2016년도

대한악안면성형재건외과학회

춘계학술워크숍

Main thema : 비대칭 턱 얼굴개선의 Total Solution

일 시 : 2016년 5월 28일(토) 오후 1시 30분 - 5시 20분

장 소 : 고려대학교 구로병원 의생명연구센터 1층 대강당

대 한 악 안 면 성 형 재 건 외 과 학 회

THE KOREAN ASSOCIATION OF MAXILLOFACIAL PLASTIC AND RECONSTRUCTIVE SURGEONS

초대의 글

계절의 여왕 아름다운 5월에 고려대 구로병원에서 2016년 춘계학술워크숍을 개최하여 회원 여러분들을 만나게 되어 매우 기쁩니다.

최근들어 턱 얼굴 성형재건외과 분야가 괄목할만한 발전을 하고 있음에 따라 새로운 치료법과 정보들이 계속적으로 소개되고 있습니다. 이에, 턱 얼굴 성형치료에 대한 환자들의 요구와 기대도 증가하고 있는 추세입니다.

이런 변화에 능동적으로 대처하기 위해서는 우리 악안면성형재건외과 분야에 종사하고 있는 의료인들도 계속적인 교육을 통한 지식습득이 필요합니다.

금년 춘계학술워크숍은 "비대칭 턱 얼굴개선의 Total Solution"의 주제로 준비하였습니다. 임상에서 어려움을 겪고 있는 안모 비대칭 환자에 대한 체계적인 치료를 위해 술전 진단부터 수술 방법까지 이르기 까지 이에 대한 많은 임상 경험과 전문적인 노하우를 가진 연자분들을 모시고 심도있는 강의와 토론이 이루어 질 수 있도록 구성하였습니다.

본 워크숍에서는 악안면성형재건외과 의사들 이외에도 교정과, 이비인후과 전문의들을 초청하여 안면 비대칭 유형에 따른 STO 및 수술 전 교정치료, 비대칭 환자 3D simulation 이용한 수술치료, 비대칭 환자의 턱교정수술시 고려사항, 부가적으로 필요한 안모 심미수술, 비중격 만곡증의 외과적 교정술 등에 관하여 심도있는 연구결과와 임상경험 등을 논의하고자 합니다. 부디 많은 회원님들이 참석하시어 활발한 토론과 경험을 나누는 귀한 자리가 되기를 기대합니다.

마지막으로 춘계학술워크숍을 준비해주신 김선종 학술이사와 여러 임원님들을 비롯하여 현장에서 수고해 주시는 고려대학교 구로병원 구강악안면외과 의국원께도 깊은 감사를 드립니다.

2016년 5월 28일

대한악안면성형재건외과학회장 **오 희 균**

■목차 및 일정표■

- 학술행사 진행: 김 선종 학술이사
이 부규 총무이사

13:30-14:00	Registration and Opening Remark	오 희 균 회장
Session Ⅰ		**좌장 박영욱 교수**
14:00-14:40	안면 비대칭 유형에 따른 STO 및 수술 전 교정치료	경희대 치과병원 김수정 교수
14:40-15:20	비대칭환자 3D simulation 이용한 수술치료	서울아산병원 이지호 교수
15:20-15:40	Coffee Break	
Session Ⅱ		**좌장 이재훈 교수**
15:40–16:20	비대칭 환자의 턱교정수술시 고려사항	에버엠치과 윤규식 원장
16:20-17:00	Surgical correction of a deviated nasal septum	이화여대 목동병원 배정호 교수
17:00-17:20	Comprehensive Discussion	Audience and Co-chair
17:20	Closing Remark	오 희 균 회장

연제 1　　　　　　　　　　　　　　　　　　　좌장: 박영욱 교수

경희대학교 치과대학 교정학교실 김수정 교수

안면 비대칭 유형에 따른 STO 및 수술 전 교정치료

경희대학교 치과병원 교정과 부교수
미국 UCLA 대학교 치과대학 객원 교수 역임
세계치과교정학회 정회원
미국치과교정학회 정회원

안면 비대칭 유형에 따른 STO 및 수술 전 교정치료

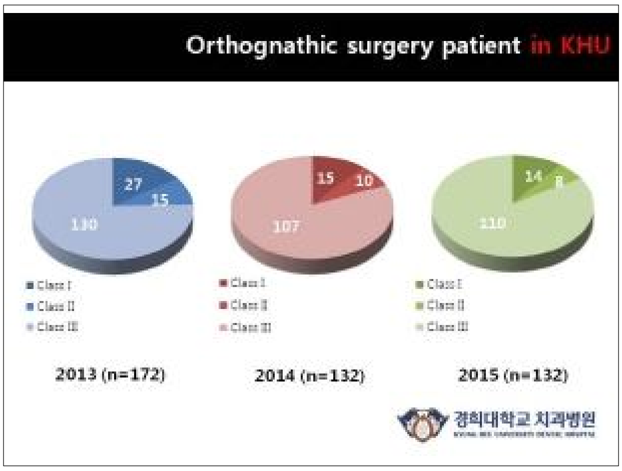
경희대학교 치과대학

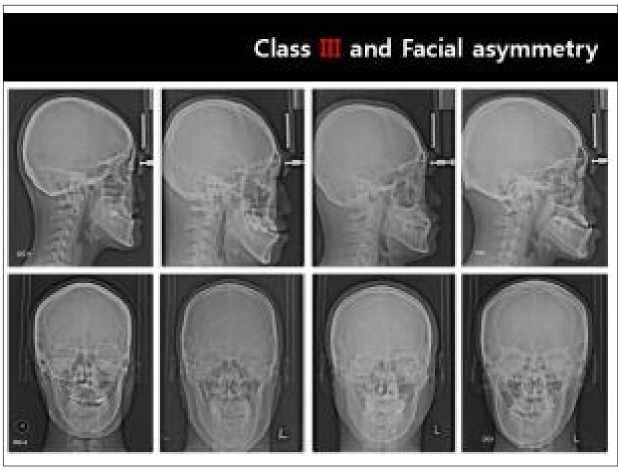
교정학교실 김수정 교수

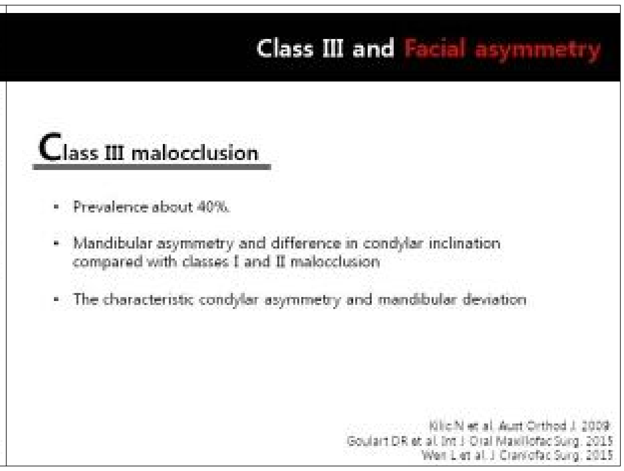
안면 비대칭 환자의 성공적인 악교정 수술 치료를 위해 최근 3차원 영상을 이용한 정밀한 수술 계획 및 wafer 제작이 시도되고 있음에도 불구하고 치료 후 비대칭이 잔존하는 경우가 여전히 존재한다. 그 대표적인 두 가지 이유로, 환자의 안면 비대칭 유형에 따라 실제 수술 방에서 시뮬레이션에서와 동일한 골격 이동을 재현하기 어려운 해부학적 한계가 존재할 수 있으며, 비대칭 유형에 맞지 않는 수술 전 교정 치료로 인해 수술 시 골격 이동을 계획대로 달성하지 못하는 경우를 들 수 있다.

