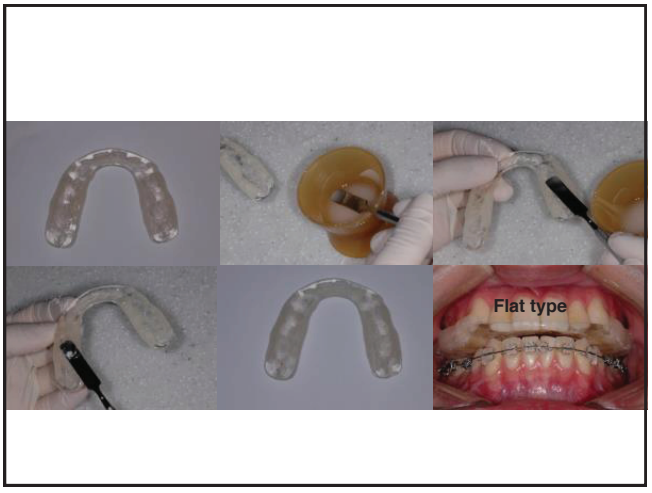


2w

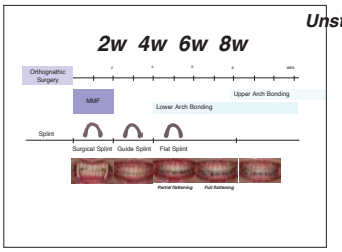



4w




Flat type

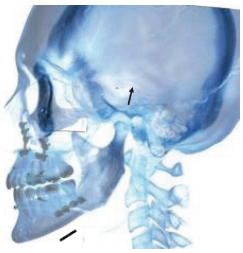
8 w

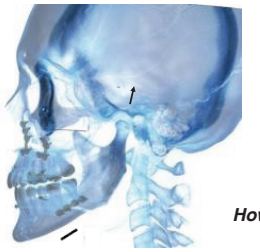


Unstable occlusion

Can be managed by continuous use of the splint !

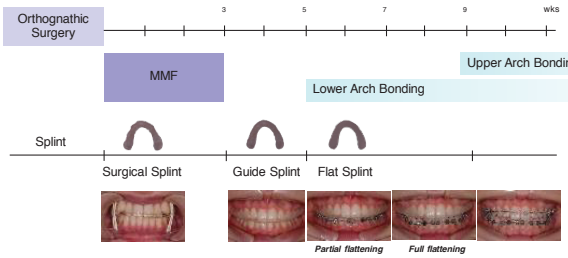
If the condyle is displaced…



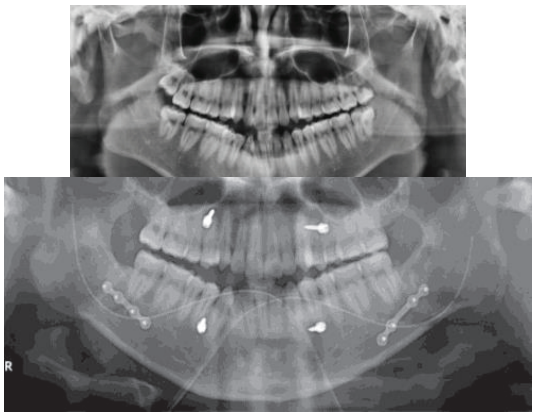


How do we maintain surgical occlusion ?

. Do semi-rigid fixation, rather than rigid !
. Do Inter-maxillary fixation well !



. Extend IMF period!
. Do partial flattening before full flattening!
. Have the patient wear the splint well!



CBCT-generated Ceph (CG Ceph) !

