

KEFALOMETRIJSKA ANALIZA PROFILA LICA OSOBA SA MALOKLUZIJOM II KLASSE 2. ODELENJA

PROFILE CEPHALOMETRIC ANALYSIS OF PATIENTS WITH CLASS II DIVISION 2 MALOCCLUSION

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Kratak sadržaj

Profil lica osoba sa malokluzijom II klase 2. odeljenja, zbog specifičnosti same nepravilnosti, ima tipične karakteristike koje se prilikom planiranja ortodontske terapije moraju uzeti u obzir. Cilj ovog istraživanja bio je procena uloge mekih tkiva usana i brade na izgled profila lica osoba sa malokluzijom II klase 2. odeljenja. Za analizu su korišćeni profilni telerentgenski snimci 48 osoba (23 osoba muškog i 25 osoba ženskog pola) sa ovom nepravilnošću na kojima su mereni uglovi SNA,SNB,ANB,SNPg,G-SN-PG, Holdaway ugao i debljina gornje usne i mekog tkiva brade. Rezultati ispitivanja su pokazali da su lica u celini konveksna. Debljina gornje usne i brade delimično kompenzuje prisutni dentoalveolarni i gnatični retrognatizam kod oba pola i tako ublažava izrazito konkavan izgled profila u donjoj trećini lica. Interesantno je da, u poređenju sa utvrđenim standardima, osobe muškog pola imaju skladniji profil nego osobe ženskog pola, mada zbog širokog polja varijacije vrednosti Holdaway ugla, dobijene rezultate treba posmatrati sa oprezom. Takođe, treba imati na umu i da lica koja strogo prate prosečne skeletne i dentalne norme, ne znači da su i realno harmonična i uravnotežena.

Cljučne reči: malokluzija II klase 2. odeljenja, meka tkiva, kefalometrijska analiza

Uvod

Profili lica mogu biti veoma različiti, a opet usklađeni i harmonični. Veoma je širok opseg estetski prihvatljivih profila, pri čemu se uzima u obzir i izgled brade koja zajedno sa gornjom usnom treba da bude blizu Holdaway linije. Povećana debljina mekog tkiva u predelu brade poboljšava izgled profila u donjoj polovini lica.

Abstract

Class II division 2 malocclusion profile, is typical, due to its specific characteristics which cannot be ignored in therapy planning. The aim of this paper was to define the role of lips and chin soft tissue on profile of patients with this malocclusion. The evaluation included 48 lateral roentgenograms (23 male, 25 female) and analysis of angular measurements: SNA,SNB,ANB,SNPg, G-SN-PG and Holdaway angle and linear measurements – upper lip and chin soft tissue thickness. As we expected, facial form is convex. Upper lip and chin soft tissue thickness partially compensate dentoalveolar and jaw retrognathism at both sexes, and reduce significant concave profile in lower third of the face. It is interesting that, according to detented standards, male's profile is more symmetrical than females, although, because of the broad field of variations of Holdaway angle, results should be taken with cautions. We should, also, have in mind that faces that rigidly follow average skeletal and dental measurements are not always really harmonious and balanced.

Key words: class II division 2 malocclusion, soft tissue, cephalometric analysis

Introduction

Face profiles may be very different and still well-formed and harmonized. There is a wide range of aesthetically acceptable profiles, whereupon there is taken into consideration, the looks of the chin which, along with the upper lip, should be near Holdaway line. The increased thickness of soft tissue in the region of the chin makes the profile in the lower half of the face better.

Osobe sa malokluzijom II klase 2. odeljenja imaju specifičnu formu profila koju karakteriše jače isturen nos i brada. Duboki zagrižaj, prisutan kod ove nepravilnosti, prepreka je razvitku alveolarnog nastavka donje vilice. Kao posledica toga, veća je isturenost brade, ali i retruzija sekutića. Individualne varijacije izgrađenosti brade kod osoba sa malokluzijom II klase 2. odeljenja mogu biti kamufirane ili potencirane debljinom mekih tkiva. Gornja usna, takođe, može uticati na izgled profila lica u smislu kamuflaže ili potenciranja nepravilnosti II klase 2. odeljenja.

Uticaj mekih tkiva na formiranje nepravilnosti istican je od strane nekih autora^{1,2} kao značajan etiološki faktor kod malokluzije II klase 2. odeljenja kao i da položaj gornjih inciziva kod ove nepravilnosti može biti rezultat funkcije perioralne muskulature. Flecher^{3,4}, takođe, u svojim longitudinalnim studijama zaključuje da muskulatura ima značajan uticaj u određivanju inklinacije gornjih inciziva posle nicanja, ali i da je položaj gornjih inciziva uslovljen i međusobnim odnosom facijalnih struktura i perioralne muskulature. Thuer⁵ i sar., ispitujući snagu i pritisak gornje i donje usne na gornje i donje centralne incizive, zaključuju da kod malokluzije II klase 2. odeljenja položaj inciziva nije uslovljen snagom muskulature usana. Većina autora, ipak, smatra da je ova nepravilnost rezultat nasleđa,⁶⁻¹¹ i to da se radi o autozomno dominantnom tipu nasleđivanja anomalije¹² a da funkcija, položaj i dejstvo donje usne nije najglavniji etiološki faktor u nastajanju ove malokluzije.