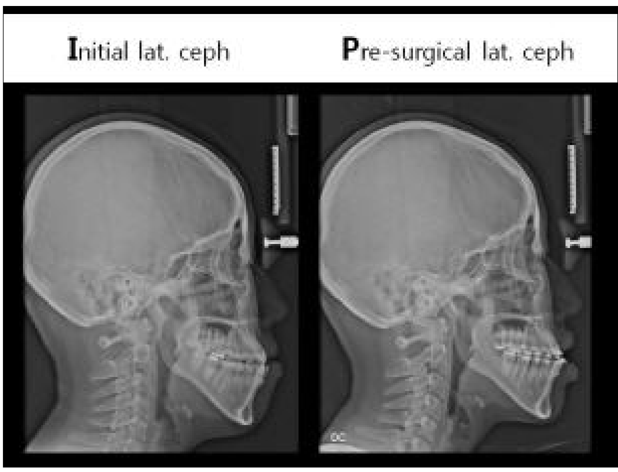
경희의료원 구강악안면외과 및 교정과에 안면 비대칭을 주소로 내원한 환자의 비대칭 골격 유형을 3차원적으로 분석해 본 결과 크게 4가지 타입으로 분류가 가능하였고, 각 유형에 따라 수술 전 교정적 치아 이동의 목표 (STO)가 달라져야 함을 확인하였다. 수술 시 골격 이동이 충분하지 못했던 환자들의 원인 분석을 통해 수술 전 decompensation의 충분한 양뿐만 아니라 정확한 3차원적 방향 설정이 중요함을 알 수 있었다. 여기에는 또한 비대칭 유형 별 해부학적 한계 요인까지 예상하여 반영되어야 할 것이다. 최첨단 기술의 도입으로도 고도의 수술 실력으로도 만회될 수 없는 기본적인 오류를 최소화 하는 것이 중요한 만큼, 이번 고찰은 수술 성공률 향상 뿐 아니라 선수술 결정 기준으로서도 역할을 할 것으로 기대된다.

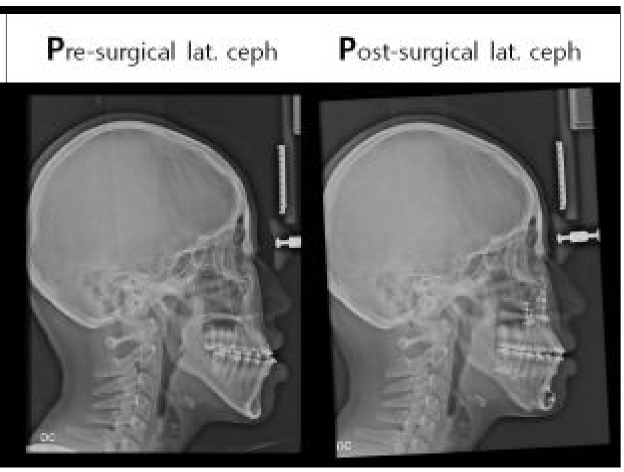
이에 본 강연에서는 안면 비대칭의 4가지 유형에 따른 수술 계획 수립 및 수술 전 교정치료 목표 설정의 방법을 카테고리화 함으로써 구강악악면외과의와 교정의 간의 협진에 구체적으로 활용될 수 있는 대화의 기준을 제시해 보고자 한다.


Orthognathic surgery patient in KHU
27
15
130
15
10
107
14
8
110
Class I
Class II
Class III
2013 (n=172)
2014 (n=132)
2015 (n=132)
경희대학교 치과병원

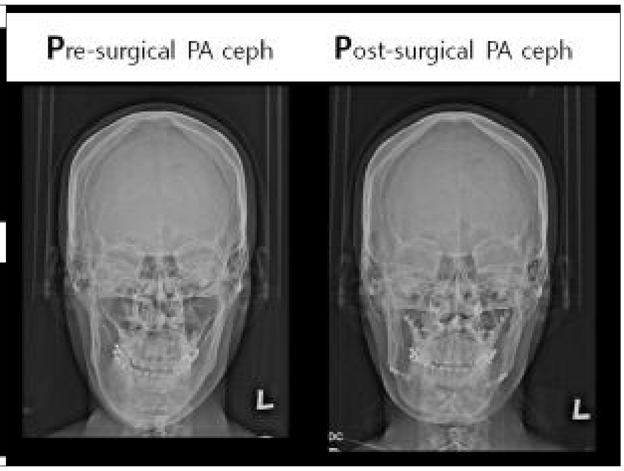

Class III and Facial asymmetry

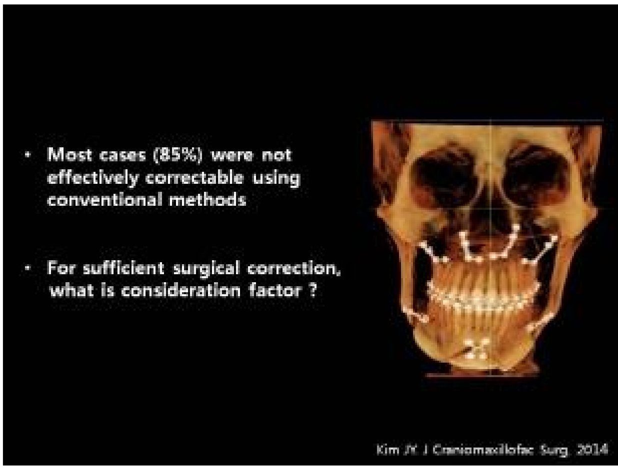

Class III and Facial asymmetry
Class III malocclusion
• Prevalence about 40%.
• Mandibular asymmetry and difference in condylar inclination compared with classes I and II malocclusion
• The characteristic condylar asymmetry and mandibular deviation
Kilic N et al. Aust Orthod J. 2009
Goulart DR et al. Int J Oral Maxillofac Surg. 2015
Wen L et al. J Craniofac Surg. 2015

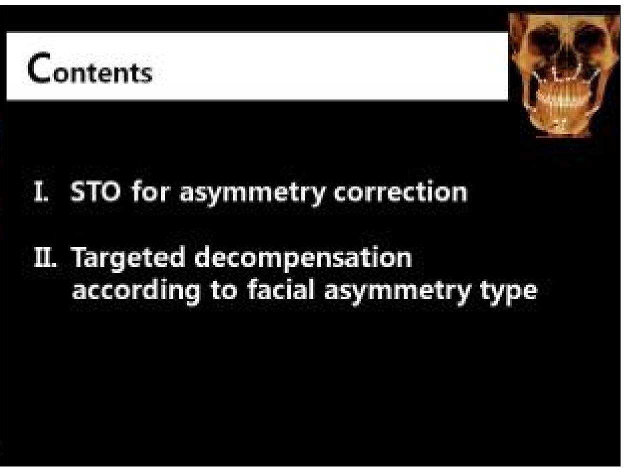

Initial lat. ceph
Pre-surgical lat. ceph

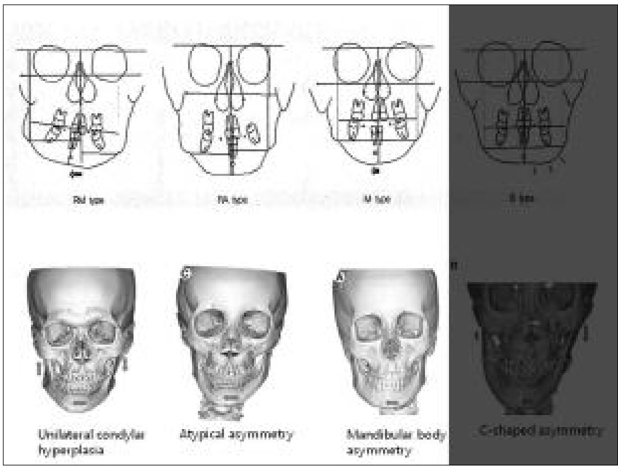

Pre-surgical lat. ceph
Post-surgical lat. ceph

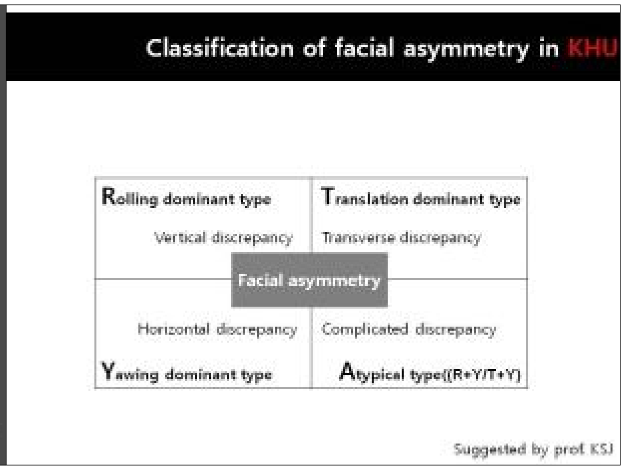

Pre-surgical
Post-surgical

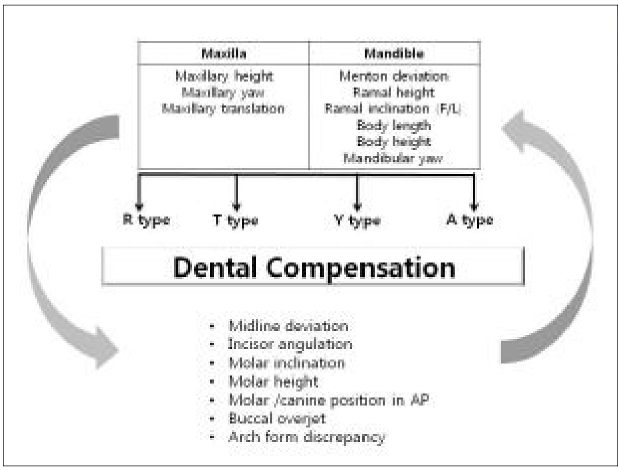

Pre-surgical PA ceph
Post-surgical PA ceph
L
L


Most cases (85%) were not effectively correctable using conventional methods
For sufficient surgical correction, what is consideration factor ?
Kim JY. J Craniomaxillofac Surg. 2014