술후 3w

술직후

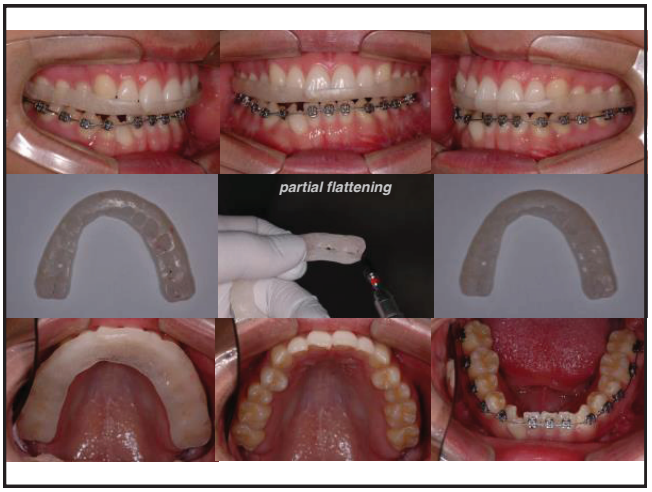
술후 3w

술후 3w

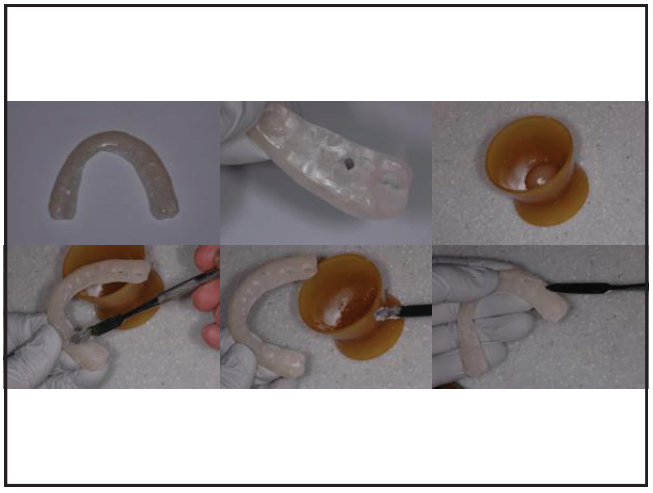
술후 5w

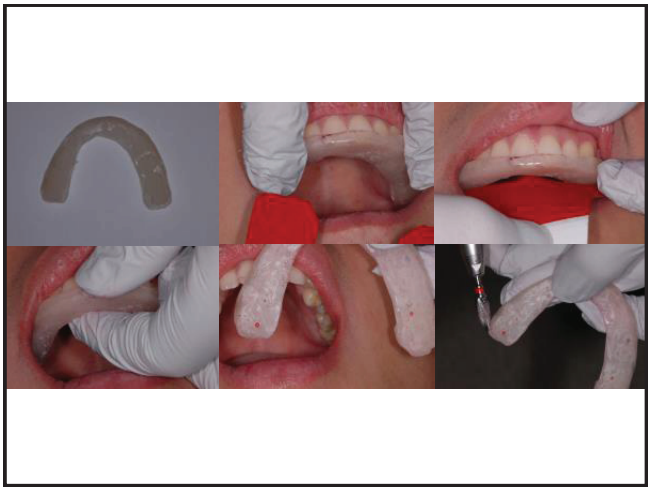
perfect repositioning !

