
SÜDTIROL

Class II is the most prevalent malocclusion and severe Class II (overjet > 7mm) affects 3.8% of the total population.

NHANES III (National Health and Nutrition Examination Survey) 1998

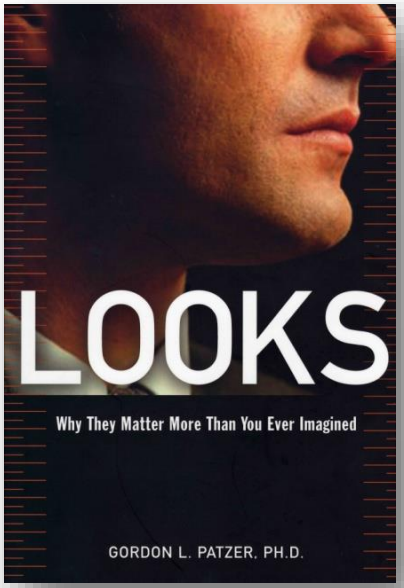
More than 800.000 Americans suffer from skeletal Class II malocclusions that would require surgical-orthodontic treatment

About 24.000 add up every year

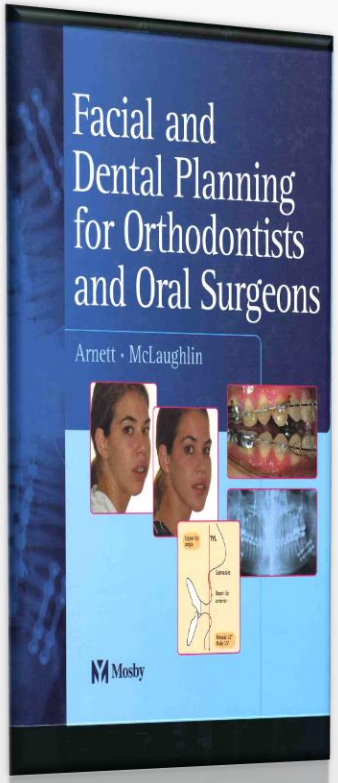
Proffit WR, White RP
Int J Adult Orthod Orthogn Surg 5: 81-89, 1990

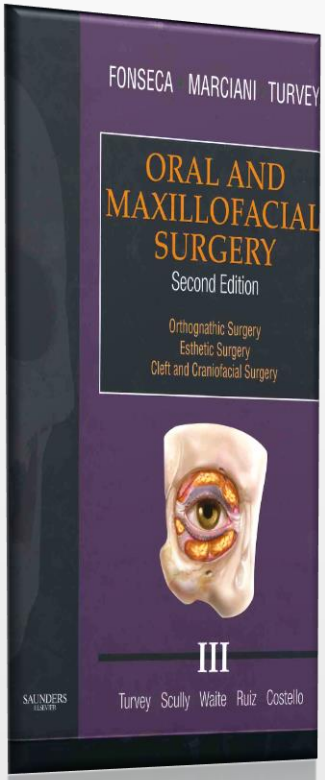
In contemporary society physical attractiveness is highly regarded and desired, because attractive individuals are perceived to be

more intelligent, happier and ***more successful*** in their professional and private life than their less attractive peers.



The demand for orthodontic care seems to be largely driven by ***the desire to improve one's appearance.***


Facial and Dental Planning for Orthodontists and Oral Surgeons
Arnett • McLaughlin
Mosby


FONSECA MARCIANI TURVEY
ORAL AND MAXILLOFACIAL SURGERY
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Orthognathic Surgery
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Cleft and Craniofacial Surgery
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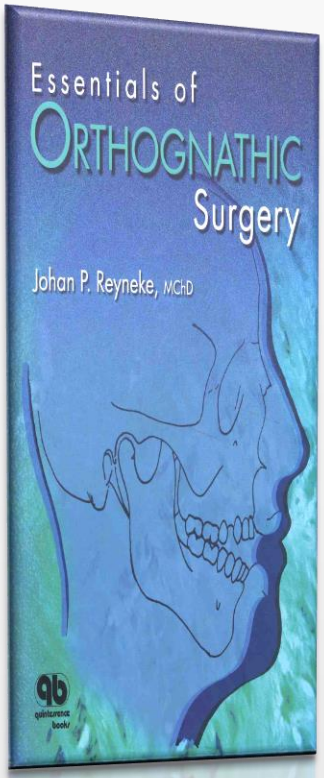
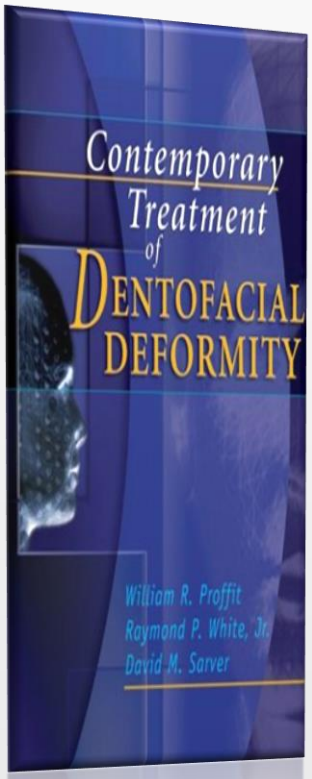
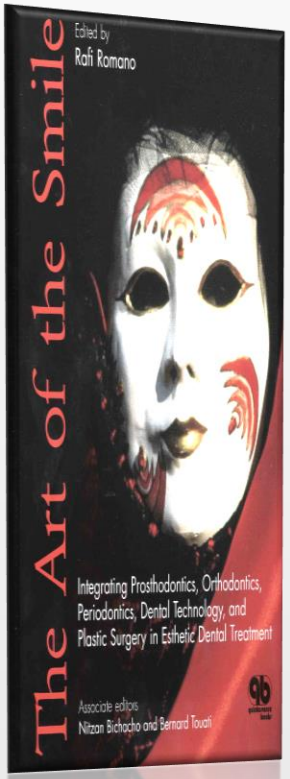
Turvey Scully Waite Ruiz Costello
SAUNDERS


Essentials of
ORTHOGNATHIC
Surgery
Johan P. Reyneke, MChD


Contemporary Treatment of DENTOFACIAL DEFORMITY
William R. Proffit
Raymond P. White, Jr.
David M. Sarver


Edited by
Rafi Romano
The Art of the Smile
Integrating Prosthodontics, Orthodontics, Periodontics, Dental Technology, and Plastic Surgery in Esthetic Dental Treatment
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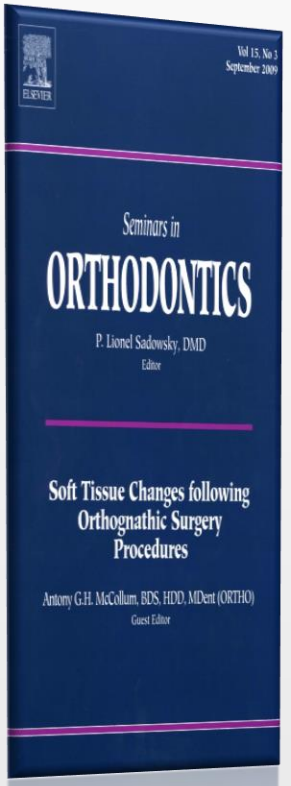
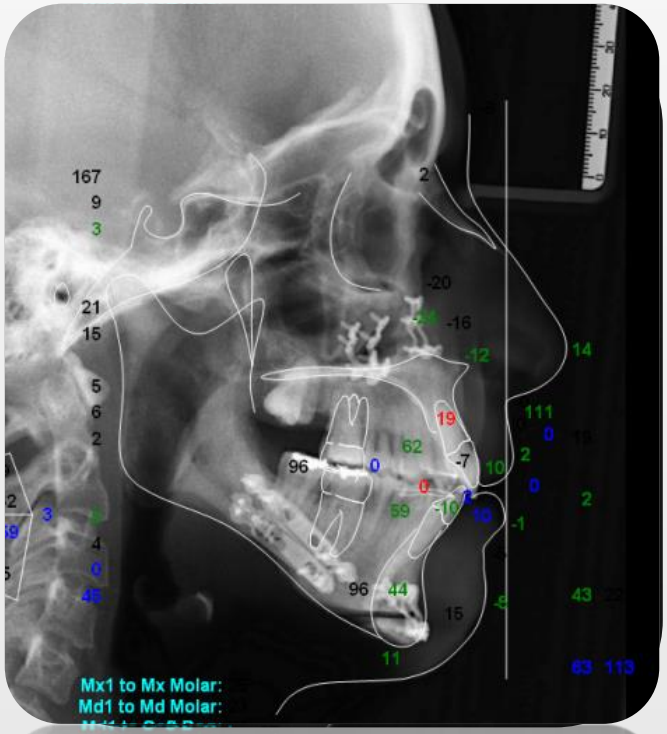

ELSEVIER
Vol 15, No 3
September 2009
Seminars in
ORTHODONTICS
P. Lionel Sadowsky, DMD
Editor
Soft Tissue Changes following Orthognathic Surgery Procedures
Antony G.H. McCollum, BDS, HDD, MDent (ORTHO)
Guest Editor

INTRODUCTION

With combined orthodontic-surgical correction of skeletal Class II malocclusions facial proportions become balanced and cephalometric values approach norms,

suggesting that facial esthetics will automatically be enhanced ???



Surgical Class II correction

Shell et al. Angle Orthod 73 (4): 365-373, 2003

1/3 of patients judged esthetically worsened with treatment

Burdon et al. Am J Orthod Dentofacial Orthop 131(1):1-8,2007

only in 49% ideal postsurgical soft-tissue profiles

Pancherz et al Angle Orthod 74 (6): 800-809, 2004

90% show an increased MP-angle after surgery

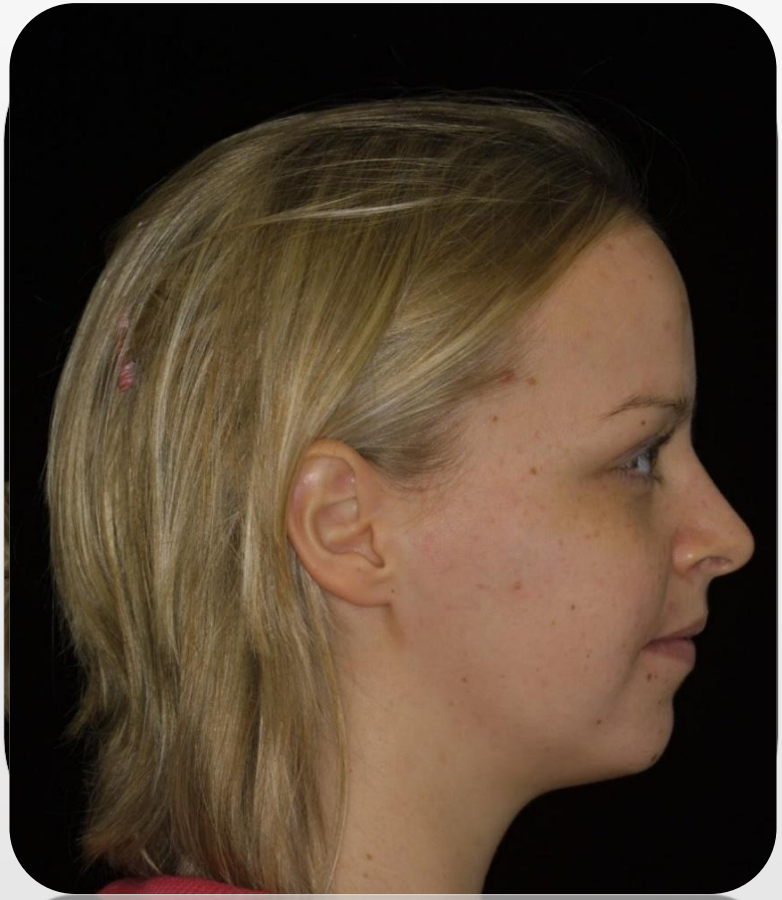
"(…) the observed increase counteracts the mandible coming forward, which is one of the goals in surgical Class II treatment. "

Why do these negative side effects occur?

- Insufficient incisor orthodontic decompensation
- inherent bite-rising of the surgical mandibular advancement
- inadequate overlap of the bony fragments
- unfavorable hard and soft-tissue adaptation / remodeling
- initial dysgnathia too severe to be perfectly corrected
- error of transferring the surgical plan to the operation table
- condylar resorption
- ?

Why do we often achieve good soft-tissue esthetics?

but sometimes end up with Class II profiles…



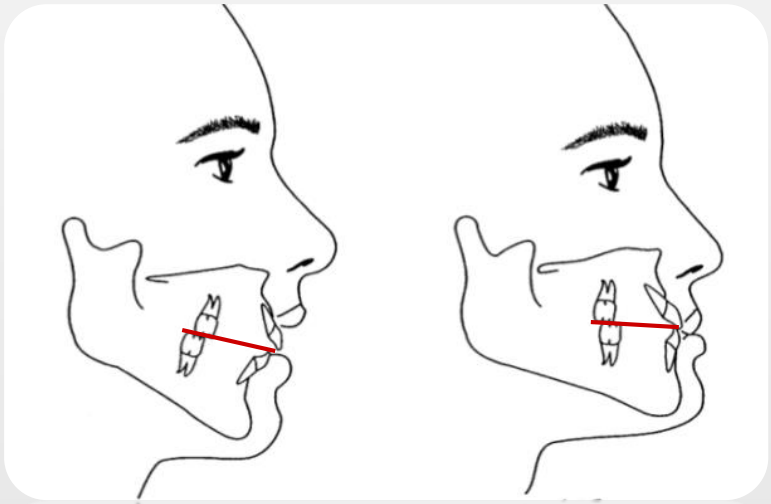
…or even with Class III profiles after Class II surgery?

Bishara S.