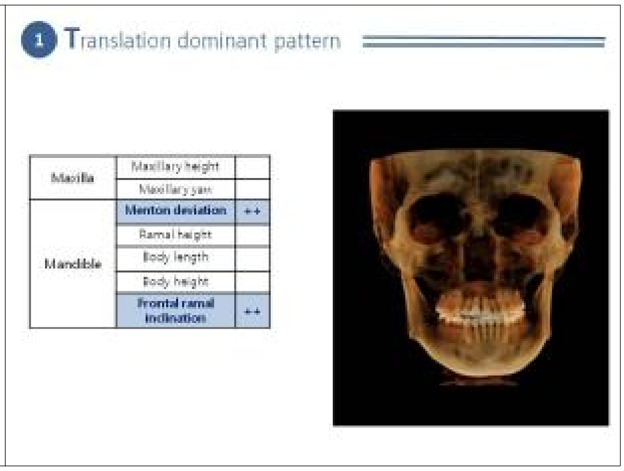

Contents
I. STO for asymmetry correction
II. Targeted decompensation according to facial asymmetry type


Unilateral condylar hyperplasia
Atypical asymmetry
Mandibular body asymmetry
C-shaped asymmetry

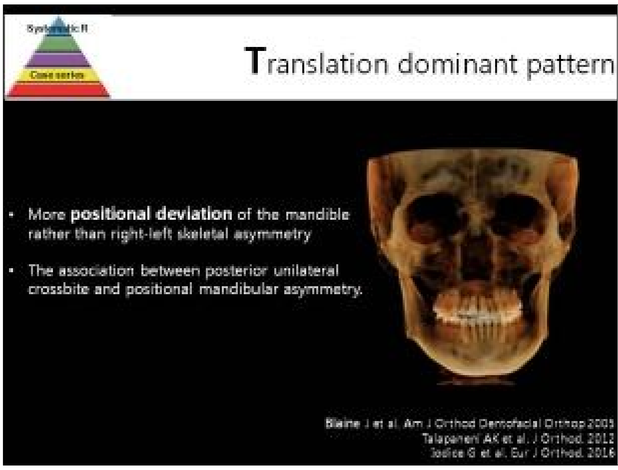

Classification of facial asymmetry in KHU
Rolling dominant type
Vertical discrepancy
Translation dominant type
Transverse discrepancy
Facial asymmetry
Horizontal discrepancy
Yawing dominant type
Complicated discrepancy
Atypical type((R+Y/T+Y)
Suggested by prof. KSJ



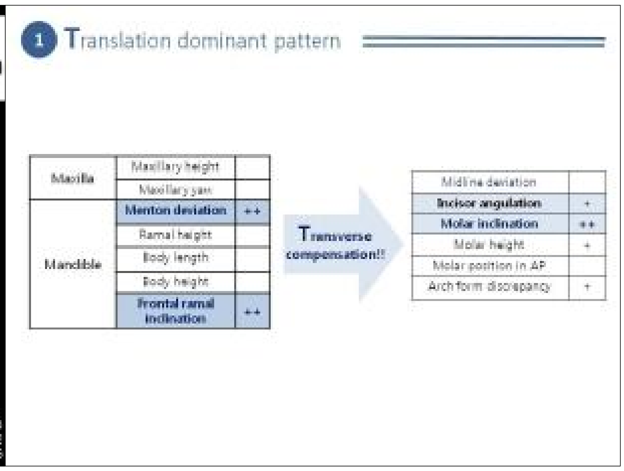
Maxilla
Maxillary height
Maxillary yaw
Maxillary translation
Mandible
Menton deviation
Ramal height
Ramal inclination (F/L)
Body length
Body height
Mandibular yaw
R type
T type
Y type
A type
Dental Compensation
• Midline deviation
• Incisor angulation
• Molar inclination
• Molar height
• Molar /canine position in AP
• Buccal overjet
• Arch form discrepancy



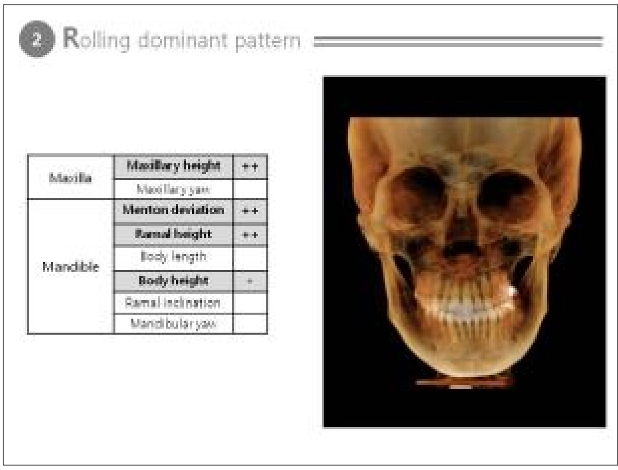
1 Translation dominant pattern
Maxilla
Maxillary height
Maxillary yaw
Mandible
Menton deviation ++
Ramal height
Body length
Body height
Frontal ramal inclination ++



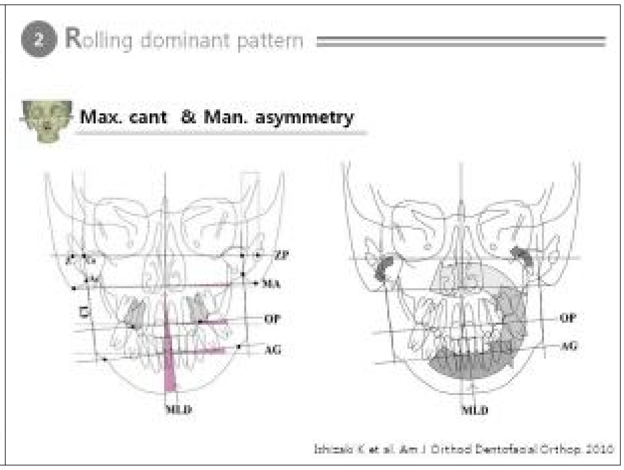
Translation dominant pattern
• More positional deviation of the mandible rather than right-left skeletal asymmetry
• The association between posterior unilateral crossbite and positional mandibular asymmetry.
Blaine J et al. Am J Orthod Dentofacial Orthop 2005
Talapaneni AK et al. J Orthod. 2012
Iodice G et al. Eur J Orthod. 2016



1 Translation dominant pattern
Maxilla
Maxillary height
Maxillary yaw
Mandible
Menton deviation ++
Ramal height
Body length
Body height
Frontal ramal inclination ++
Transverse compensation!!
Midline deviation
Incisor angulation +
Molar inclination ++
Molar height +
Molar position in AP
Arch form discrepancy +



2 Rolling dominant pattern
Maxilla
Maxillary height ++
Maxillary yaw
Mandible
Menton deviation ++
Ramal height ++
Body length
Body height +
Ramal inclination
Mandibular yaw



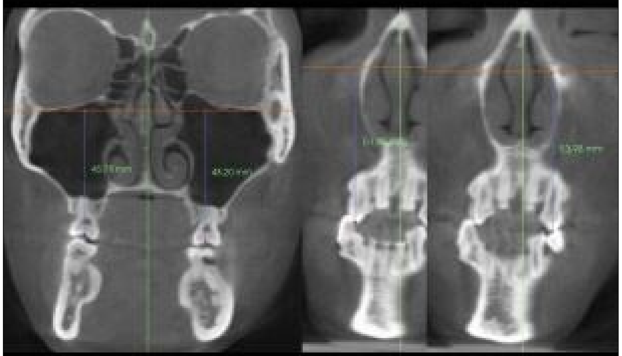
2 Rolling dominant pattern
Max. cant & Man. asymmetry
ZP
MA
OP
AG
MLD
OP
AG
MLD
Ishizaki K et al. Am J Orthod Dentofacial Orthop 2010