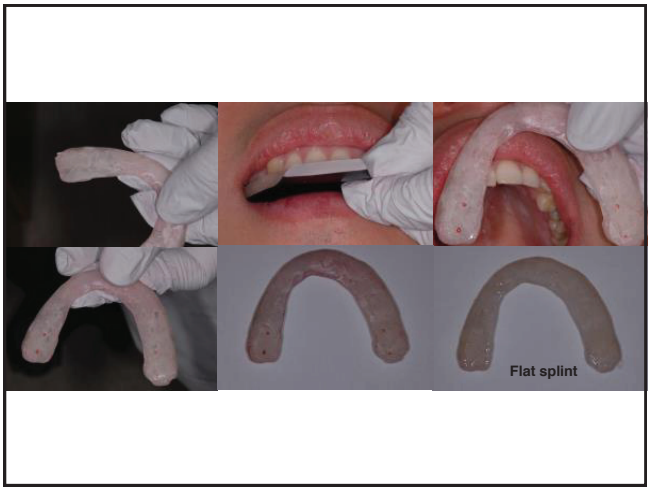

술후 5w


partial flattening


7w
016x022 copper NiTi
Standard edgewise bracket
full flattening

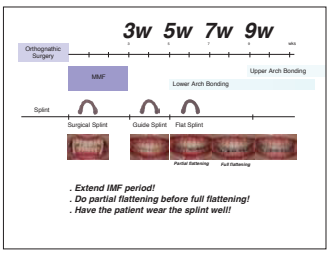





Flat splint

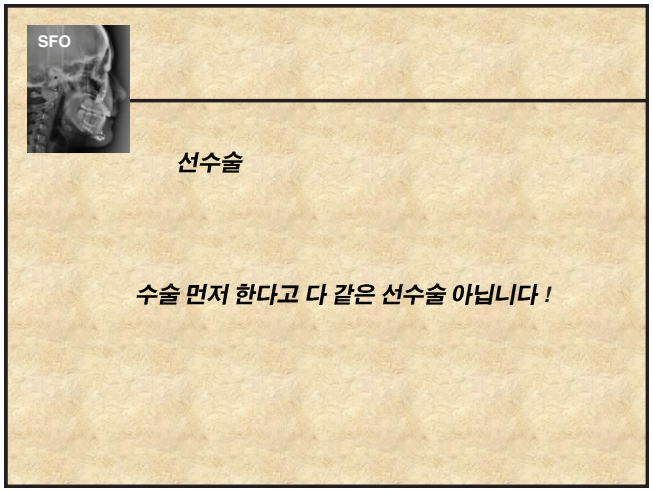
7 to 7 bonding

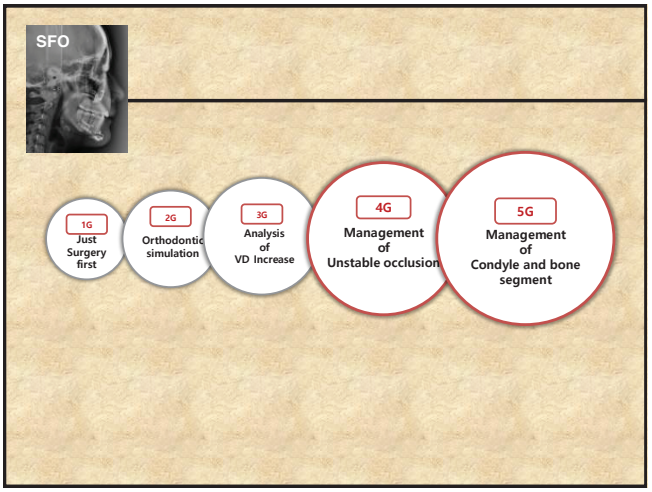
3-5-7-9 protocol !

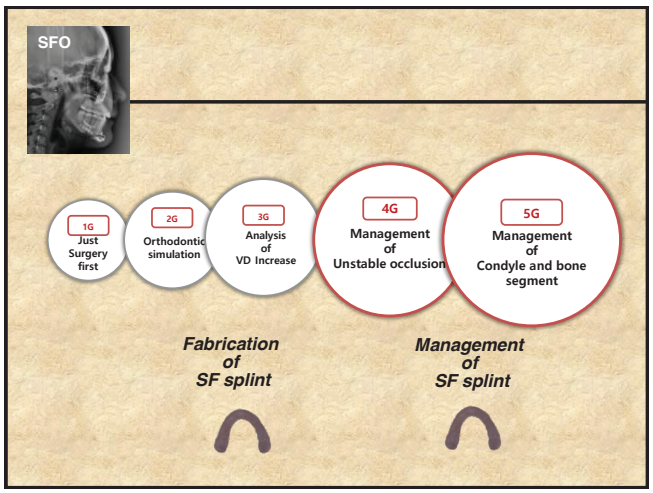


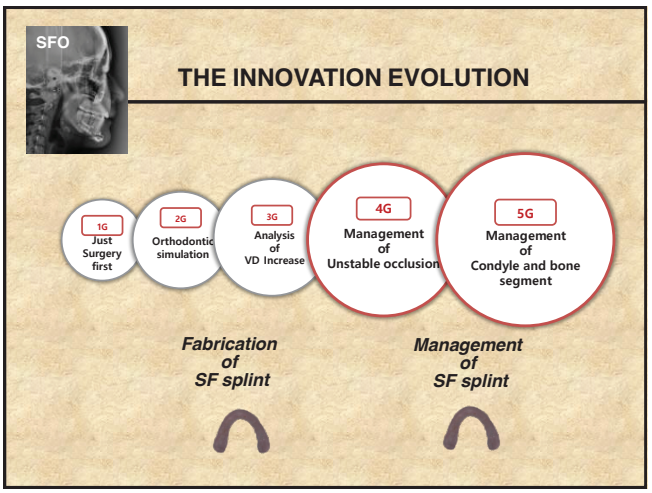
Condylar displacement

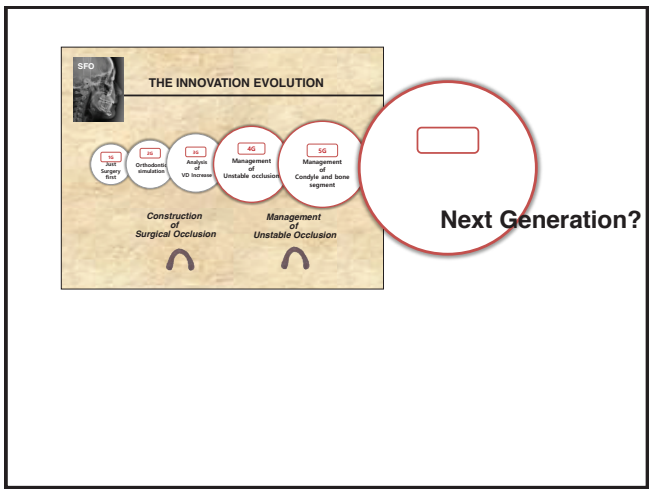
Also can be managed by continuous use of the splint !