(..) “Cl II malocclusion should not be analyzed as an isolated sagittal discrepancy, but requires also evaluation of the transverse and vertical relationships and their differential effect on the soft-tissue profile.” (…)

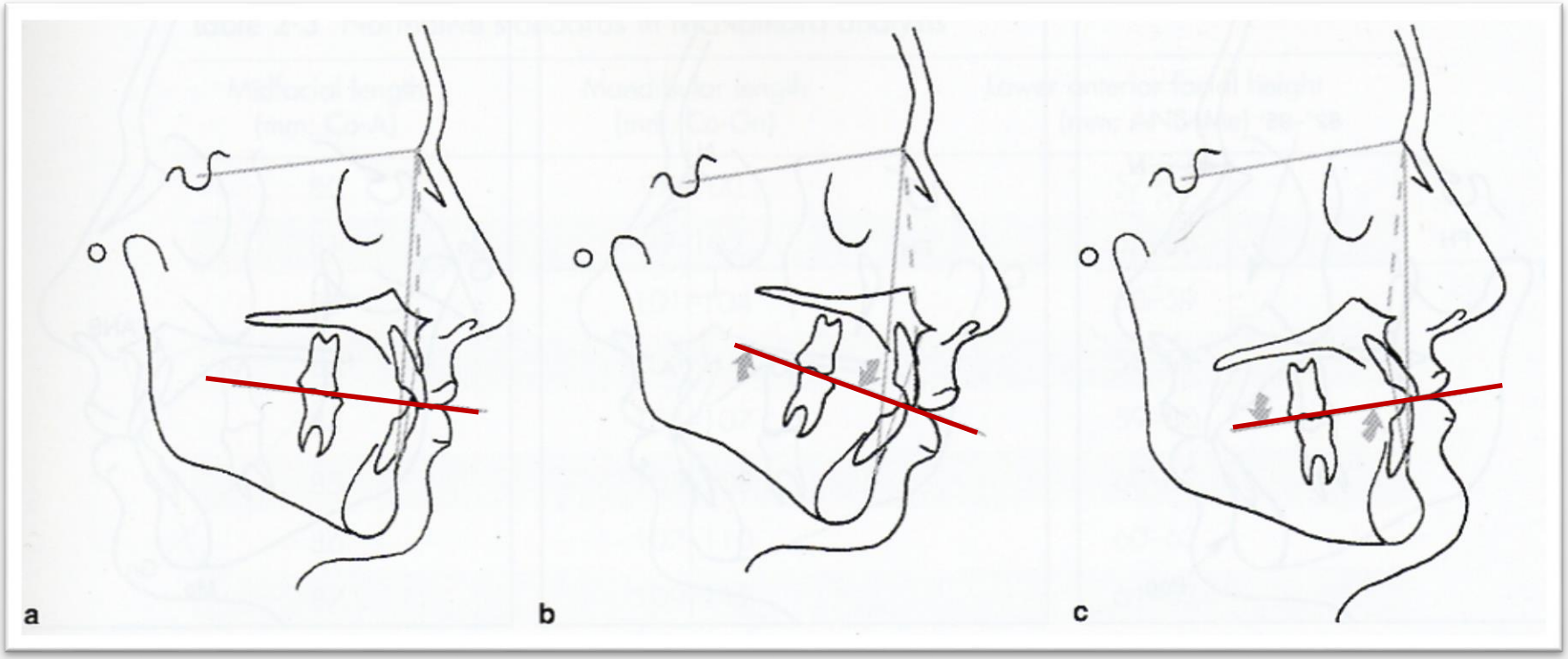
Sem in Orthod 12(1):11-24, 2006

In this context the cant of the occlusal plane is an important parameter, because it is supposed to have significant effects on the soft-tissue profile.



1. Hellman M. Int J Ortho, Oral. Surg. and Radiol. 13: 1927
2. Stallard H. Dental Cosmos 75:1933
3. Bushra E. Angle Orthod 18:1948
4. Maj G., Luzi C., Lucchese P.O. Angle Orthod. 30: 26-34, 1960
5. Schudy F.F. Angle Orthod 33: 69-82,1963
6. Downs W.B. Am J Orthod 34: 812-840, 1984

Effects of different occlusal plane cants on the profile

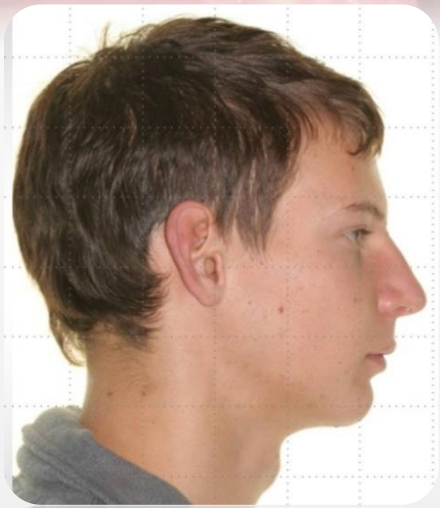


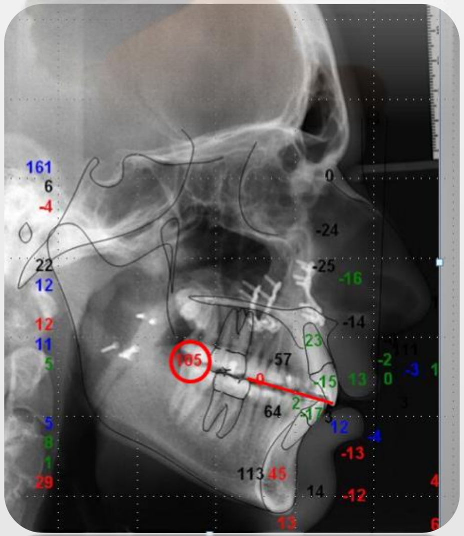
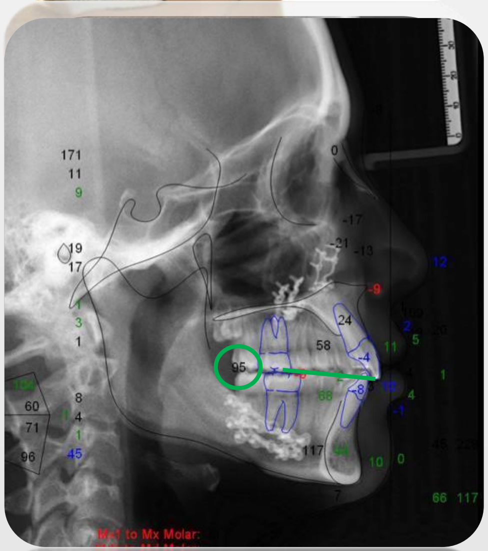
a. Correct OP > harmonious profile = good nose-lip-chin proportion

b. Steep OP > obtuse nasolabial angle, poor lip & chin projection

c. Flat OP > acute nasolabial angle, increased lower lip & chin projection





Is the occlusal plane inclination important for the profile outcome in surgical Class II patients ?

Ute Schneider-Moser, *ANGLE EAST*

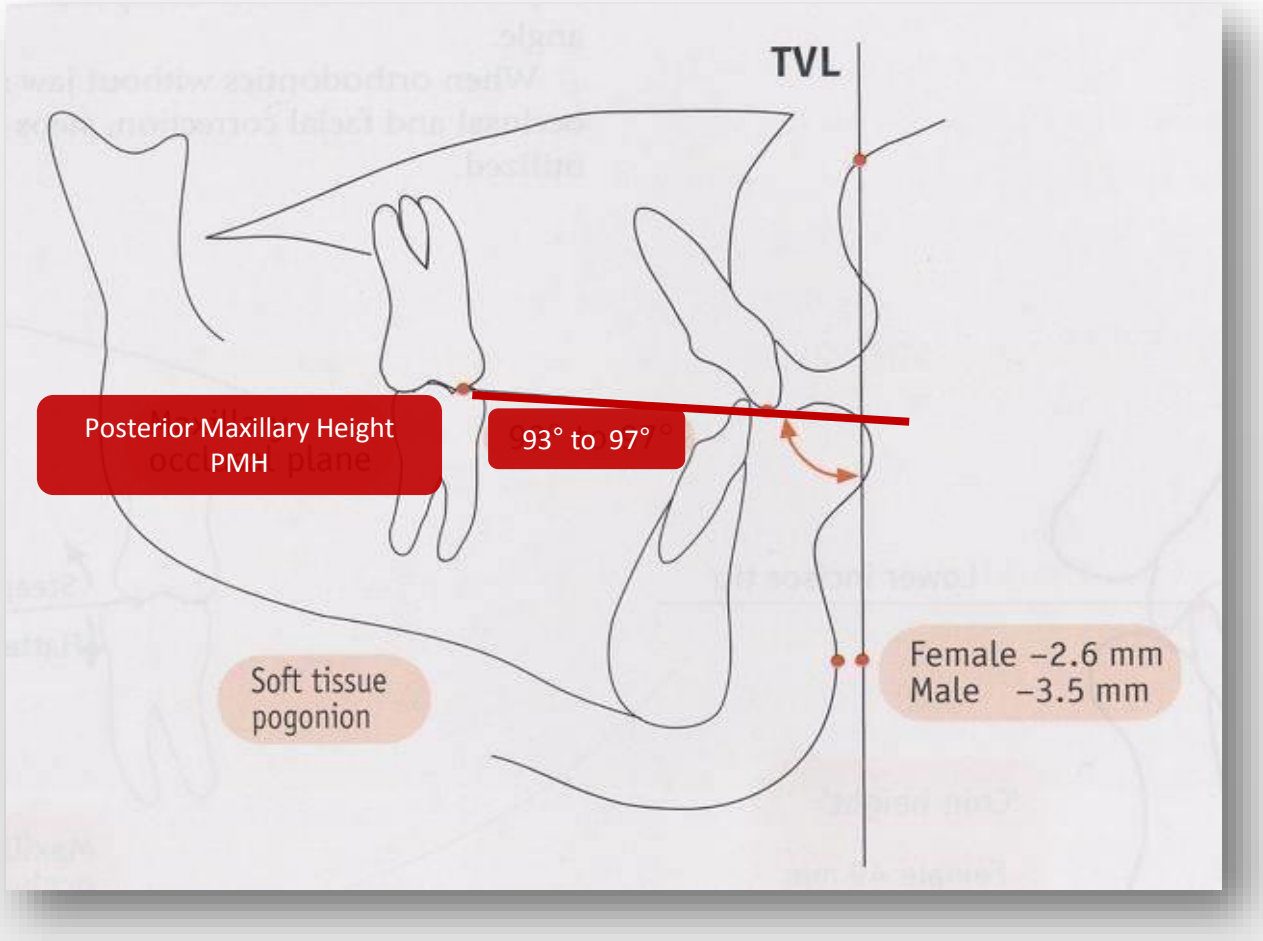
Intentional rotation of the maxillo-mandibolar complex

1. **Mc Collum AGH, Reyneke JP, Wolford LM**: An alternative for the correction of the low angle mandibular plane angle. Oral Surg Oral Med Oral Pathol 67: 231, 1989.
2. **Nattestad A, Vedlofte P:** Mandibular autorotation in orthognathic surgery: a new method of locating the center of mandibular rotation and determining the consequence in orthognathic surgery. J Craniomaxillofac. Surg. 20: 163, 1992.
3. **Rosen HM**: Occlusal plane rotation: aesthetic enhancement in mandibular microgenia. Plast Reconstruct Surg 91: 1231, 1993.
4. **Chemello PD, Wolford LM, Buschang PH**: Occlusal plane alteration in orthognathic surgery-Part II: Long-term stability of results. Am J Orthod Dentofac Orthop 106: 434, 1994.
5. **Reyneke JP**: Surgical manipulation of the occlusal plane: new concepts in geometry. Int J Adult Orthod Orthognath Surg 13: 307-316, 1998.
6. **Reyneke JP**: Surgical cephalometric prediction tracing for the alteration of the occlusal plane by means of the rotation of the manxillomandibular complex. Int J Adult Orthod Orthognath Surg 14:55, 1999.

8. **Arnett WG, McLaughlin RP**: Facial and dental planning for orthodontists and Oral Surgeons, Mosby 2004.

9. **Posnick JC, Fantuzzo JJ, Orchin JD**: Deliberate operative rotation of the maxillo-mandibular complex to alter the A-point to B-Point relationship for enhanced facial esthetics. J Oral Maxillofac Surg 64: 1687-95, 2006.
10. **Reyneke JP, Bryant RS, Suuronen R, Becker PJ**: Postoperative skeletal stability following clockwise and counter-clockwise rotation of the maxillomandibular complex compared to conventional orthognathic treatment. Br J Oral and Maxillofac Surg, Vol 45(1): 56-64, 2007.
11. **Fonseca RJ, Marciani RD, Truvey TA:** Oral and maxillofacial Surgery - Vol. III, Second Edition, Saunders Elsevier, 2009.

Soft-Tissue Cephalometric Analysis (STCA)