Maxillary cant : skeletal cant or dental cant

- **Maxillary transverse occlusal plane & maxillary base line (J-J plane)**

Intercanine TOP　　Interpremolar TOP　　Intermolar TOP

Maxillary height



#6 Rt. 2.5mm high　　#3 Rt. 3.0mm high

Ramal height

Mandibular body height

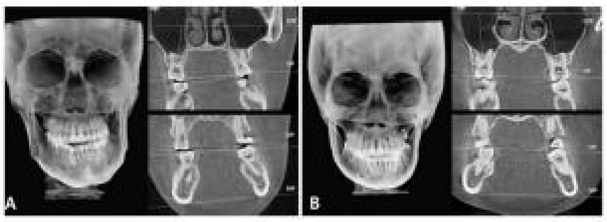
② Rolling dominant pattern

Maxilla	**Maxillary height**	++
	Maxillary yaw	
Mandible	**Menton deviation**	++
	Ramal height	++
	Body length	
	Body height	-
	Ramal inclination	
	Mandibular yaw	

Vertical compensation!! →

Midline deviation	
Incisor angulation	++
Molar inclination	+
Molar height	++
Molar position in AP	
Arch form discrepancy	

Dental compensation study in KHU

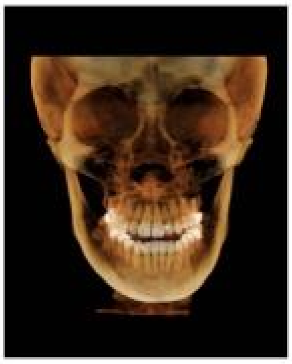


R- type　　**T- type**

Ahn HW et al. Angle Orthod. 2015

3 Yawing dominant pattern

Maxilla	Maxillary height	
	Maxillary yaw	++
Mandible	Menton deviation	++
	Ramal height	
	Body length	+
	Body height	
	Ramal inclination	
	Mandibular yaw	++

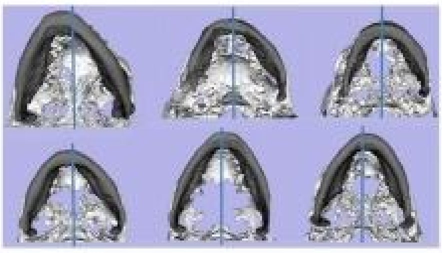


3 Yawing dominant pattern

Maxilla	Maxillary height	
	Maxillary yaw	++
Mandible	Menton deviation	++
	Ramal height	
	Body length	+
	Body height	
	Ramal inclination	
	Mandibular yaw	++

Case series

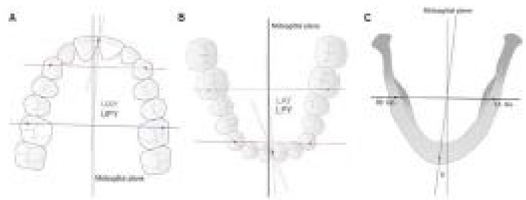
Mandibular yaw



Cevidanes LH et al, Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011

Yaw

Anterior yaw or Posterior yaw



Kang KH et al. Korean J Orthod 201

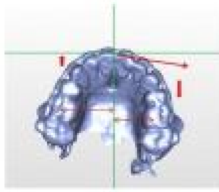
3 Yawing dominant pattern

Maxilla	Maxillary height	
	Maxillary yaw	++
Mandible	Menton deviation	++
	Ramal height	
	Body length	+
	Body height	
	Ramal inclination	
	Mandibular yaw	++

Horizontal compensation!!

Midline deviation	++
Incisor angulation	
Molar inclination	
Molar height	
Molar position in AP	+/-
Arch form discrepancy	++

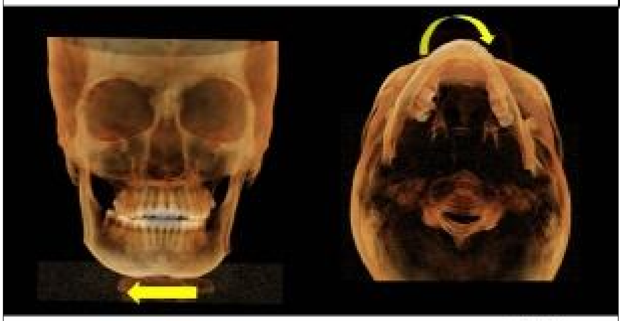
Horizontal compensation



- Maxillary midline deviation.
- Differences in the AP distances of Mx3, Mx6
- Arch width

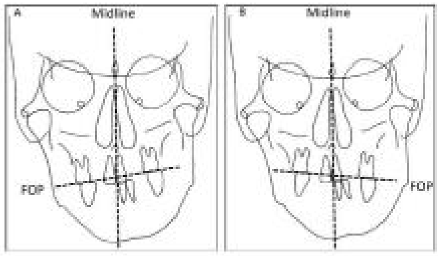
Song WW et al. J Oral Maxillofac Surg 2013

4 Atypical pattern



T+ Y type

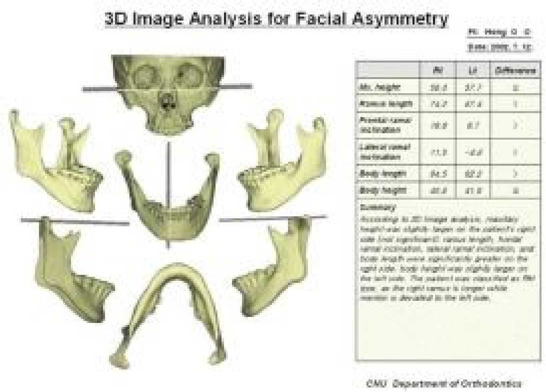
Comparison in Dental compensation pattern



R-type

Reverse canting

Uesugi S et al. Am J Orthod Dentofacial Orthop 2016



Gateno J et al. J Oral Maxillofac Surg 2011

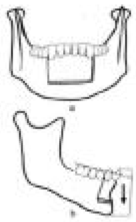
Facial asymmetry analysis in KHU

			Rt		Lt
Maxilla	Dental Midline				
	Maxillary height	J-J plane			
		canine			
		Molar			
	yaw				
Mandible	Menton deviation				
	Dental Midline				
	Ramal height				
	Body length				
	Body height	canine			
		molar			
	Ramal inclination				
	yaw				

→ **R / T / Y / A**
Type

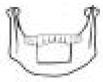
Speedy anterior segmental osteotomy(SASO)

Treatment objectives of pre-surgical orthodontics



Direction	Problem List	Treatment planning
Vertical	Deep overbite	Parallel intrusion
Transverse	Discrepancy between mandibular dental midline and menton	Coincidence of ant. dental arch with basal arch
A-P	Labioversion	Retraction (controlled tipping)

3 Dimensional Ant. Decompensation by **SASO**



Anterior Decompensation Using Segmental Osteotomy for Patients With Mandibular Asymmetry

3 Dimensional Ant. Decompensation

- Leveling the occlusal plane
- Changing the AP position of the teeth
- Coincidence the dentition with basal arch
- Changing the axial angulation of the teeth

➕

- Anatomical limitation

Kim SJ et al. J Oral Maxillofac Surg. 2015

연제 2 좌장: 박영욱 교수

서울아산병원 구강악안면외과 이지호 교수

비대칭환자 3D simulation 이용한 수술치료

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비대칭환자 3D simulation 이용한 수술치료

서울아산병원 구강악안면외과
이지호 교수

최근 3차원 영상정보 처리 기술과 3D printer의 대중화로 악안면성형재건 영역에서 3D 기술을 활용하는 것에 대한 관심과 수요가 빠르게 증가하고 있다. 특히 악안면 영역에서 가장 대표적인 과제중 하나인 안면비대칭은 정확한 진단과 치료 계획 수립이 매우 중요하다. 기존의 방법은 대부분 이차원적인 영상에서 이루어지고 그에 따라 수술이 구현되었다. 그러나, 3D simulation 기술이 효율적으로 진단과 수술에서 응용될 수 있다면 안면비대칭 환자의 치료에 있어서 훨씬 수월한 수술과 치료 효과를 기대할 수 있을 것으로 사료된다. 본 강의에서는 안면비대칭에서 있어서 3D simulation을 안면 비대칭의 진단에 응용할 수 있는 접점들을 고찰해 보고 이러한 진단을 기반으로 실제 수술에서 구현할 수 있는 가능성에 대하여 알아보고자 한다.