SFO
선수술
수술 먼저 한다고 다 같은 선수술 아닙니다 !


SFO
1G Just Surgery first
2G Orthodontic simulation
3G Analysis of VD Increase
4G Management of Unstable occlusion
5G Management of Condyle and bone segment


SFO
1G Just Surgery first
2G Orthodontic simulation
3G Analysis of VD Increase
4G Management of Unstable occlusion
5G Management of Condyle and bone segment
Fabrication of SF splint
Management of SF splint

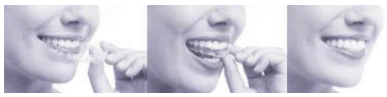

SFO
THE INNOVATION EVOLUTION
1G Just Surgery first
2G Orthodontic simulation
3G Analysis of VD Increase
4G Management of Unstable occlusion
5G Management of Condyle and bone segment
Fabrication of SF splint
Management of SF splint

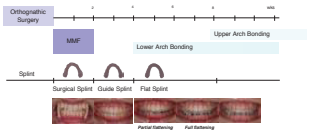

SFO
THE INNOVATION EVOLUTION
Construction of Surgical Occlusion
Management of Unstable Occlusion
Next Generation?


Surgery-First Orthodontics as a Way of Accelerating Tooth Movement
How Can We Manage Unstable Occlusion in Surgery-First Patients ?
Hyeon-Shik Hwang, DDS,MSD,PhD
Chonnam National University School of Dentistry
Korean Adult Orthodontic Research Institute
Gwangju and Seoul, Korea
InterContinental Hotel
Align Technology

. No need of molar banding !
. Acceleration of tooth movement via RAP !

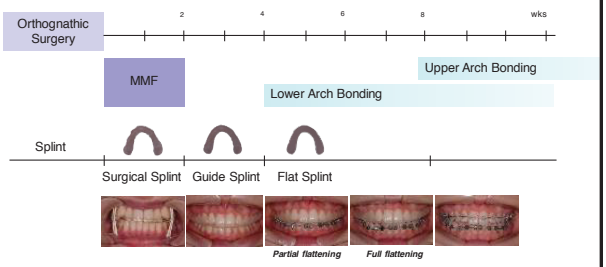
인비절라인 수술 환자는 선수술 !

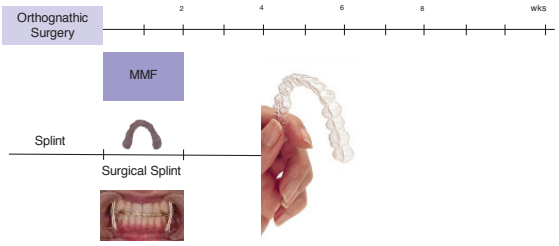


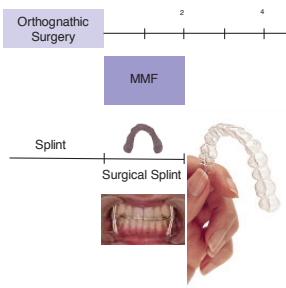


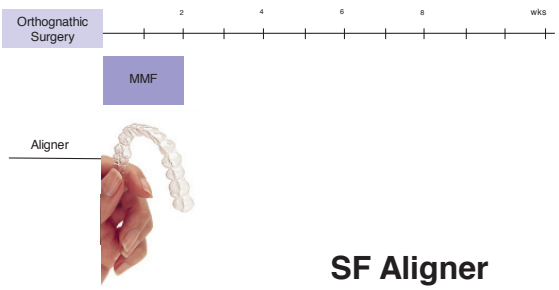
. Earlier tooth movement !
. While maintaining orthognathic position of mandible

선수술 환자는 인비절라인으로 !









SF Aligner

MEMO

MEMO

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大韓顎顔面成形再建外科學會
The Korean Association of MaxillofacialPlastic and Reconstructive Surgeons

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