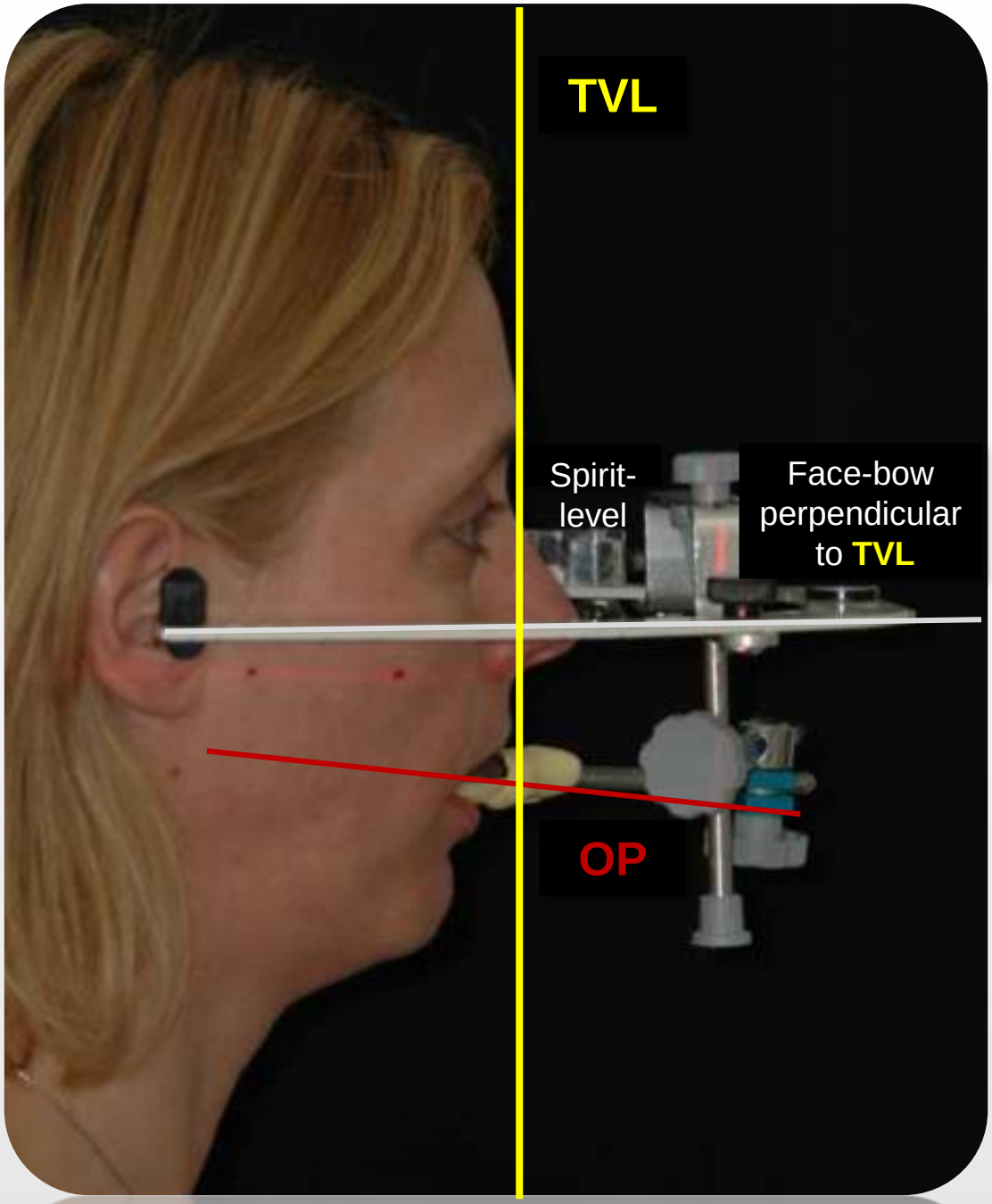


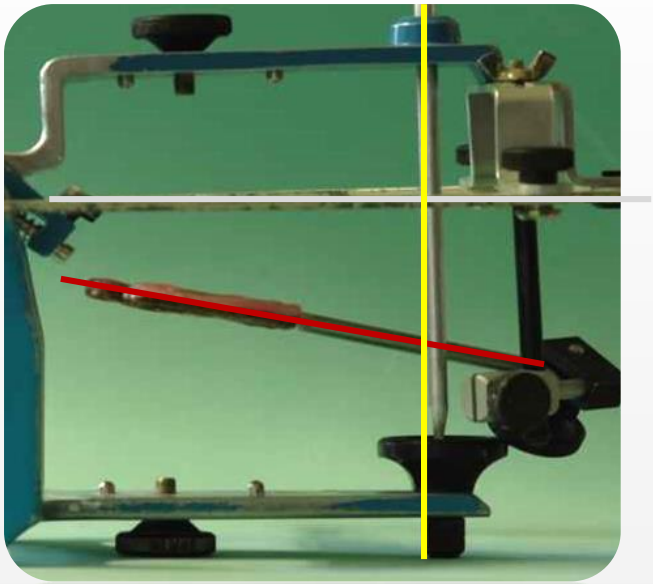
Arnett GW et al:
Am J Orthod Dentofac Orthop 116 (3): 239-253, 1999.

Natural Head Position (NHP) & True Vertical Line (TVL)

- **NHP = Head position while observing an object at the horizon or looking at one's own eyes in a mirror**
- ***NHP is the most realistic and reproducible head position for diagnosis and tx planning***
- ***TVL does not have any correlation with the cranial base or other constructed reference lines as FH, SN +7***

- Moorees. Am J Phys. Anthropol 16:213-34, 1958
- Cooke. Am J Orthod Dentofac Orthop 93 213-33, 1988
- Lundstrom and Lundstrom. Am J Orthod Dentofac Orthop 101:244-7, 1992
-Arnett and Bergman. AmJ Orthod Dentofac Orthop 103: 299-312 , 395-411, 1993


TVL
Spirit-level
Face-bow perpendicular to TVL
OP



Aim of the study

1. **Evaluate** in a customized group of untreated Class I females with excellent soft-tissue profiles = control sample if:
   - the cant of the OP (= PMH) concordes with the standards defined by Arnett
   - the STCA presents differences compared to Arnett's norms

2. **Demonstrate** how surgically induced changes of the cant of the OP determine the soft-tissue profile of Cl II patients

3. **Confirm** that the proposed range between 93-97° for the cant of the Maxillary Occlusal Plane relative to the True Verticel Line is a valid guideline for diagnosis and treatment planning in surgical Class II patients

MATERIAL

PATIENT SAMPLE

2 orthodontists , 2 surgeons

Mean age 30,7 yrs

81 surgical
Cl II females

OPERATION

Rigid Internal Fixation

23 single jaw surgery (BSSO)

58 double jaw surgery
(Le Fort I + BSSO)

MATERIAL

CONTROL GROUP

Italian models
skeletal and dental Class I occlusion
Mean age 27,6 yrs

30 non-treated females

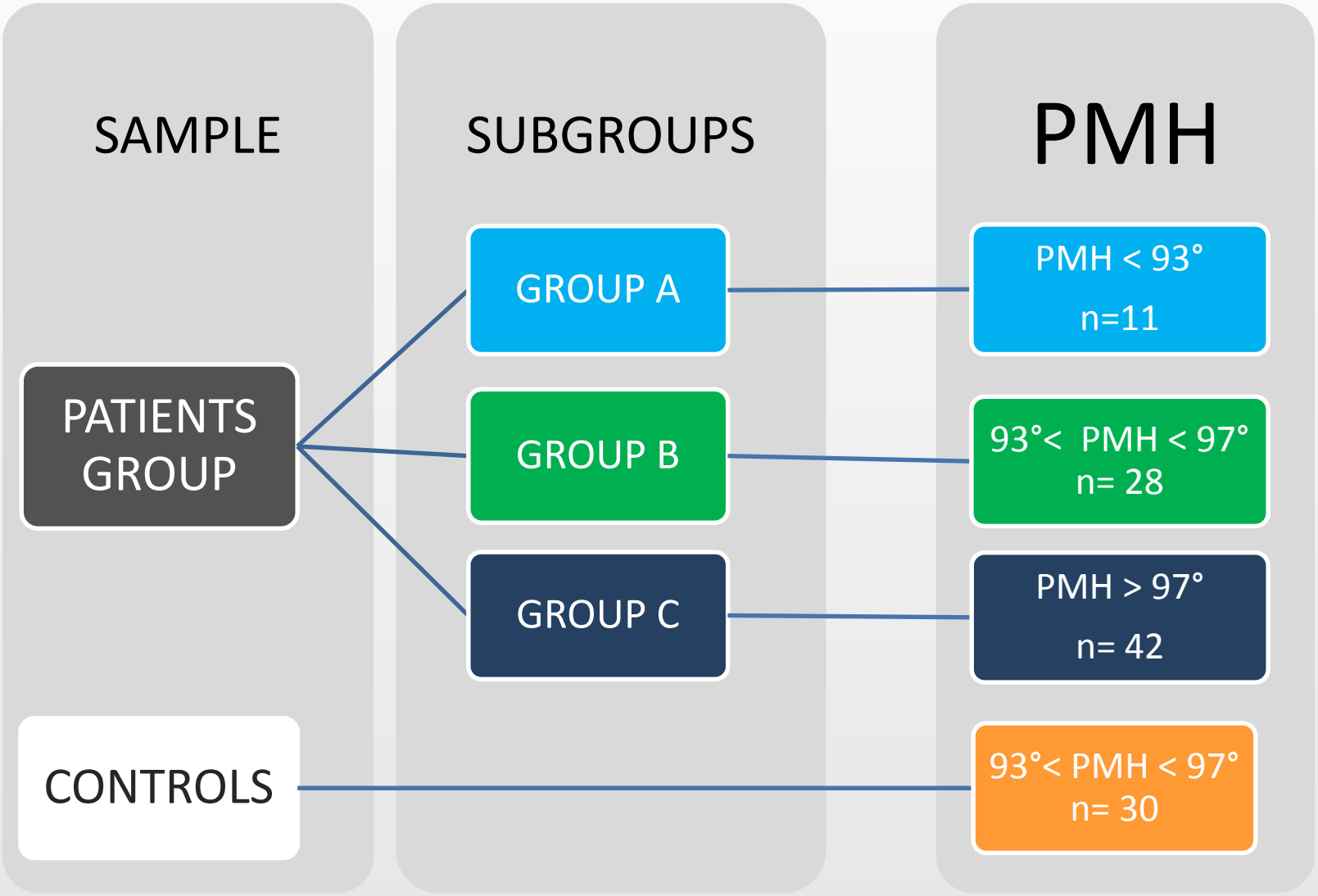
METHOD

- Post-treatment lateral headfilm taken on the day of debonding
- All lateral headfilm acquired with the same radiograph by the same operator
- NHP with relaxed lips and wax bite in CR
- All digitizations performed by the same operator with the Dolphin 10.0 program
- Division of the patients into sub-groups relative to PMH

Group A	Group B	Controls	Group C
Flat OP	Normal OP	Normal OP	Steep OP
n= 11	n= 28	n= 30	n= 42

- All consecutive measurements related group specifically

METHOD


SAMPLE
SUBGROUPS
PMH
PATIENTS GROUP
CONTROLS
GROUP A
GROUP B
GROUP C
PMH < 93°
n=11
93°< PMH < 97°
n= 28
PMH > 97°
n= 42
93°< PMH < 97°
n= 30

Age conformity

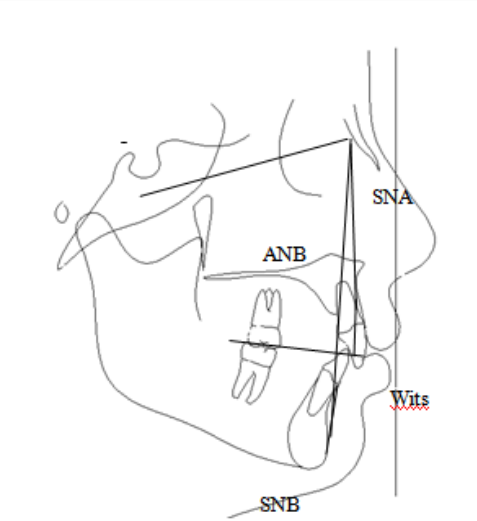
- 1. Test di Komolgorow-Smirnow for normal intragroup distribution
- 2. ANOVA F test di Fisher (p= 0.645400)

GROUPS	AGE		
	Mean	SD	95% CI
PATIENT GROUP A	32.5	2.9	26.8 to 38.3
PATIENT GROUP B	29.3	1.8	25.7 to 33.0
PATIENT GROUP C	29.9	1.5	26.9 to 32.8
CONTROLS	25.9	1.7	22.5 to 29.3

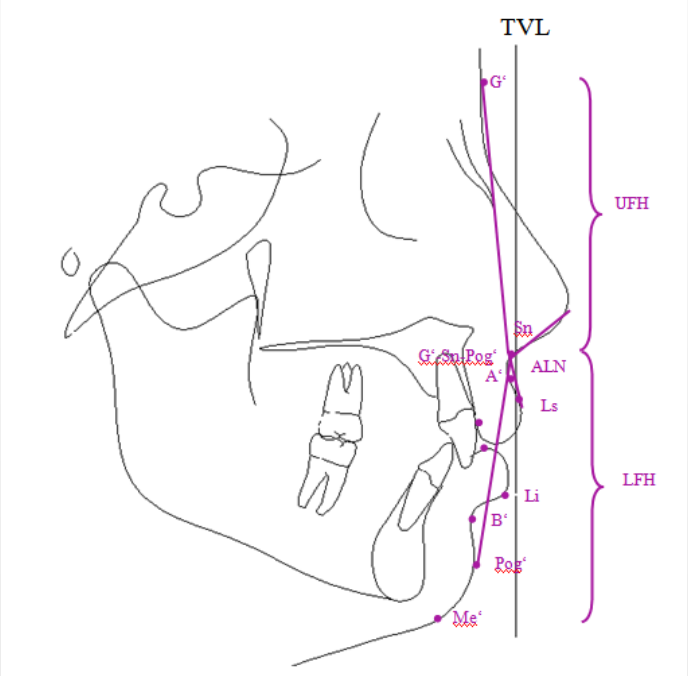
HOMOGENITY OF ALL GROUPS REGARDING AGE

Analyzed parameters

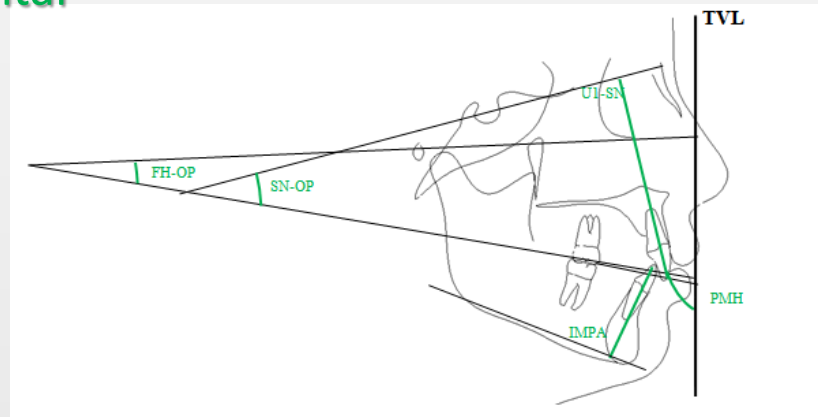
Skeletal



Soft-tissue



Dental



Error of the method

- After two weeks the lateral headfilms of 1/3 of the patients & controls were remeasured by same operator
- Systematic error (paired t-test for dependent samples) and random error (Dahlberg's formula) were calculated
- None of the parameters showed significant systematic error ($p < 0.05$)
- Random error below the natural variability of the SD