The Application of Three Dimensional Simulation for Surgical Treatment of Facial asymmetry

Jee-Ho LEE, DDS, MSD, PhD
Clinical Assistant Professor,
Department of Oral and Maxillofacial Surgery,
Seoul ASAN MEDICAL CENTER

3D diagnosis and analysis

3D planning

3D materialization

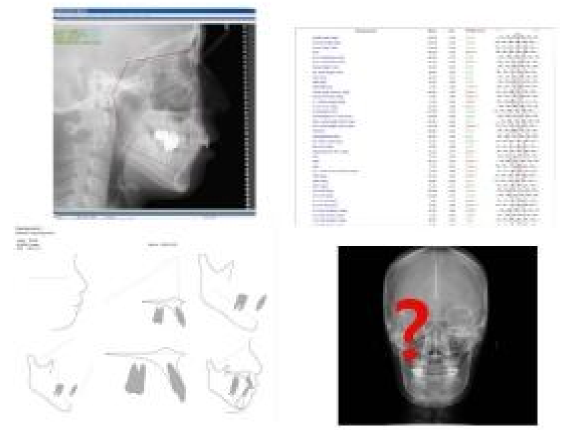
3D diagnosis and analysis

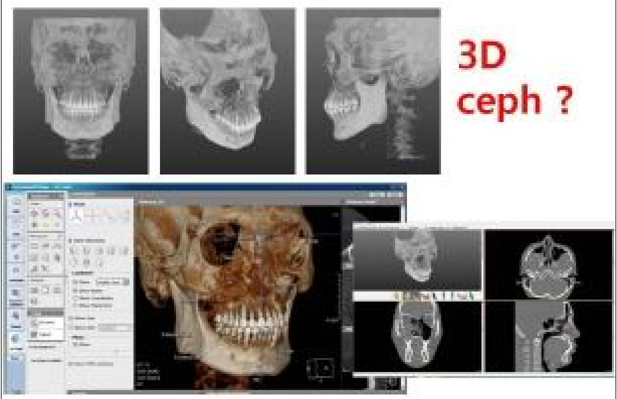
Pre operative analysis

important factor for evaluation of surgical treatment
treatment result and prospective treatment strategy

2D cephalometric analysis

commonly used for the comparison of case analysis
constructed of standard points and planes
limited view points for 3D materialization

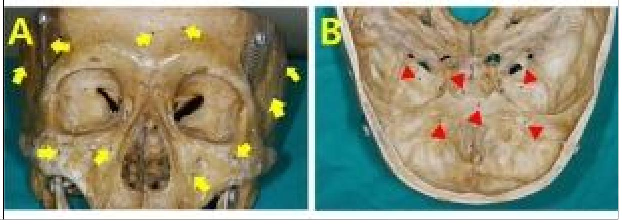




3D ceph ?

In vitro test for image fusion accuracy

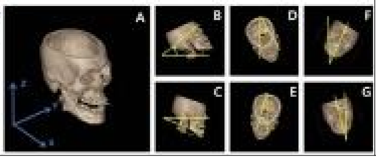
- dry cadaver skull and mandible
- titanium markers for accuracy and robustness
- random attachment : 16 markers
  - midface, temporal surface (10), cranial fossae (6)



In vitro test for image fusion accuracy

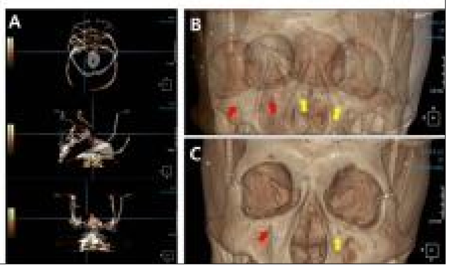
- Simulation of patient's state in CT taking
  - head positions , mandibular occlusions
- Spring wire fixation between skull and mandible
  - for mandible simulation
- Setting different mandibular occlusions
  - CO (centric occlusion)/ open mouth (20mm)/
  - lateral excursion (5mm)/ protrusion (5mm)
- Setting different head position – 7 types
  - standard, 6 options of experiments

B. Upper rotation (30°)	D. Left lateral rotation (30°)	F. Left tilting (30°)
C. Lower rotation (20°)	E. Right lateral rotation (20°)	G. Right tilting (20°)



In vitro test for image fusion accuracy

- Standard setting (1) : centric occlusion + standard head position
- Experimental setting (24) : four mandibular occlusions + six head positions
- 3D CBCT taking : KaVo CT 3D eXam (KaVo Co, Biberach, Germany) voxel size 0.2mm
- Image fusion processing : experimental image superimposed on standard
  - 3D simulation surgery program (OnDemand3D; Cyber Med Co., Seoul, Korea)



In vitro test for image fusion accuracy

Euclidean distance = D

$$D(p,p') = \sqrt{(x-x')^2 + (y-y')^2 + (z-z')^2}$$

p = (x,y,z): 3D coordinate of titanium marker in standard image

p' = (x',y',z') 3D coordinate of titanium marker in experimental image

Distances (errors) of 16 titanium markers in each superimpositions

1. pointing errors on 3D images
2. mean errors and significance differences in a patient's changes

Student t – test; Two-way ANOVA with repeat (normality, homoscedasticity)

Marking error on 3D images

two examiners performed marking on 3D images (28 random titanium markers on the skull) twice over 2 weeks

distances between two points over 2 weeks (one sample t-test)

comparison of two examiners errors (paired t-test)

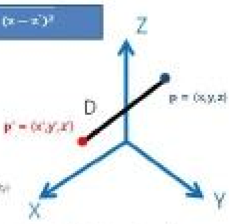


Image fusion robustness

- **In vitro test**
  - standard setting (1) and experimental setting (24)
  - image fusion processing : experimental image superimposed on standard
  - NMI value : Two-way ANOVA with repeat (normality, homoscedasticity)
  - KaVo CT 3D eXam (KaVo Co, Biberach, Germany)
- **Actual human images**
  - 41 patients' pre and post CT images, SNUDH IRB No. CRI09004: Informed consent
  - NMI value : independent t – test (normality, homoscedasticity)
  - Multislice CT (SOMATOM Sensation 10, Siemens CO., Munich, Germany)

	Mean age	*Sex (M/F)*	*surgery*	*Mean time interval (days)*
Major change (18)	22.6 ± 3.8	11/7	Orthognathic surgery (Le Fort I, BSSRO)	206 ± 58
Minor change (23)	57 ± 11.5	9/14	Dentoalveolar surgery (implant, sinus graft, alveolar bone graft)	77 ± 57

Image fusion accuracy

marking error on 3D images

mean error = 0.2mm (voxel size 0.2mm)

no difference between the examiners

image fusion error

0.398mm, clinically acceptable

not affected by head positions and mandibular occlusions

stable errors at a patient's any spatial conditions

Image fusion robustness

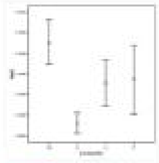
NMI values

experimental setting

not affected by head position, but by mandibular occlusion

geometric changes affect NMI values

image fusion performed under 54.5 ~58.5% image sharing

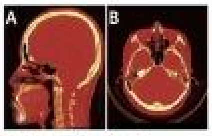


actual patients

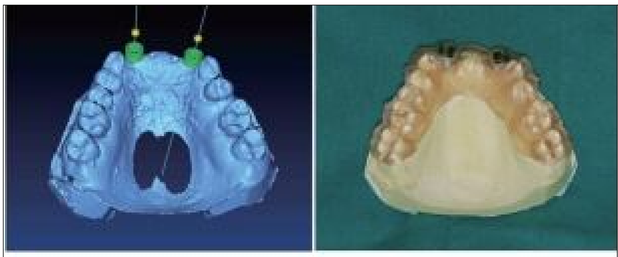
56% image sharing for image fusion

no significant change according to surgical change

not affected by surgical materials



Stable image fusion was performed under the 56% information sharing

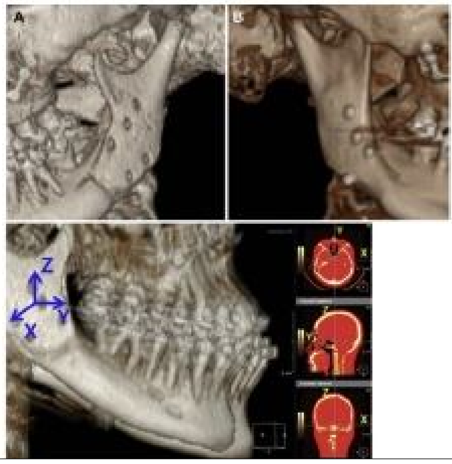


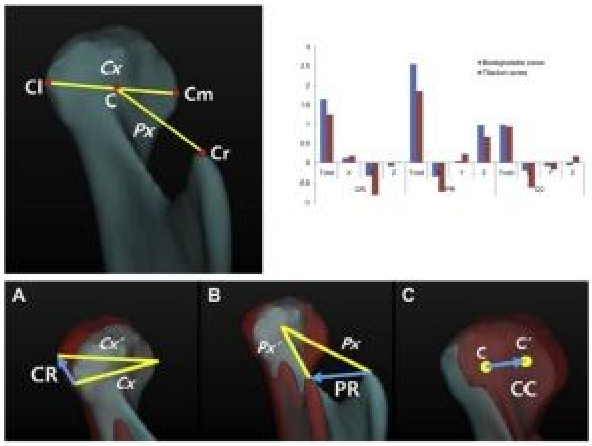
3D planning

Planning of facial asymmetry in the 3D space ?

3D coordination

Vectors





Patient evaluation

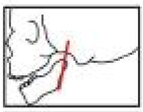
- Unilateral distraction
  - most of hemifacial microsomia
  - classification of patient
- Reference classification

Pruzansky classification

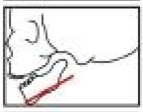
Type I	**Mild hypoplasia of the ramus, and the body** of the mandible is minimally affected.
Type II	Condyle and ramus are small, the head of the **condyle is flattened**, the **glenoid fossa is absent**, the condyle is hinged on a flat and often convex infratemporal surface, and the coronoid process may be absent.
Type III	Ramus is reduced to a thin lamella of bone or is completely absent; **no evidence of a temporomandibular joint.**

Classification of vector

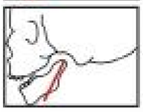
- Vertical :
  approximately perpendicular to the body of the mandible or parallel to posterior border of Ramus



- Horizontal :
  parallel to the inferior border or body of occlusal plane

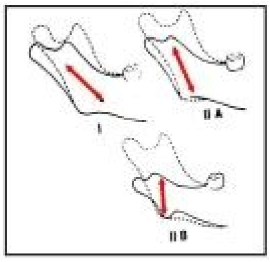


- Oblique :
  combination of two vectors



Relationship between vector and type of mandibular hypoplasia

- Pruzansky classification
  - Reference for evaluation of severity
  - Severity of hypoplasia
    - determining the direction of vector
  - more vertical vector in more severe case



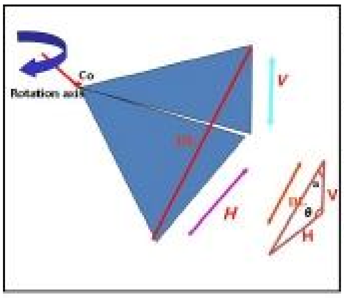
Theoretical basis

- Device placement formula

Pin placement angle=
Ramus deficiency
180 – Gonial angle x ―――――――
Total deficiency

Pin placement angle =
the angle between the distraction vector and the mandibular plane
* this formula can be modified for accurate calculation

Geometrical analysis



- Θ : gonial angle
- H : The amount of Horizontal deficiency (parallel to mandible inferior border)
- V : The amount of vertical deficiency (parallel to ramus posterior border)
- DL : The estimated amount of Distraction
- a : distraction vector to posterior border of ramus
- Rotation axis : vertical to the rotation triangle (plane)

RP model surgery

3D coordinate system for analysis of patients

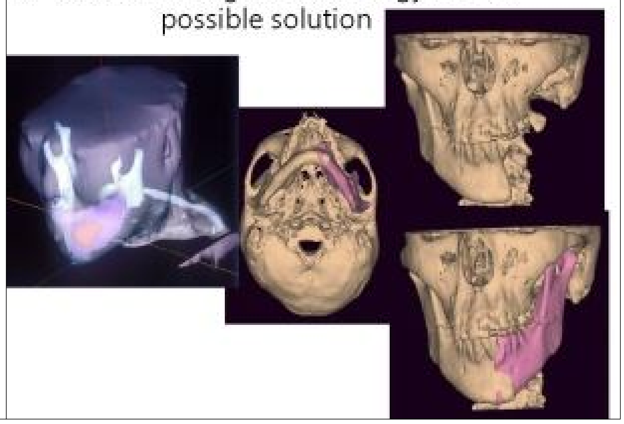
standardization of anatomical landmarks and planes

establishment of reliable 3D coordinate system

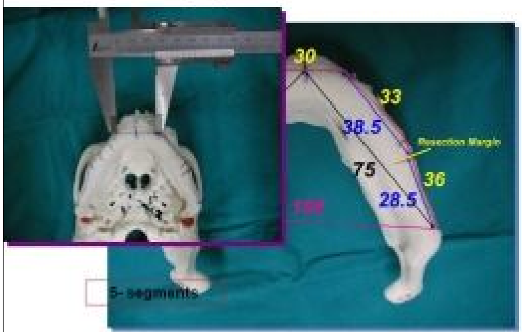
extension to the soft tissue evaluation

3D materialization

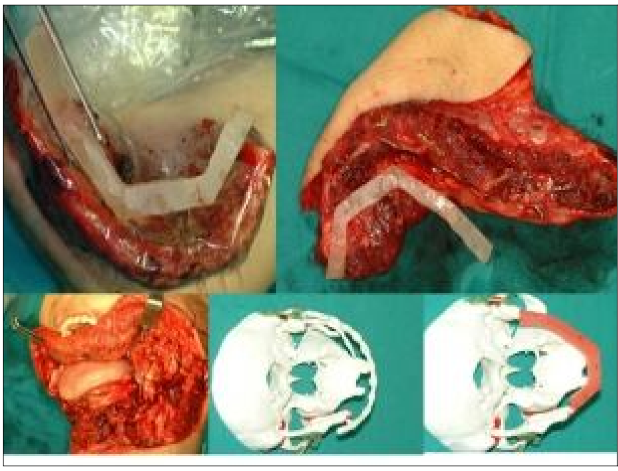
RP model and digital technology can be possible solution



Bending point determination



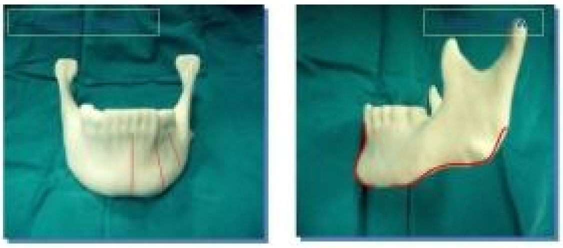
Resin Template Fabrication



For More Esthetic Results

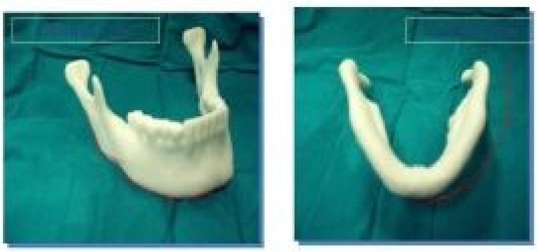
- Digital template

- Anatomy of Mandible -



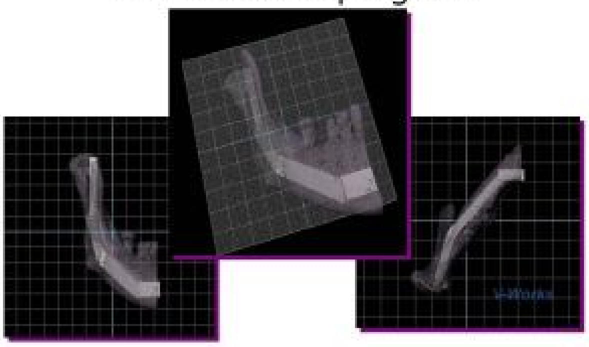
Mandible Body Shape

* B – Go – Gn – Me
*Antegonial Notch



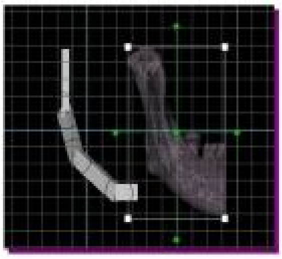
Multiple Inferior border plane

Reconstruction Template in Simulation program



V-Works

3D wedge osteotomy



V-Works

Computer-Guided Surgery (CGS)