NO ERROR FOUND

Variable	Mean	Std.Dv.	Diff.	Std.Dv. Diff.	p	Dahlberg
FH-OP 1	8,6333	4,088700				
FH-OP 2	8,4933	4,036466	0,140	0,9379	0,42028	0,65954
P. Max Height 1	99,040	4,528347				
P. Max Height 2	99,090	4,671288	-0,050	0,3287	0,41168	0,23130
SN-OP 1	17,050	5,494872				
SN-OP 2	17,216	5,438565	-0,167	0,7043	0,20517	0,50365
ST-A 1	-1,230	1,665916				
ST-A 2	-1,183	1,685452	-0,047	0,3380	0,45572	0,23734
UL-ant 1	0,6867	2,365519				
UL-ant 2	0,623	2,396072	0,063	0,4055	0,39936	0,28548
ST-B 1	-7,540	4,492569				
ST-B 2	-7,616	4,547912	0,077	0,5751	0,47119	0,40352
ST-Pg 1	-6,123	5,582465				
ST-Pg 2	-5,970	5,720872	-0,153	0,7309	0,25996	0,51961
LL-ant 1	-2,053	3,747434				
LL-ant 2	-2,206	3,695938	0,153	0,4754	0,08783	0,34785
UL-thick 1	11,720	0,952094				
UL-thick 2	11,700	1,022168	0,020	0,2441	0,65693	0,17029
LL-thick 1	11,156	0,874419				
LL-thick 2	11,170	0,987910	-0,013	0,2648	0,78472	0,18439
NaslabAng. 1	114,436	8,820489				
NaslabAng. 2	115,553	9,568689	-1,117	4,4804	0,18272	3,21343
U1-SN 1	104,700	5,610339				
U1-SN 2	104,683	5,974202	0,017	1,2448	0,94204	0,86554
IMPA 1	93,836	6,092872				
IMPA 2	93,850	6,154715	-0,013	0,8435	0,93160	0,58651
G-Sn-Pg 1	165,776	6,059688				
G-Sn-Pg 2	165,950	5,823895	-0,173	0,9937	0,34729	0,70166
SNA 1	81,376	2,896214				
SNA 2	81,340	2,879368	0,037	0,5417	0,71352	0,37749
SNB 1	78,556	3,477284				
SNB 2	78,426	3,410929	0,130	0,3592	0,05703	0,26614
ANB 1	2,833	1,785639				
ANB 2	2,913	1,844046	-0,080	0,3418	0,21000	0,24426
Wits 1	-0,840	1,623236				
Wits 2	-0,683	1,950439	-0,157	1,6709	0,61147	1,16697
Throat l. 1	50,766	5,747463				
Throat l. 2	50,650	6,042707	0,117	1,4154	0,65502	0,98750
UFH:LFH 1	98,300	6,380574				
UFH:LFH 2	98,303	7,020536	-0,003	1,2254	0,98821	0,85195

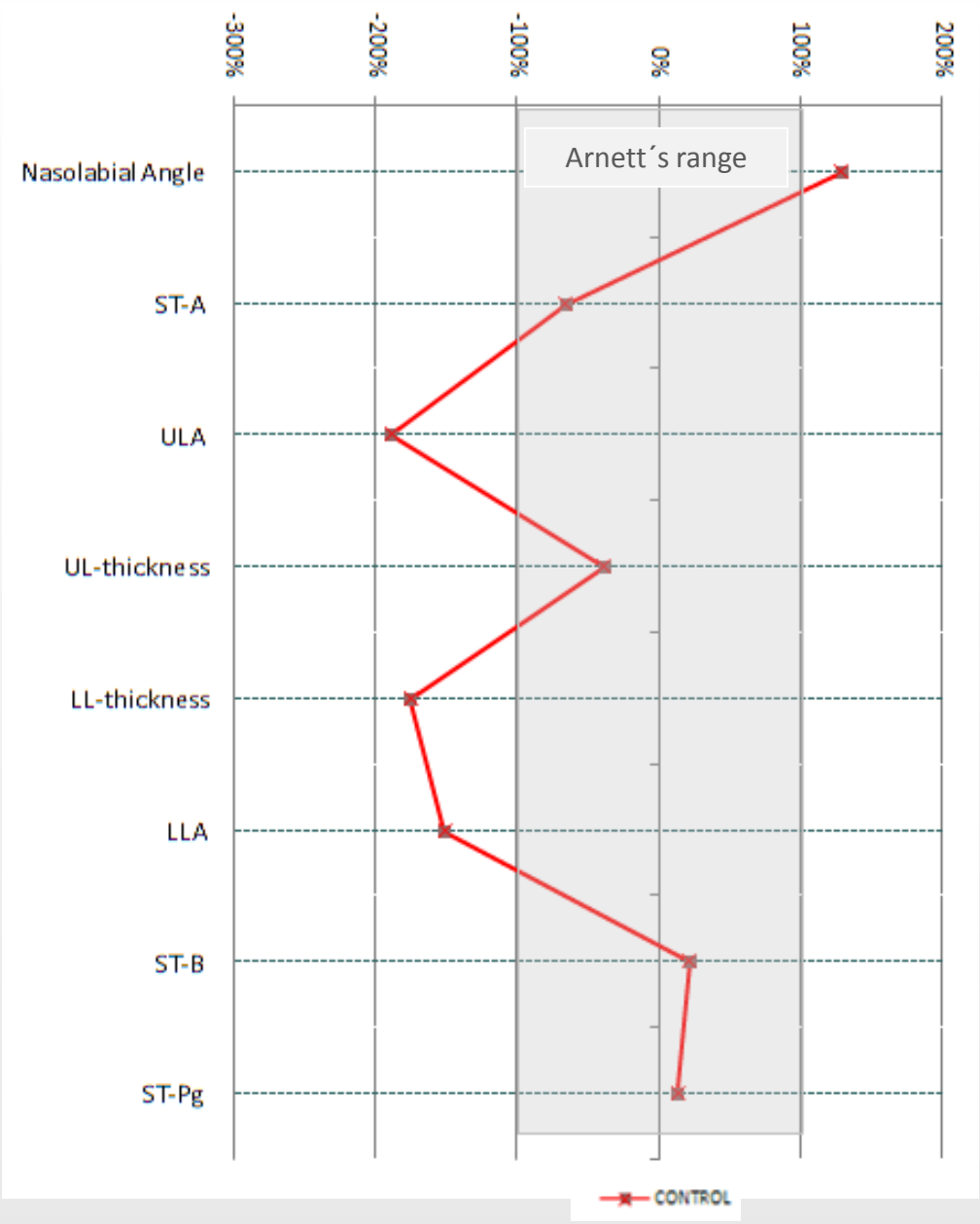
RESULTS Control group

Differences between the Measurements and the Reference Range, n=30

Parameter	Mean	95% Confidence Interval of Mean	Reference Range (Arnett et al.)	Standard Deviation SD	Standard Error SE	Student's t-test p value
ST-A (mm)	-0.8	-1,1 to -0.4	-1.1 to 0.9	0.94	0.17	NS
Upper lip anterior (mm)	1.4	0.9 to 2.0	2.5 to 4.9	1.41	0.25	<0.001***
Upper Lip thickness (mm)	11,5	11,1 to 11.8	10.8 to 14.4	1.30	0.23	NS
Nasolabial angle (degrees)	112.8	110.9 to 114.9	97.2 to 110.8	5.90	0.06	0.04*
Lower lip anterior (mm)	-0.2	-0.9 to 0.4	0.6 to 3.3	1.75	0.31	0.005**
Lower lip thickness (mm)	-11.2	10.8 to 11.5	12.2 to 15.0	0.89	0.16	<0.001***
ST-B (mm)	-2.3	-5.7 to '-4.2	-6.8 to -3.8	2.04	0.37	NS
ST-Pg (mm)	-2.3	-3.3 to'-1.4	-4.5 to 0.7	2.57	0.46	NS
G'-Sn'-Pg' (degrees)	170.0	169.0 to 170.1	165.7 to 172.4	2.59	0.47	NS
SNA (degrees)	81,0	80,2 to 81.7	80.0 to 84.0	1,99	0,36	NS
SNB (degrees)	78,6	77,8 to 79.3	78.0 to 82.0	2,01	0,04	NS
ANB (degrees)	2,3	2,1 to 2.6	0.0 to 4.0	0,78	0,14	NS
Wits (mm)	0,1	-0,3 to'-0.6	-1.0 to 1.0	1,19	0,21	NS
U1-SN (degrees)	103,6	102,1 to 105.1	97.6 to 108.6	4,04	0,72	NS
IMPA (degrees)	93,3	91,7 to 94.9	85.0 to 95.0	4,44	0,80	NS

*p = .05; **p= .01; ***p = .001, NS = nonsignificant

Blue fields indicate that none of the measured values lies in the standard range.


-300%
-200%
-100%
0%
100%
200%
Arnett´s range
Nasolabial Angle
ST-A
ULA
UL-thickness
LL-thickness
LLA
ST-B
ST-Pg
CONTROL

Correlation between PMH and the analyzed parameters

PMH	Pearson correlation coefficient			
	r	r^2	p value	Significance
ST-A	-0.4697	-0.2333	<.001	S
Upper lip anterior	-0.5874	-0.3450	<.001	S
Upper lip thickness	0.3293	0.1084	.003	S
Nasolabial angle	0.5503	0.3028	<.001	S
Lower lip anterior	0.7711	0.5946	<.001	CS
Lower lip thickness	0.1601	0.0256	0.153	NS
ST-B	0.8651	0.7484	<.001	CS
ST-Pg	0.8780	0.7709	<.001	CS
G'-Sn'-Pg'	0.8967	0.8041	<.001	CS

Statistically significant (S) correlation for r between 0.5 to 1.0 or -0.5 to -1.0.

Clinically significant (CS) correlation for r^2 between 0.5 to 1.0 or -0.5 to 1.0.

Non-significant = NS.

RESULTS Group A flat OP

Differences between the Measurements and the Reference Range , n= 13

Parameter	Mean	95% Confidence Interval of Mean	Reference Range Arnett et al.	Standard Deviation SD	Standard Error SE	Student's t-test p value
ST-A	-0.2	-0.8 to '-0.4	-1.1 to 0.9	1.04	0.29	NS
Upper lip anterior	2.6	1.5 to 3.7	2.5 to 4.9	1.77	0.49	NS
Upper lip thickness	10.8	10.0 to 11.7	10.8 to 14.4	1.36	0.38	NS
Nasolabial Angle	105.8	99.0 to 112.5	97.2 to 110.8	11.25	3.12	NS
LLA	2.8	0.9 to 4.7	0.6 to 3.3	3.09	0.86	NS
ST-B	-1.0	-2.8 to 0.9	-6.8 to '-3.8	3.04	0.84	0.006**
ST-Pg	2.7	0.7 to 4.7	-4.5 to '-0.7	3.38	0.94	0.004**
G'-Sn'-Pg'	175.5	173.4 to 177.6	165.7 to 172.4	3.45	0.96	0.007**
SNA	81.8	80.3 to 83.3	80.0 to 84.0	2.55	0.71	NS
SNB	80.9	79.3 to 82.5	78.0 to 82.0	2.64	0.73	NS
ANB	0.88	0.0 to 1.7	0.0 to 4.0	1.39	0.39	NS
Wits	-0.9	-1.6 to '-0.2	-1.0 to 1.0	1.72	0.33	NS
U1-SN	110.6	106.8 to 114.3	97.6 to 108.6	6.17	1.71	0.274
IMPA	90.7	85.0 to 96.4	85.0 to 95.0	9.38	2.60	NS

*p = .05; **p= .01; ***p = .001, NS = nonsignificant

Red fields indicate that none of the measured values lies in the standard range.

RESULTS Group B

normal OP

Differences between Measurements and Reference Range, n=28

Parameter	Mean	95% Confidence Interval of Mean	Reference Range Arnett et al.	Standard Deviation SD	Standard Error SE	Student's t-test p value
ST-A	-0.9	-1.3 to '-0.5	-1.1 to 0.9	1.04	0.20	NS
Upper lip anterior	1.4	0.9 to 1.9	2.5 to 4.9	1.33	0.25	<0.001***
Upper lip thickness	11.4	11.0 to 11.9	10.8 to 14.4	.120	0.23	NS
Nasolabial Angle	112.9	110.8 to 114.9	97.2 to 110.8	5.29	1.00	0.016*
Lower lip anterior	-0.2	-0.8 to 0.5	0.6 to 3.3	1.72	0.32	0.045*
ST-B	-5.0	-5.5 to -'4.5	-6.8 to -3.8	1.30	0.25	NS
ST-Pg	-2.4	-2.9 to '-1.9	-4.5 to -0.7	1.26	.024	NS
G'-Sn'-Pg'	169.7	169.2 to 170.3	165.7 to 172.4	1.43	0.27	NS
SNA	81.7	80.5 to 82.8	80.0 to 84.0	2.95	0.56	NS
SNB	79.6	78.4 to 80.8	78.0 to 82.0	3.02	0.57	NS
ANB	2.1	2.0 to 2.6	0.0 to 4.0	1.25	0.24	NS
Wits	-0.4	-1.9 to 1.1	-1.0 to 1.0	2.48	0.69	NS
U1-SN	105.2	103.2 to 107.1	97.6 to 108.6	5.01	0.95	NS
IMPA	91.7	89.0 to 94.5	85.0 to 95.0	7.14	1.35	NS

*p = .05; **p= .01; ***p = .001, NS = nonsignificant

RESULTS Group C steep OP

Differences between the Measurements and the Reference Range, n= 37

Parameter	Mean	95% Confidence Interval of Mean	Reference Range (Arnett et al.)	Standard Deviation SD	Standard Error SE	Student's t-test p value
ST-A	-1.6	-2.1 to -1.2	-1.1 to 0.9	1.35	0.21	0.019*
Upper lip anterior	-0.2	-0.8 to 0.4	2.5 to 4.9	1.92	0.30	<0.001***
Upper lip thickness	12.0	11.5 to 12.4	10.8 to 14.4	1.36	0.22	NS
Nasolabial Angle	118.4	115.8 to 121.0	97.2 to 110.8	8.03	1.27	<0.001***
Lower lip anterior	-3.9	-4.7 to -3.1	0.6 to 3.3	2.57	0.41	<0.001***
ST-B	-10.5	-11.4 to -9.7	-6.8 to -3.8	2.61	0.41	<0.001***
ST-Pg	-9.8	-10.8 to 8.8	-4.5 to -0.7	3.11	0.49	<0.001***
G'-Sn'-Pg'	161.6	160.6 to 162.5	165.7 to 172.4	2.88	0.46	<0.001***
SNA	81.0	80.2 to 81.9	80.0 tp 84.0	2.65	0.42	NS
SNB	76.9	76.1 to 77.8	78.0 to 82.0	2.67	0.42	0.016*
ANB	4.0	3.6 to 4.4	0.0 to 4.0	1.28	0.20	NS
Wits	-0.1	-0.7 to .0.6	-1.0 to 1.0	2.00	0.32	NS
U1-SN	102.0	100.5 to 103.6	97.6 to 108.6	4.83	0.76	NS
IMPA	96.8	95.1 to 98.5	85.0 to 95.0	5.33	0.84	0.040*