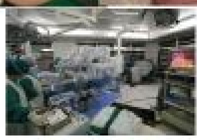
Background, Computer guided surgery

Three different classes of CGS system *(Fenin et al., COIR 2002;13:651-656)*

- **Passive system**
  - **Comparison between simulation and actual**
    ex> Navigator with an optical tracking system

- **Semi-active system**
  - Physically constrained to follow a predefined strategy
    ex> surgical template made with SLA machine

- **Active system**
  - Autonomous robotic system, supervised by surgeon
  - **Computer navigated dynamic surgery**
  - Urology, General surgery, OBGY



Navigation oral surgery

Passive system

Navigation oral surgery

optical tracking system

POLARIS - THE NEXT GENERATION

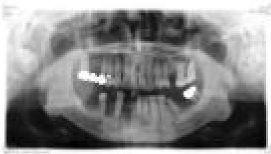
POLARIS SPECTRA

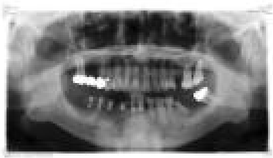
With its many advanced features, the Polaris Spectra continues to raise the standard of optical tracking systems. The flexibility and reliability of this system make it ideal for cross-platform applications and applications requiring a very large measurement volume.

POLARIS VICRA

With its exceptional accuracy and small footprint, Polaris Vicra opens the door to address requirements for existing and new computer assisted surgery and therapy applications requiring a small measurement volume.

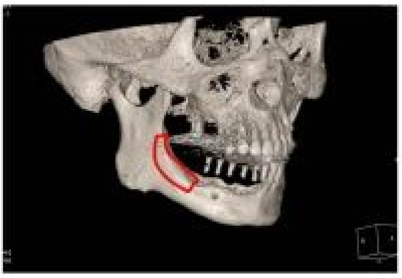
Case #1: dental implant surgery





- 57/ male
- prosthodontic reconstruction of Rt. mandibular dentition
- advanced periodontitis
- severe resorption of alveolar bone
- treatment plan
  - extraction of #31, 43, 45
  - ridge augmentation - Lt posterior mandible with ramal bone graft (#45-47 area)
  - implant : #41, 43, 44, 45, 46

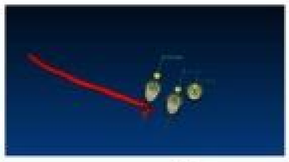
Op planning based on 3D simulation program



- 3D evaluation of mandibular bone
  - critical anatomic structure – inferior alveolar nerve
  - preliminary harvesting of mandible ramus

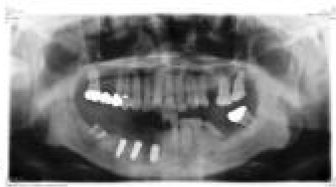
Op planning based on 3D simulation program

- Mapping of inferior alveolar nerve
- Positioning of implant fixture
  - avoiding nerve damage
  - prospective consideration of prosthodontic opt
  - 3 implants were planned.



The procedure for navigation surgery

- Surgical result
  - dentium implant
    - 4.3 x 12mm (x3)
  - ramal block bone graft
  - nerve damage (-)
  - successful ridge augmentation



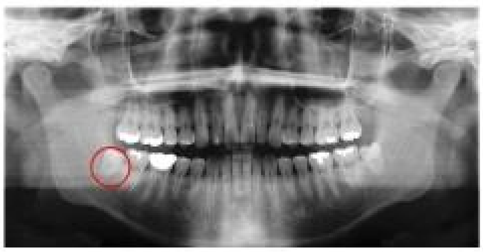
Accuracy of navigation system

Development and application of stent-based image guided navigation system for oral and maxillofacial surgery

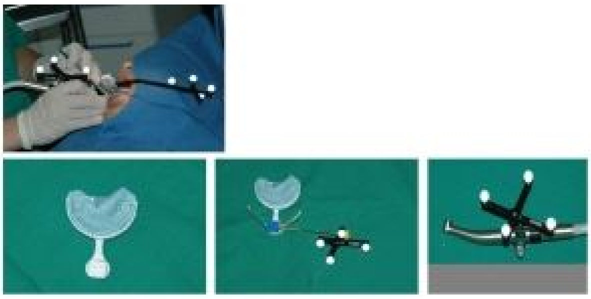
ABSTRACT

surgical extraction

- office based surgery
- 23/ male
- #48 impacted tooth: adjacent to inferior alveolar nerve
- real – time tip tracking of surgical bur tip

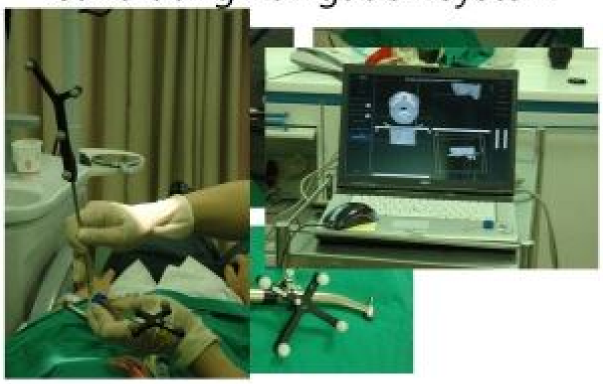


Surgical equipments for navigation



Calibrating navigation system

Calibrating navigation system



Template guided implant surgery

Semi – active system

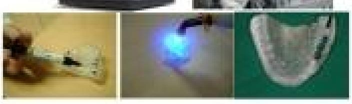
Processing of surgical template system

- **Surgical Template Design**
  Design optimal Surgical Template shape
  Create Sleeve holes based on planning
  STL output

Stereolithography Apparatus, SLA

- **SLA production & Post-processing**
  Objet Connex350™ 3D printer
  Bio-compatible material
  (FullCure M-720)
  16μm layer thickness
  Robot drilling

- **Sleeve assembly**
  metal sleeve bonding
  light curing

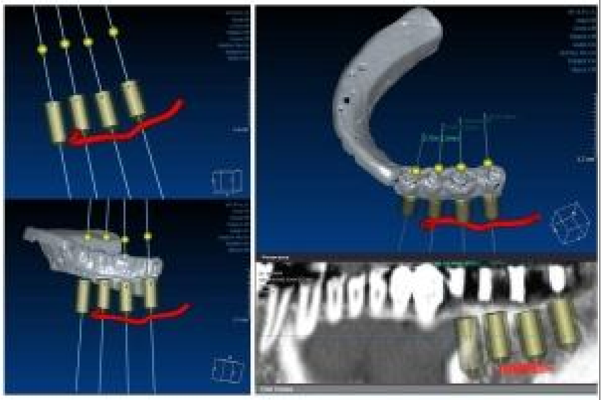


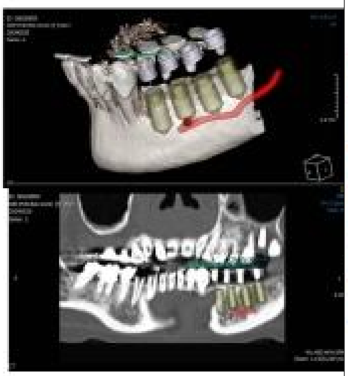
Processing of surgical template system

SLA Surgical Template

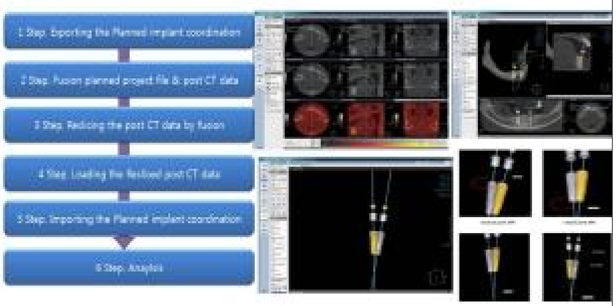
Implant Guide template – case

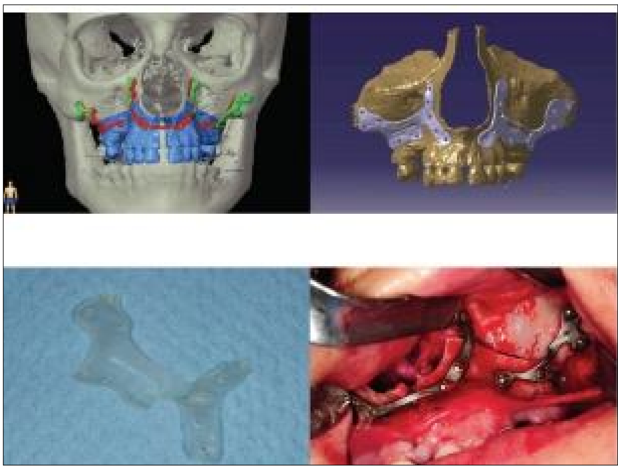
Partial edentulous ridge



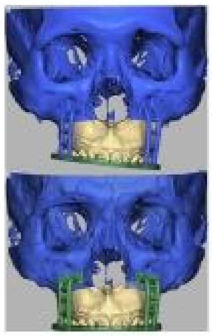


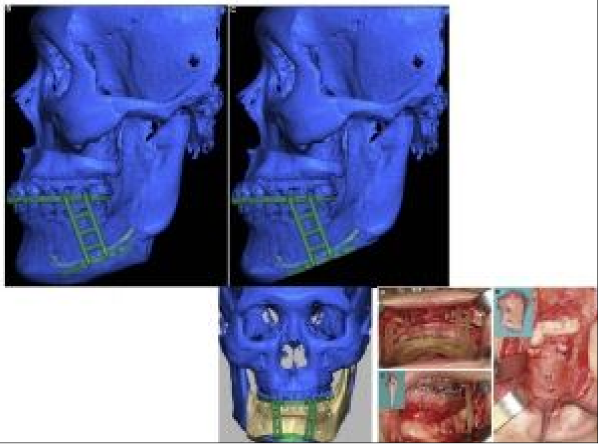
Accuracy and result of clinical cases





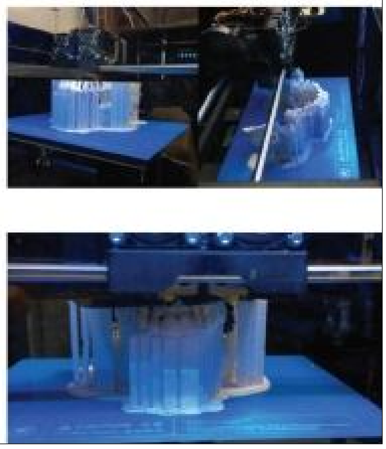

Treatment of Dentofacial Deformities Secondary to Osteochondroma of the Mandibular Condyle Using Virtual Surgical Planning and 3-Dimensional Printed Surgical Templates





하악골 골수염 증례

Creator Pro by FlashForge



Thank you

연제 3 좌장: 이재훈 교수

에버엠치과 윤규식 원장

비대칭 환자의 턱교정수술시 고려사항

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비대칭 환자의 턱교정수술시 고려사항

에버엠치과
윤규식 원장

악교정 수술시 가장 어려운 것이 안면 비대칭의 개선이다. 안면 비대칭 환자의 경우 악골의 위치 뿐만 아니라 악골의 크기나 형태 역시 비대칭을 가지고 있는 경우가 많으며, 악골과 치열의 관계도 비대칭인 경우도 많다. 또한 눈의 위치나 코의 위치, 입술 등 연조직의 비대칭 역시 동반된 경우가 대부분이므로 단순히 악골의 위치 변화만으로는 효과적인 안면 비대칭 개선이 어려울 수 있다. 따라서 안면 비대칭의 개선을 위해서는 언급하였던 여러가지 사항을 모두 고려하여 수술 계획을 세워야 하며, 비대칭 개선의 한계점 역시 환자에게 꼭 인지를 시켜야 한다. 이에 필자가 경험했던 안면 비대칭 환자의 악교정 수술 후의 경과를 바탕으로 안면 비대칭 환자를 수술할 때 고려해야 될 사항에 대해 이야기해 보고자 한다.

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Surgical correction of a deviated nasal septum

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Surgical correction of Deviated Nasal Septum

이화여대 이비인후과 배정호

Deviation of Nasal Septum

- Prevalence
  - Overall 22.38%
  - Male predominance (24.24% : 19.80%)
  - Left-sided deformities were more common (56.0% : 39.0%)
- Causes
  - Congenital or developmental abnormality
  - Trauma
  - Compensation: pressure by turbinate hypertrophy, polyp, tumor, foreign body

Symptoms

1. Nasal obstruction

   * Paradoxical nasal obstruction :
   Obstructive sense of wide side due to nasal cycle
   Narrow side: no obstructive sense due to adaptation
2. Mouth breathing
3. Dryness, crust formation, epistaxis
4. PND
5. Sleep disorder, rhinolalia clausa
6. Olfactory disturbance
7. Anterior ethmoidal nerve syndrome

   * rhinologic headache :
   Headache or facial pain due to
   compression of adjacent sensory nerve

Treatment - Surgery- Septoplasty

1. Approach
2. Mobilization
3. Resection
4. Repositioning
5. Reconstruction
6. Fixation

The Laryngoscope

Correlation of Asymmetric Facial Growth with Deviated Nasal Septum

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Objectives/Hypothesis: To evaluate the correlation between growth differences of the face and nasal septal deviation, and to evaluate whether developmental differences of the face have an effect on nontraumatic nasal septal deviation (DNS).

Study Design: Retrospective study.

Methods: Twenty-five patients with DNS who underwent facial aesthetic surgery and had an ostiomeatal unit-computed tomography (OMU-CT) scan and photos for facial analysis were included in the study. Coronal views of the OMU-CT scan where the nasal septum was most severely deviated were selected and from which five parameters (angle of septal deviation [ASD], angle of nasal floor [ANF], angle of lateral nasal wall [ALW], angle of inferior turbinate [AIT], and width of IT [WIT]) were measured. Preoperative frontal views of the patients were analyzed by comparing the distances between the following points on both sides of the faces: midsagittal plane to Zygion (MSP-Zy), Glabella to Exocanthion (G-Ex), Exocanthion to Cheilion (Ex-Ch), and Zygion to Cheilion (Zy-Ch).

Results: The differences between the right and left MSP-Zy, G-Ex, and Ch-Zy distance were significantly associated with the direction of septal deviation. The difference between the right and left AIT and WIT were also significantly associated with the direction of septal deviation. Using bivariate correlation, it was found that the absolute difference between the right and left MSP-Zy, G-Ex, and WIT showed significant correlation with the amount of septal deviation.

Conclusions: We demonstrate that there is a strong relationship between deviated nasal septum and facial growth asymmetry.

Key Words: Nasal septum, bone development, facial asymmetry.
Key Words: Septal deviation, septoplasty, facial growth
Level of Evidence: N/A.

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Review article

Pediatric septoplasty: A review of the literature

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ABSTRACT

Objectives: Controversy has surrounded the procedure of pediatric septoplasty since the 1950s due to concerns over an adverse effect on nasal and facial growth. However, more recent evidence has demonstrated that septoplasty can be safely performed without affecting nasal and facial development in the appropriately selected pediatric patient. The purpose of this article is to establish the impact of pediatric septoplasty on nasal and facial growth and review the clinical indications and evidence for timing of surgery according to the most recent literature.
Methods: A structured review of the PubMed, Ovid Medline and Cochrane Collaboration databases (Cochrane Central Register of Controlled Trials, Cochrane Database of Systemic Reviews) was undertaken, using the terms: pediatric, childhood, septoplasty, nasal septum, indications, nasal growth and facial growth.
Results: Three long term follow up studies using anthropometric measurements were identified which concluded that pediatric septoplasty does not interfere with normal nasal or facial development. A further similar study concluded that external septoplasty does not affect most aspects of nasal and facial

Conclusions: Evidence exists to support that pediatric septoplasty can be performed without affecting most aspects of nasal and facial growth. Furthermore, not performing or delaying septoplasty when indicated may adversely affect nasal and facial growth with compounding adverse effects in terms of deformity and asymmetry. Despite the majority advocating the timing of septal surgery to be 6 years and older, more clinical studies are required that may provide further evidence for correction of septal deviations in younger children, perhaps even at birth.

Thank you for your attention

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