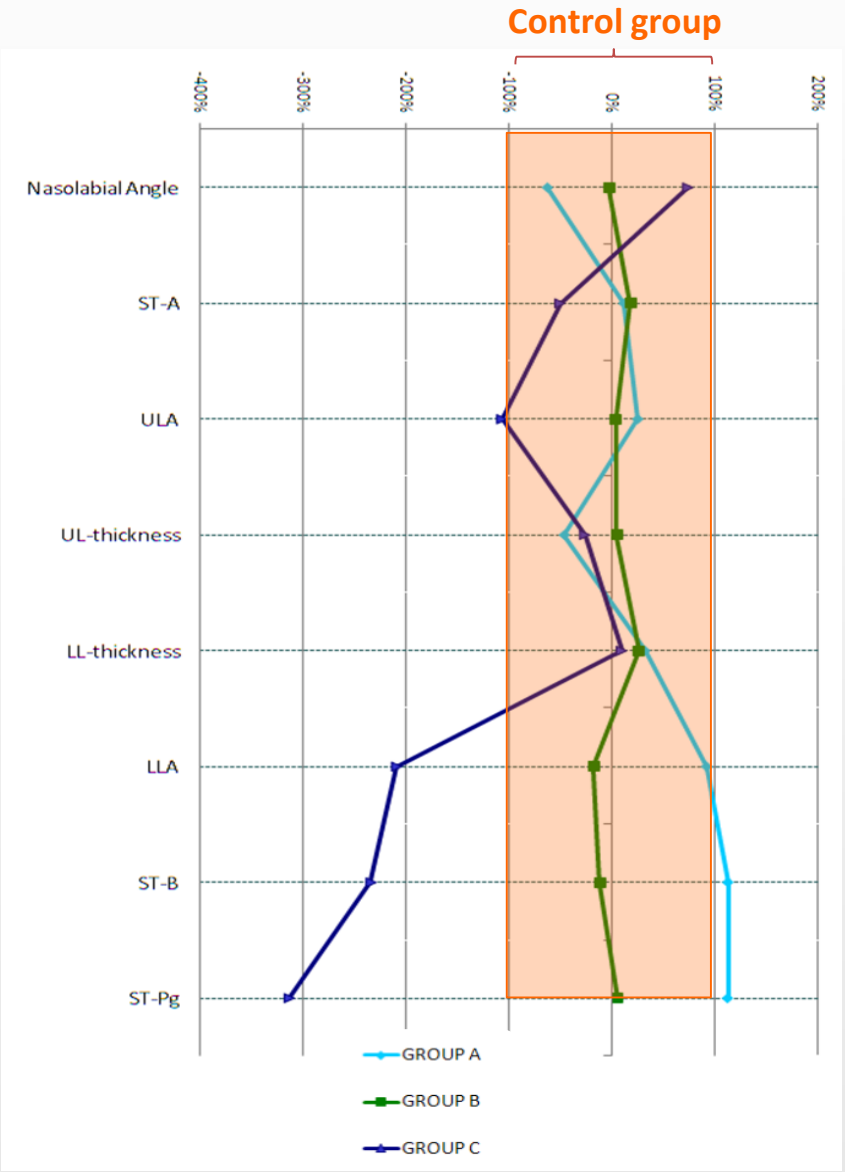
*p = .05; **p= .01; ***p = .001, NS = nonsignificant

Summary

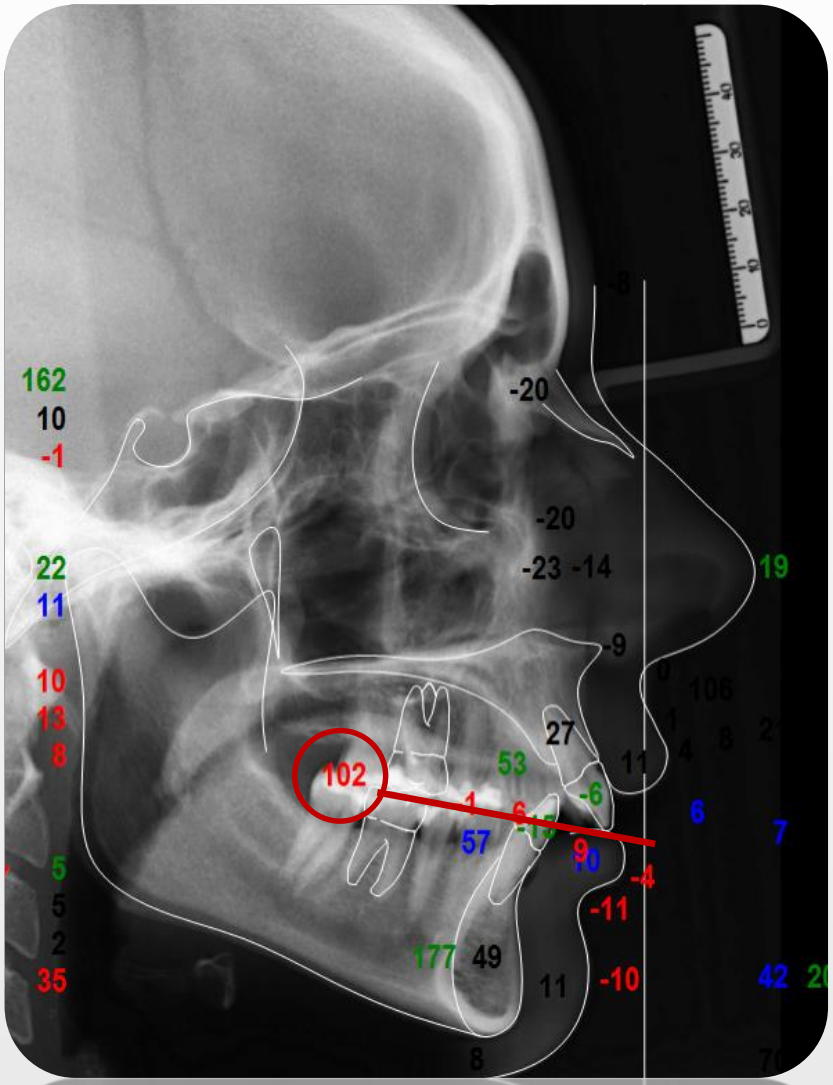
A normal cant of the OP is associated with proportionate relationships of nose, lips & chin

A flat OP leads to a increased chin prominence

A steep OP determines retrusive lips & insufficient chin projection



So what?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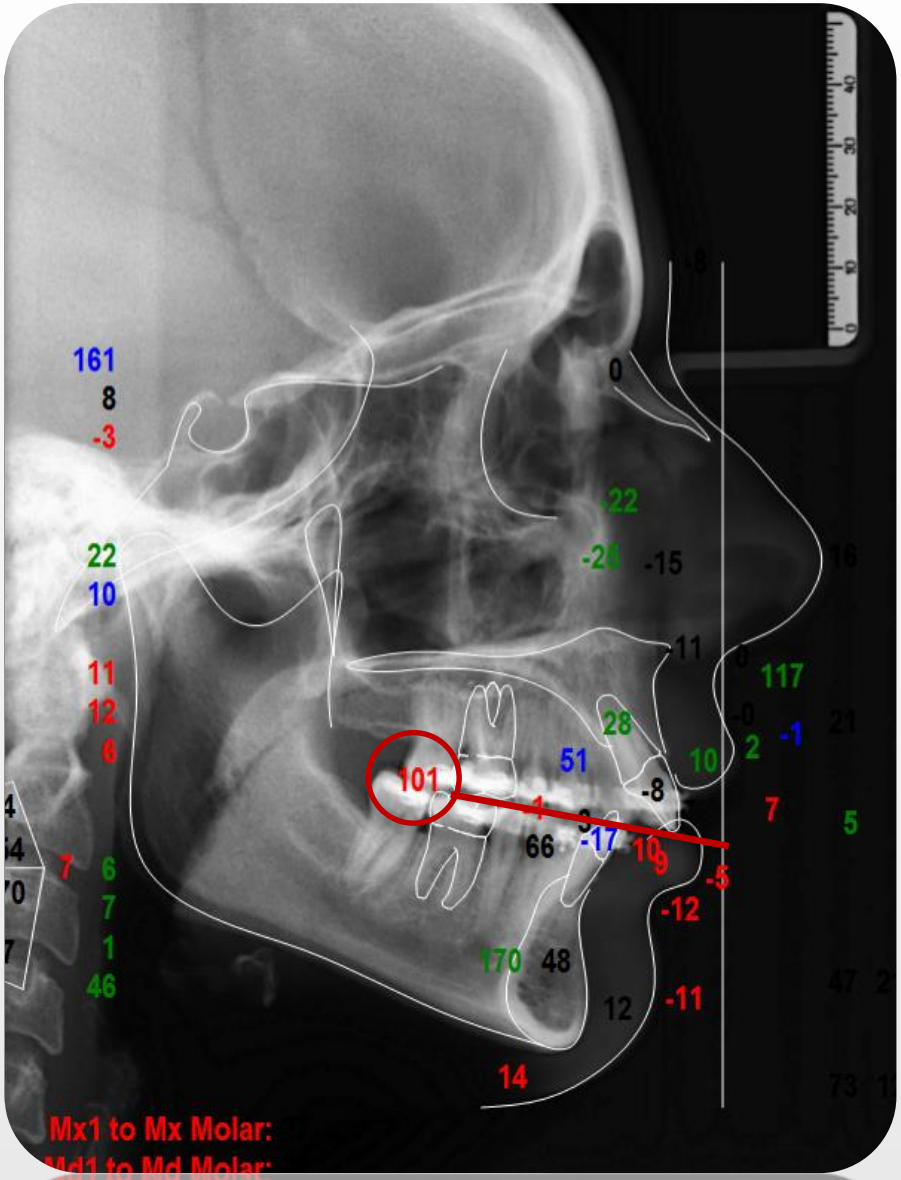
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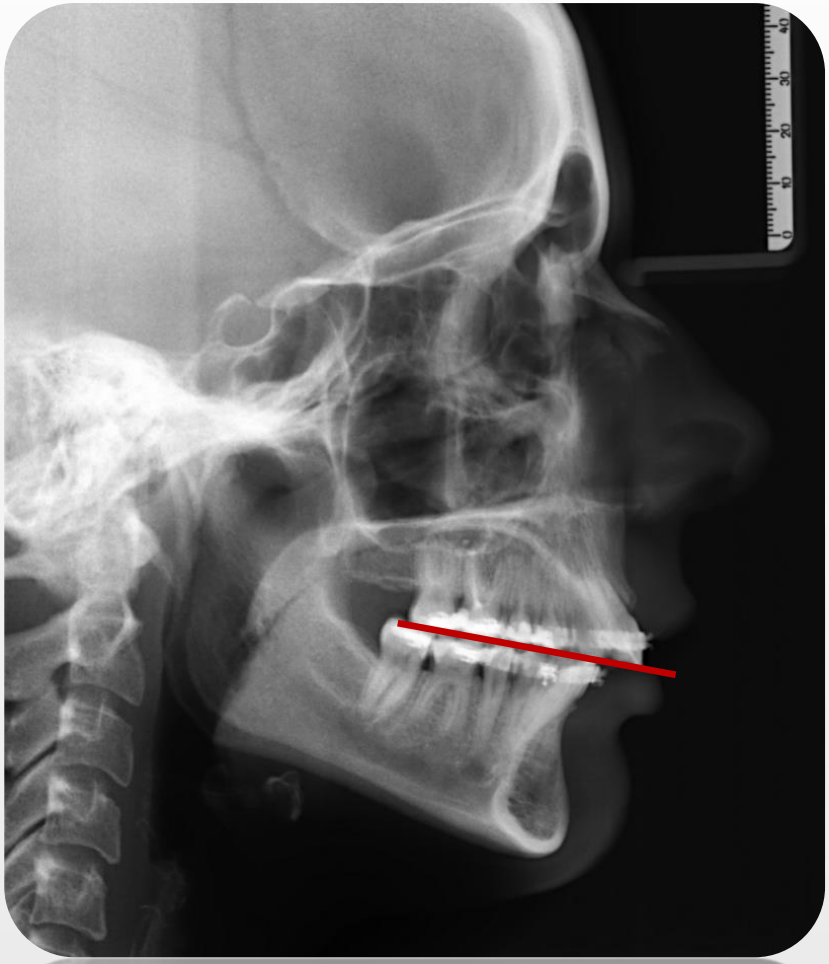
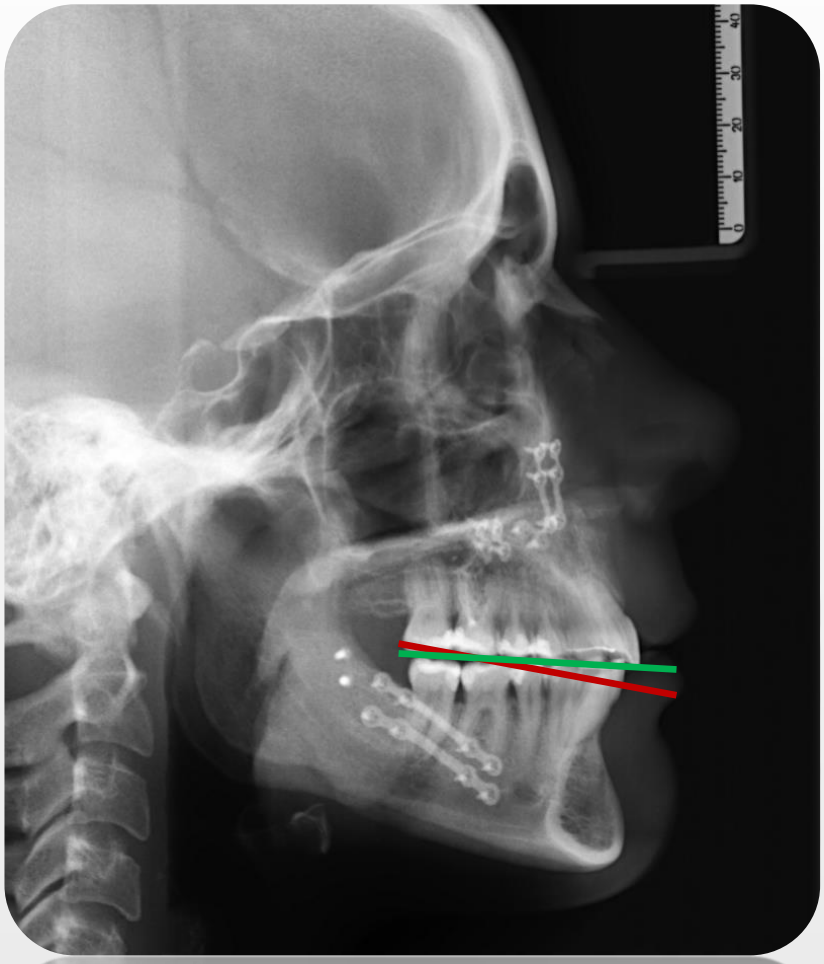
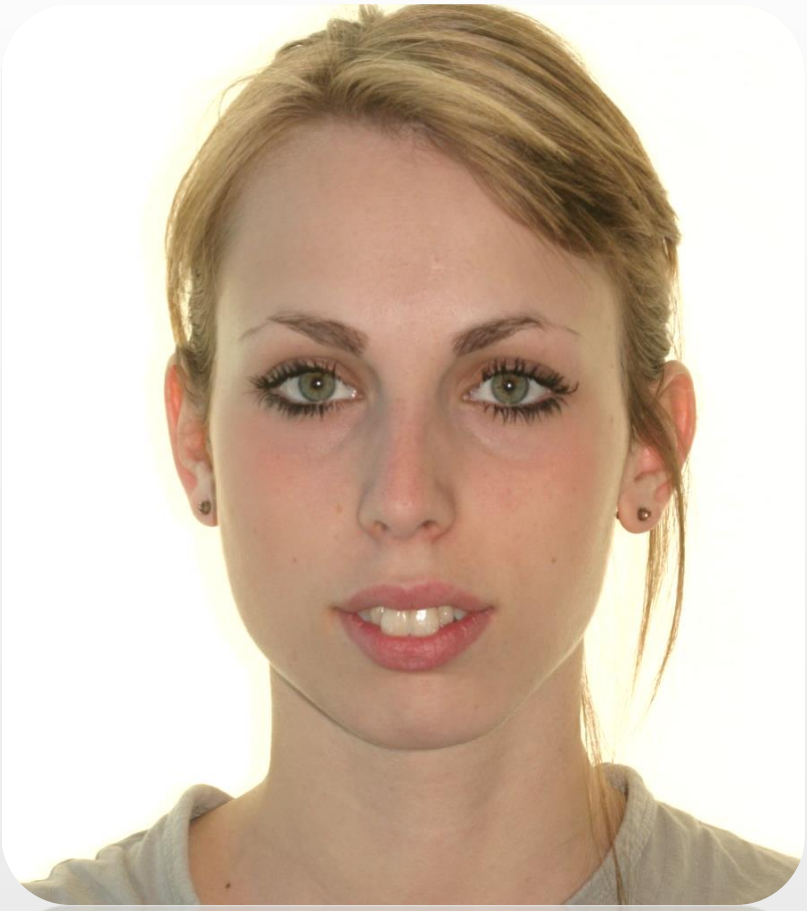
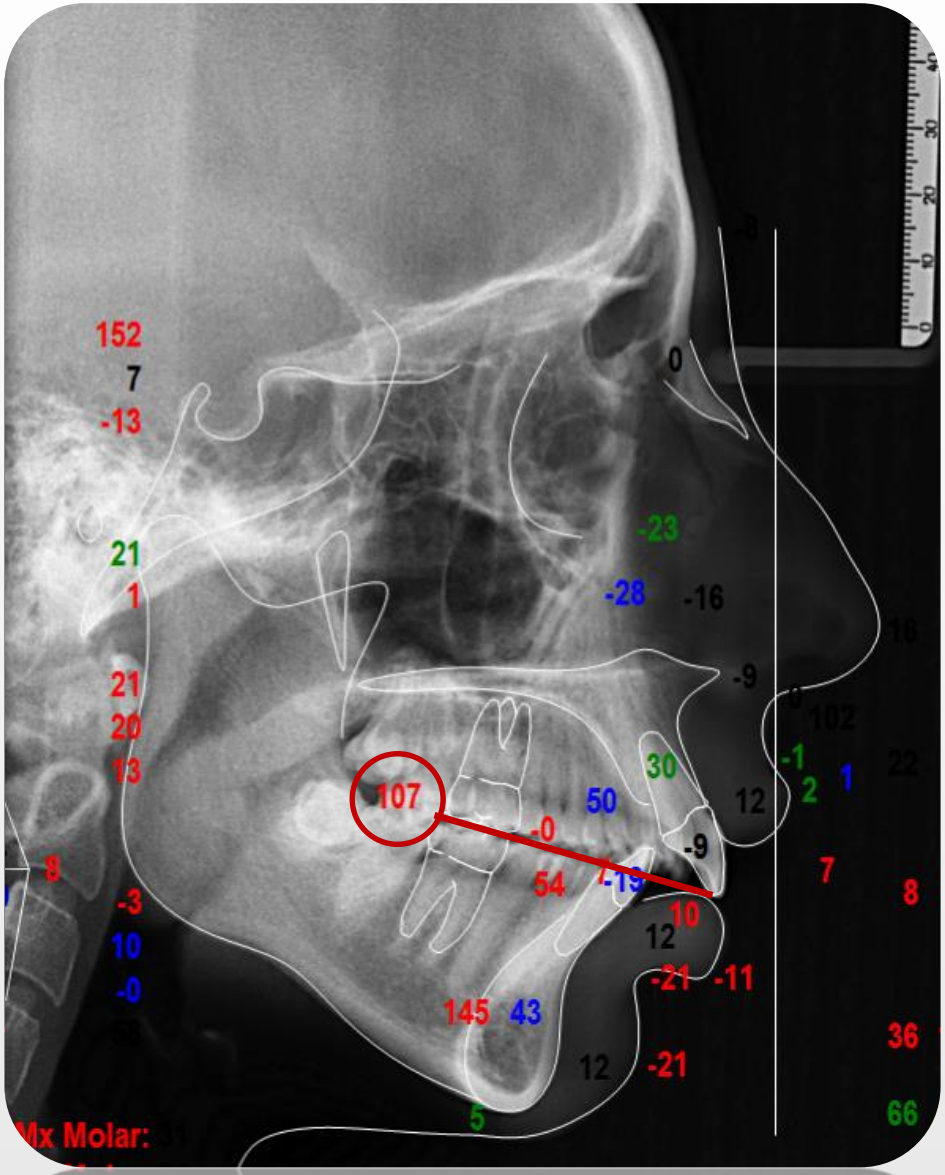
Mx1 to Mx Molar:
Md1 to Md Molar:







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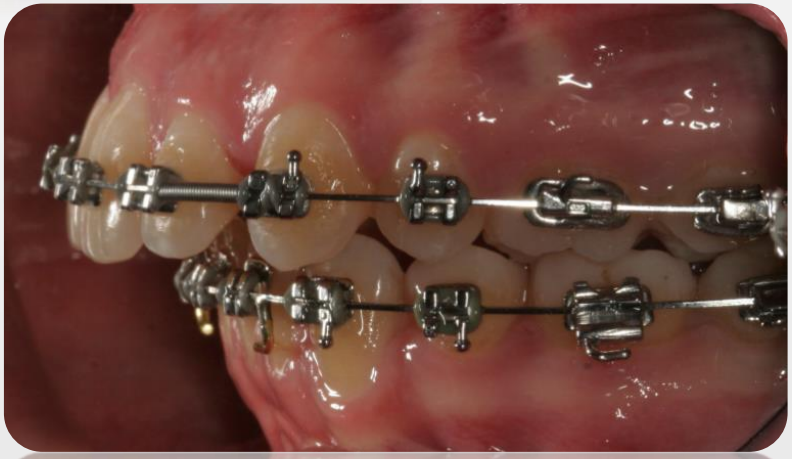
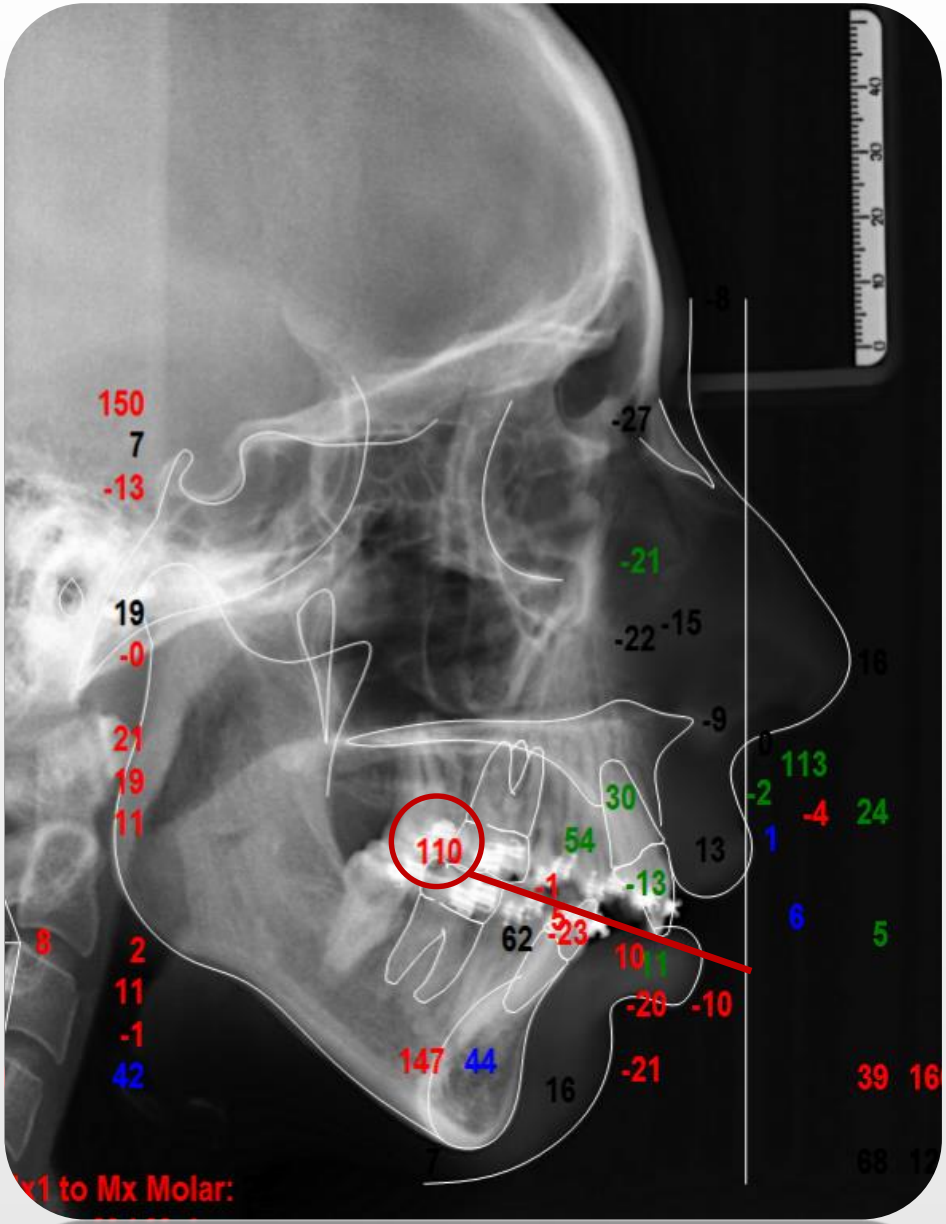
Mx Molar:

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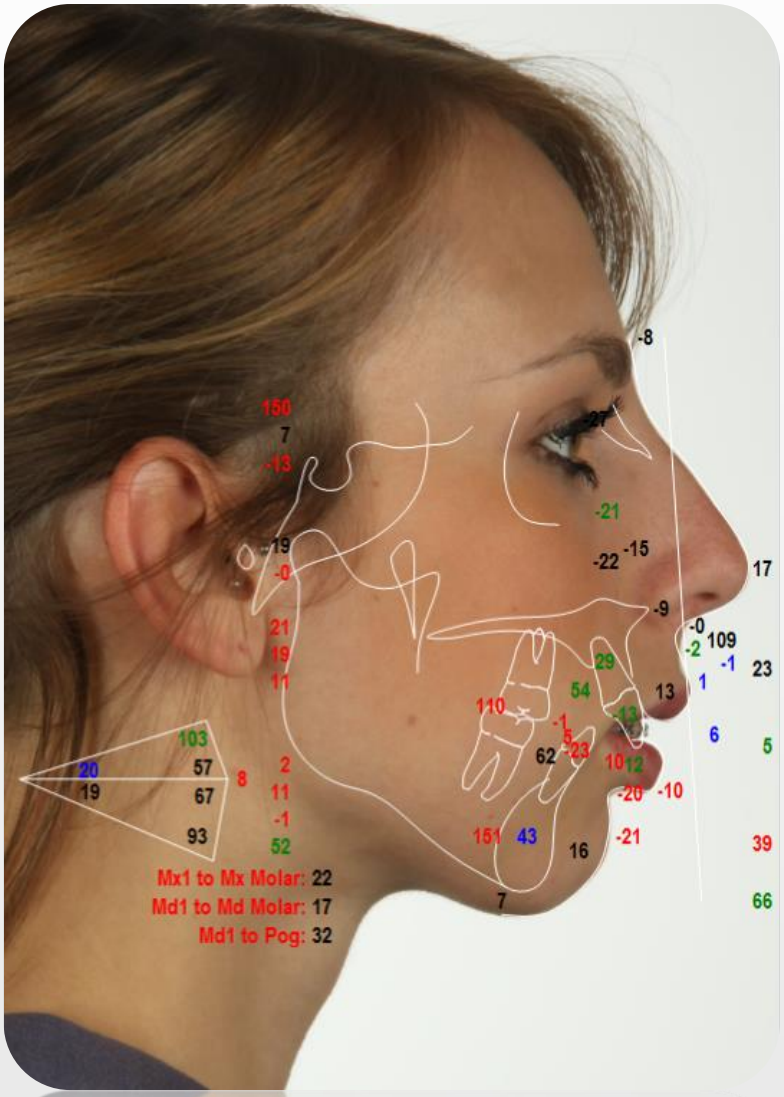
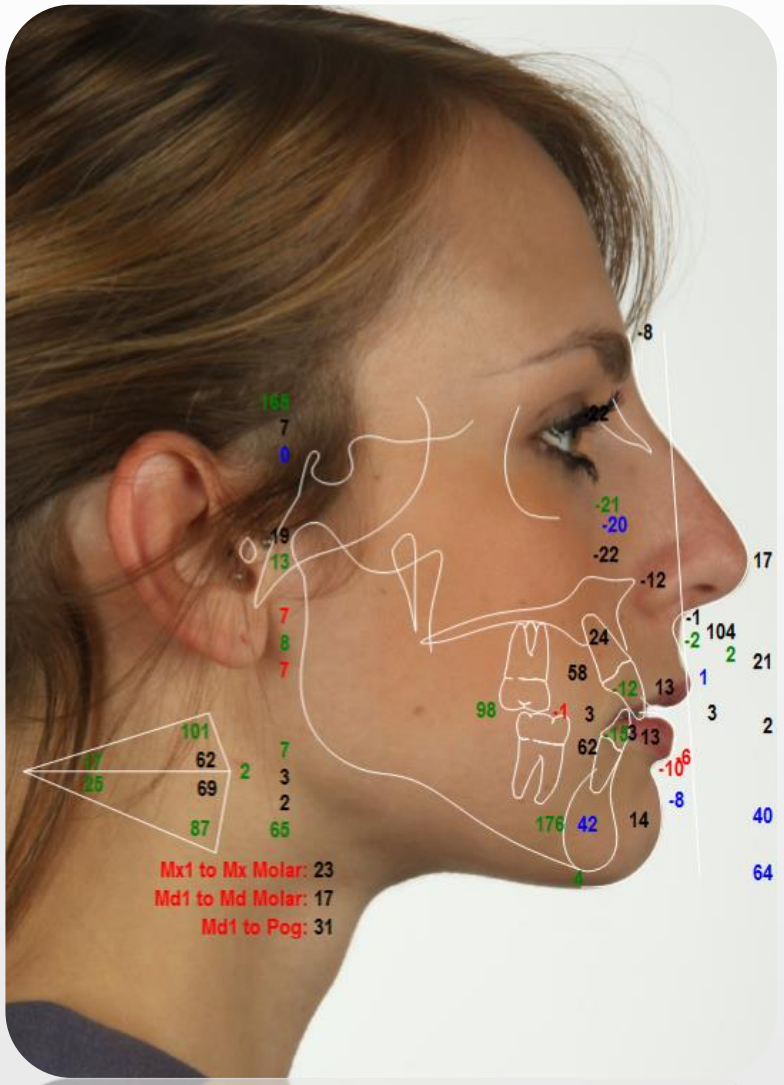
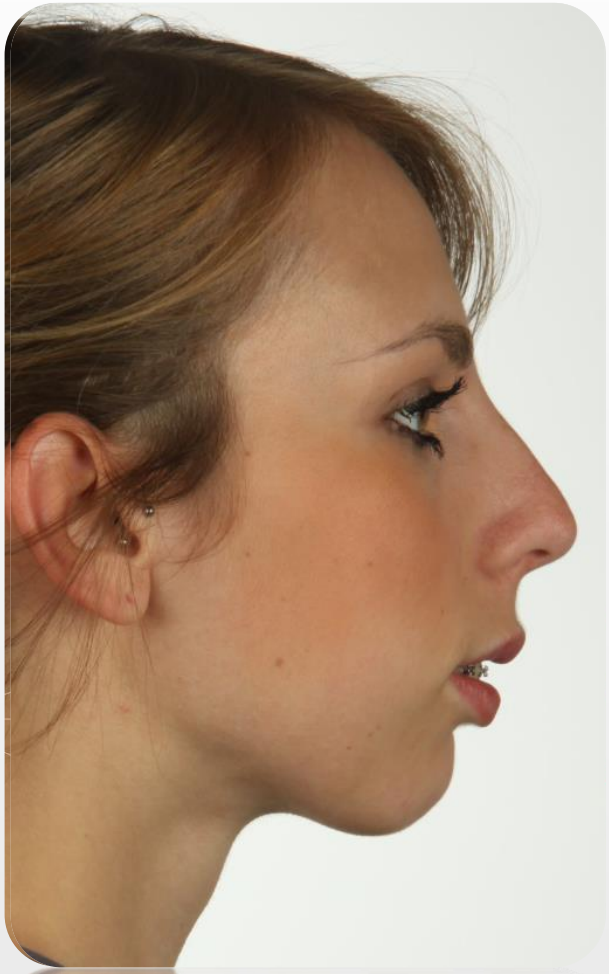
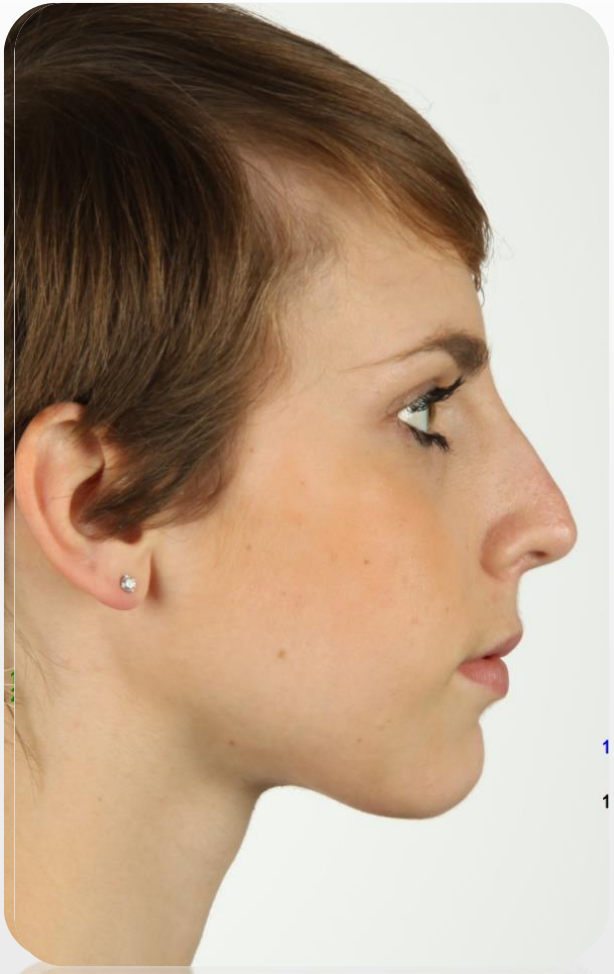
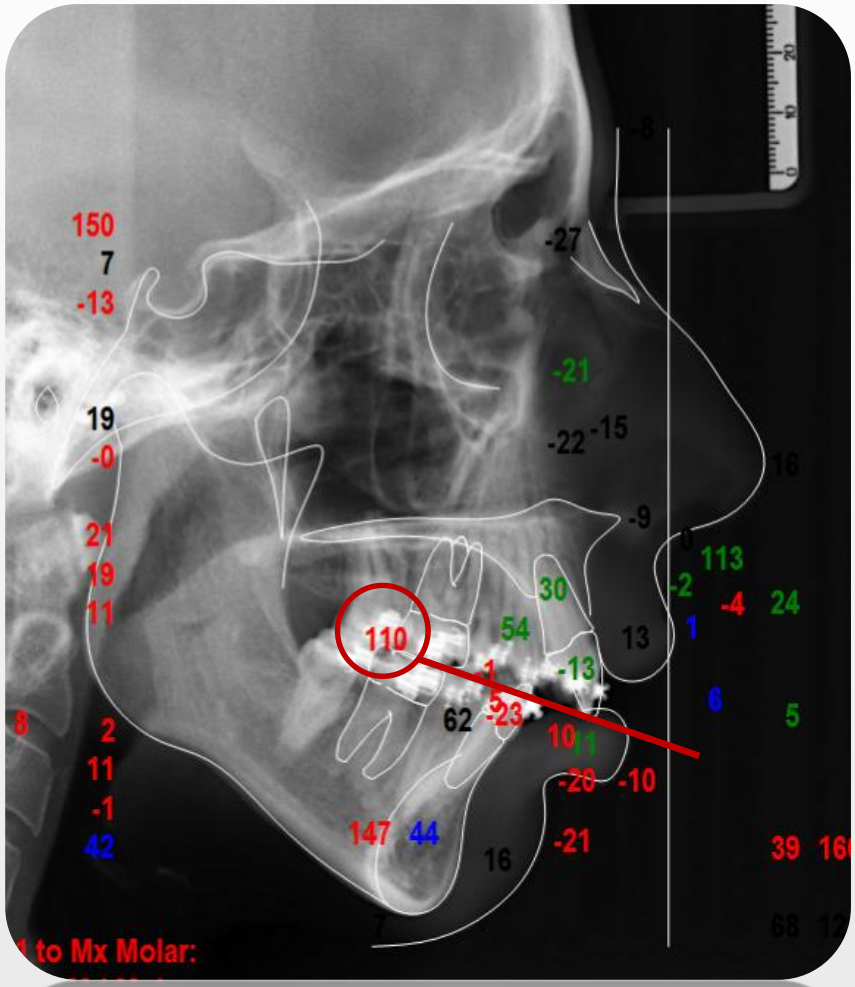
x1 to Mx Molar:


Mx1 to Mx Molar: 22
Md1 to Md Molar: 17
Md1 to Pog: 32


Mx1 to Mx Molar: 23
Md1 to Md Molar: 17
Md1 to Pog: 31



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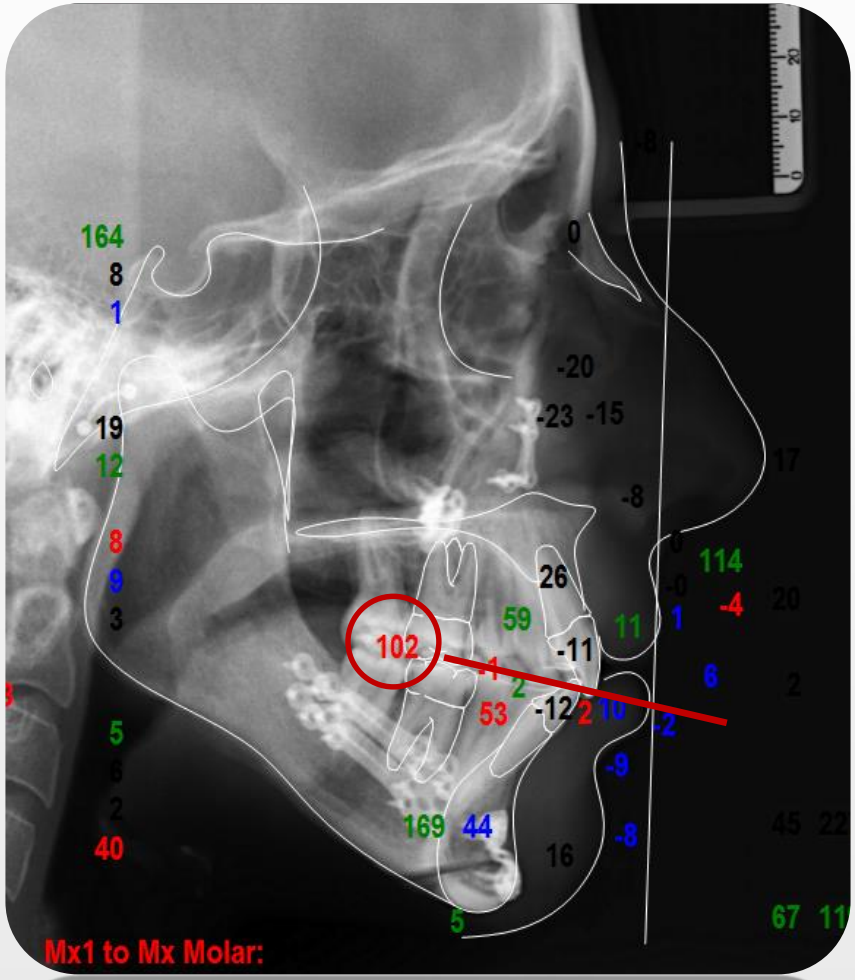
Mx Molar: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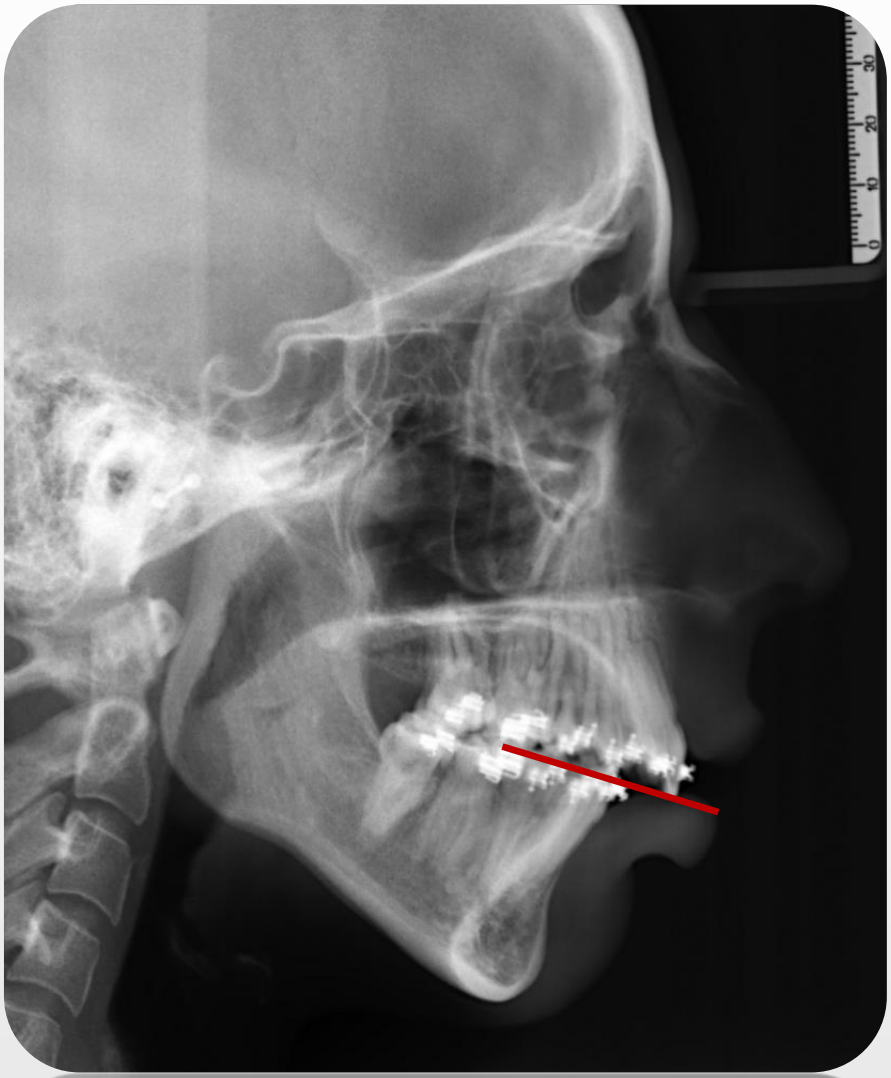
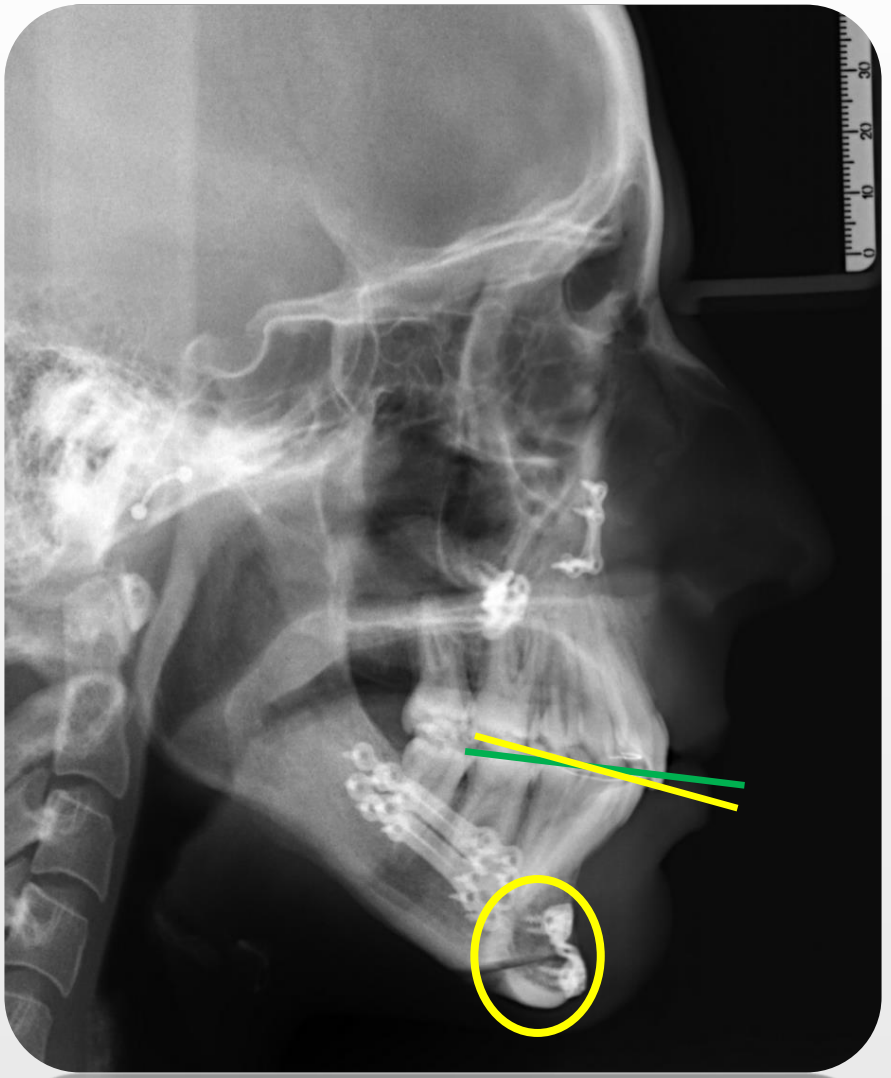
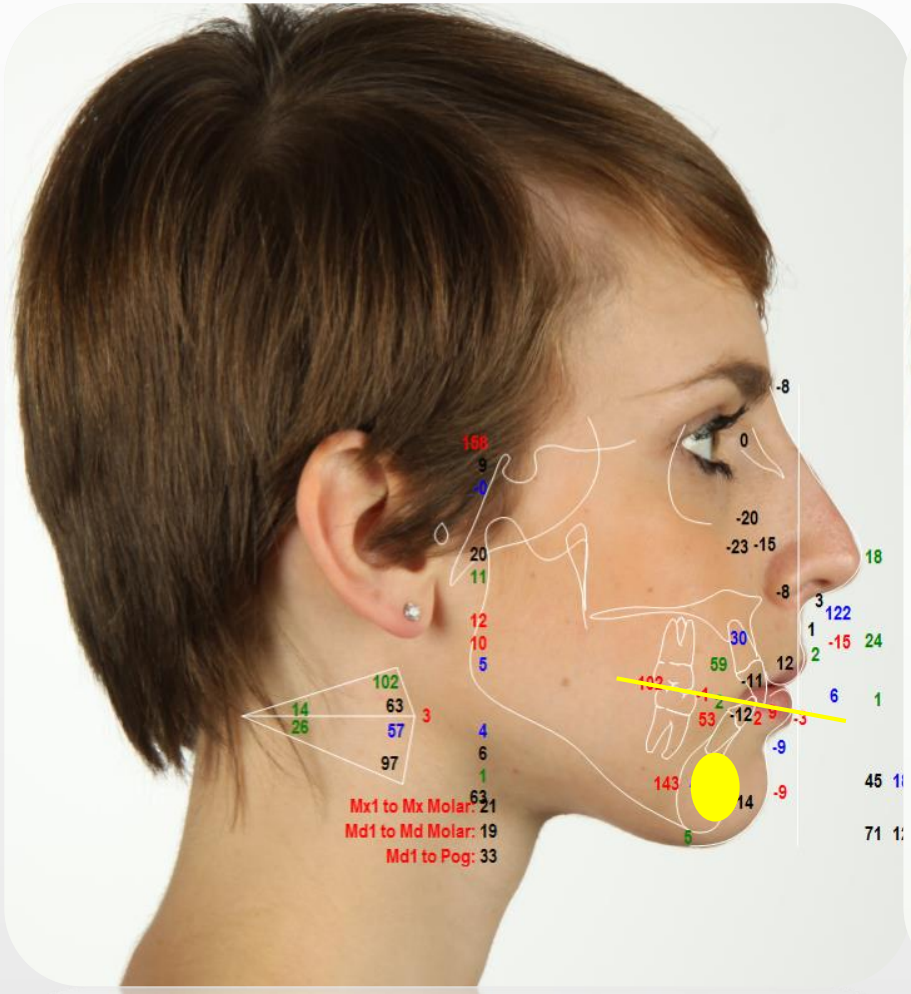
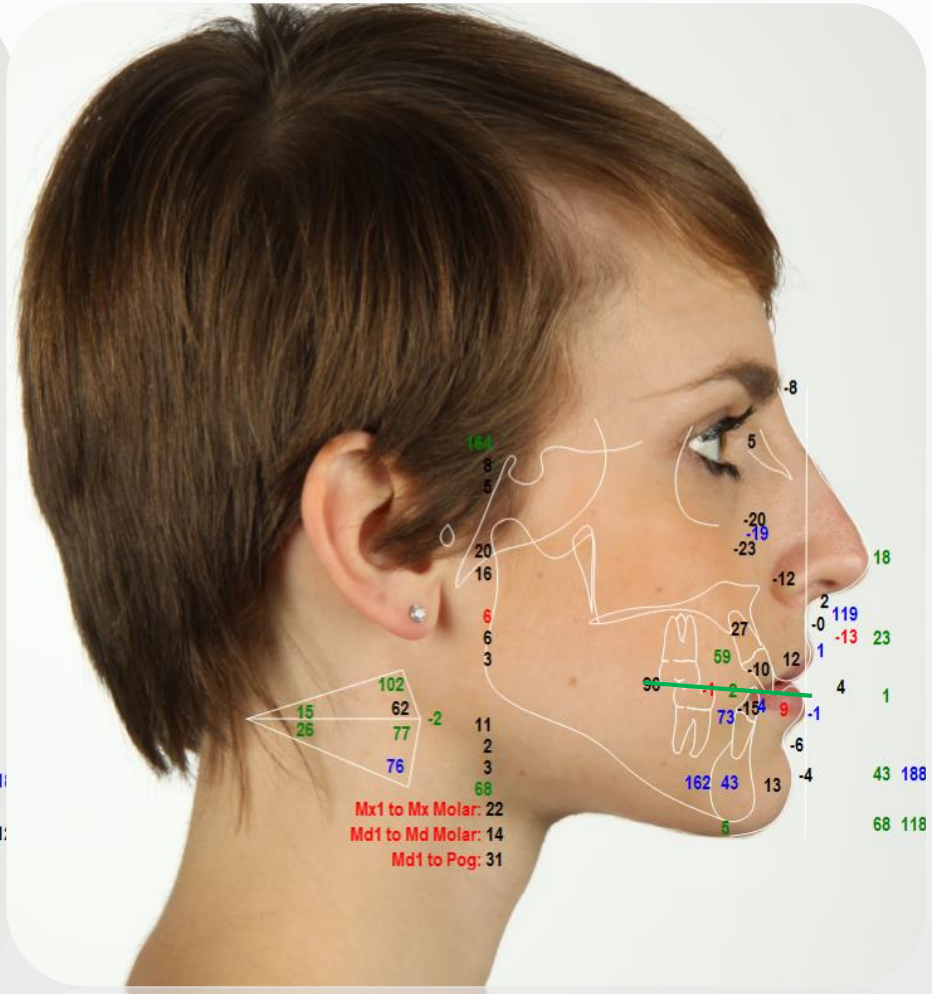
Mx1 to Mx Molar:






Mx1 to Mx Molar: 21
Md1 to Md Molar: 19
Md1 to Pog: 33


Mx1 to Mx Molar: 22
Md1 to Md Molar: 14
Md1 to Pog: 31

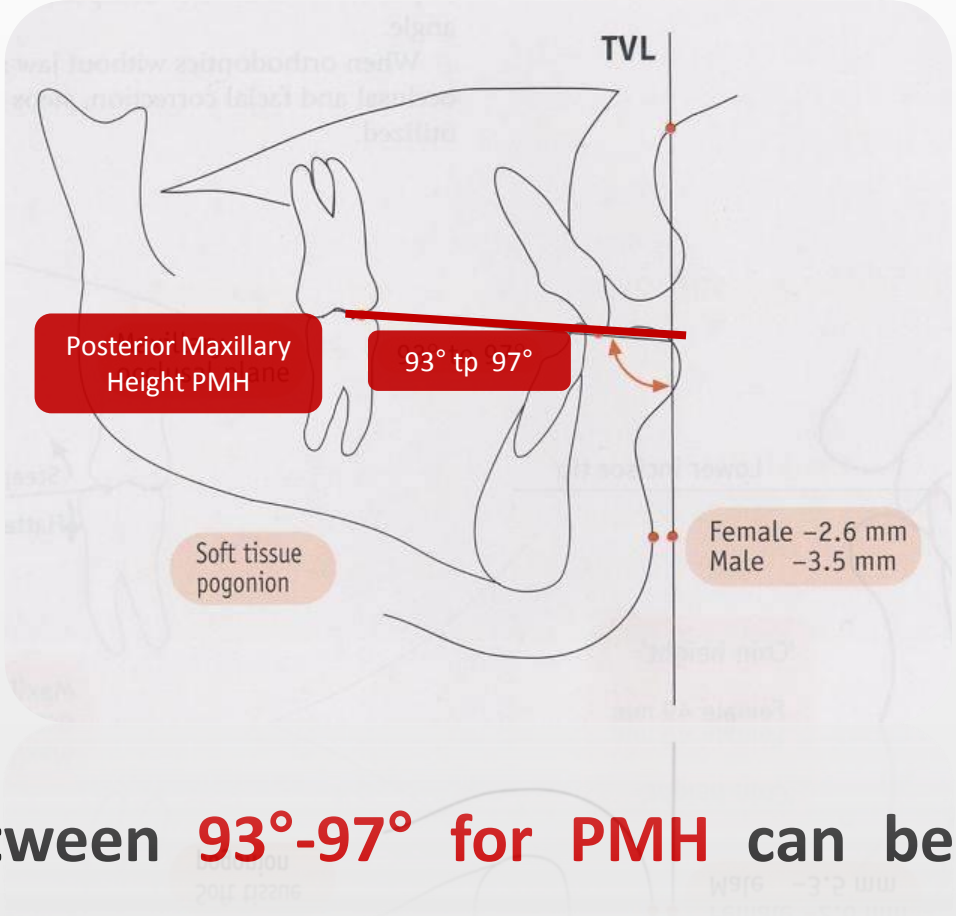
CONCLUSION

Taking so-called “Esthetic profile standards” as reference for diagnosis and treatment planning is justified, but should be done with critical attitude because of ethnic or age-related differences especially at the lip level.

CONCLUSION

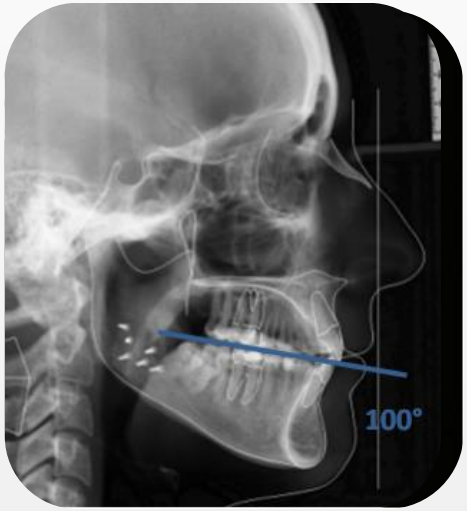
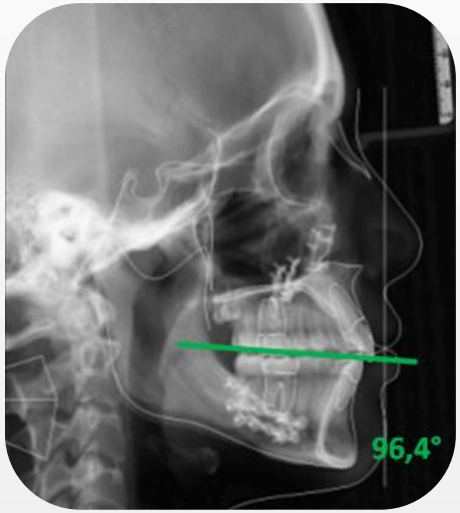
A significant cause-effect correlation exists between the occlusal plane inclination and lower lip and chin projection, while the effect on the midface is below clinical importance.

CONCLUSION



A range between 93°-97° for PMH can be considered a viable guideline for diagnosis and treatment planning.





100°

96,4°

92.7°


CONCLUSION

Two-jaw surgery with rotation of the maxillo-mandibular complex to deliberately change the cant of the OP can significantly improve the soft-tissue profile.

Trying to compensate a postsurgical steep OP only by a genioplasty cannot achieve optimal soft-tissue profiles.

Burcal RG, Laskin DM, Sperry TP.
Recognition of profile change after simulated orthognathic surgery. *J Oral Maxillofac Surg.* 1987;45:666-670.

Arpino VJ, Giddon DB, BeGole Ea, Evans CA.
Presurgical profile preferences of patients and clinicians. *Am J Orthod Dentofacial Orthop*. 1998;114:631-7.

“CAVEAT SPECTATOR”

“Watch (Read) it at least three times;
first to see what it is all about;
secondly, to see what it says; and
thirdly, in an ***attitude of friendly hostility***.”

E.H.Angle: Treatment of Malocclusion of Teeth.
Seventh ed., Philadelphia, S.S. White Company, p.613,1907.

Peck & Peck, The Angle Ortodontist, Vol. 50(1), p.74, 1980.









percepti


Thank you!

August 21st - 25th, 2005