Cilj istraživanja

Cilj ovog rada bio je oceniti ulogu mekih tkiva usana i brade na izgled profila lica osoba sa malokluzijom II klase 2. odeljenja.

Materijal i metod

Istraživanjem je obuhvaćeno 48 osoba (25 osoba ženskog i 23 osobe muškog pola), starosti od 15 do 28 godina sa malokluzijom II klase 2. odeljenja koje nisu prethodno ortodontski tretirane. Ispitanici su podeljeni u 2 grupe, prema polu:

I grupa – osobe muškog pola sa malokluzijom II klase 2. odeljenja

Persons with class II division 2 malocclusion have a specific profile form which is characterised by more protruded nose and chin. Deep bite, present with this irregularity, is an obstacle to the development of alveolar process of the lower jaw. As its consequence, chin protrusion is bigger but retrusion of incisors as well. Individual variations of the build of the chin of persons with class II division 2 malocclusion can be camouflaged or pointed out by soft tissues thickness. The upper lip can also influence the looks of the face profile in the sense of camouflage or pointing out irregularities of class II division 2 malocclusion.

The influence of soft tissues on forming irregularities has been, by some authors^{1,2}, pointed out as a significant etiological factor of class II division 2 malocclusion as well as that the position of upper incisors may be result of function of perioral musculature. Flecher^{3,4}, also, in his longitudinal studies concludes that musculature has an important influence in determining inclination of upper incisors and that the position of upper incisors has been conditioned as well by mutual relationship of facial structures and perioral musculature. Thuer⁵ et al., examining power and pressure of upper and lower lip to upper and lower central incisors, conclude that at persons with class II division 2 malocclusion the position of incisors is not conditioned by power of lips musculature. Majority of authors, nevertheless, find this irregularity as a result of inheritance⁶⁻¹¹ therefore being autosomous dominant type of inheriting anomaly¹² and that function, position and action of lower lip is not the main etiological factor of this malocclusion.

Aim of research

The aim of this paper has been to estimate role of soft tissues of lips and chin on looks of face profile of persons with class II division 2 malocclusion.

Material and method

By research, there have been included 48 persons (25 females and 23 males) aged from 15 to 28 years with class II division 2 malocclusion that had not been previously orthodontically treated. The examinees were divided into 2 groups, according to the gender:

I group – males with class II division 2 malocclusion

II grupa - osobe ženskog pola sa malokluzijom II klase 2. odeljenja

Urađeni su profilni telerentgentski snimci svih pacijenata pomoću aparata marke „Simens”, snage 90 KW i eksponažom od oko 1 sekunde. Za sve pacijente snimanje je obavljeno pod istim uslovima: glava je fiksirana pomoću kefalostata tako da je frankfurtska horizontala bila paralelna sa podom, a srednja sagitalna ravan paralelna sa kasetom i filmom. Ekspozicija je podešavana prema uzrastu pacijenta. Svi telerentgentski snimci analizirani su kombinacijom više metoda (Schwarz, Steiner i Holdaway), iscrtavanjem kontura mekih tkiva i koštanih struktura na paus papiru. Analizirani su sledeći uglovi: SNA, SNB, ANB, SNPg, G-SN-PG, Holdaway ugao i debljina gornje usne i mekog tkiva brade. Vrednosti parametara dobijenih analizom unošene su u istraživačke kartone, a potom statistički obrađivane kompjuterskim programom Microsoft Exel Me i upoređivani međusobno, između grupa. Takođe, poređenja su vršena i sa standardnim vrednostima istih parametara za ortognata lica. Kod Holdaway ugla i ugla ANB zbog visoke vrednosti koeficijenta varijacije ($C_v > 30\%$) po zakonima statistike, postojanje polnih razlika, kao i razlika u odnosu na standardne vrednosti nije moglo biti utvrđeno t-testom kao za ostale parametre, već preko statističke formule za intervale poverenja. Vrednost koeficijenta varijacije za ugao G-SN-PG kod osoba ženskog pola je ispod 30%. Međutim, da bi ovaj parametar mogao biti kompariran sa istim parametrom kod osoba muškog pola (čija je vrednost koeficijenta varijacije veća od 30%) i tako utvrđeno postojanje polnih razlika, utvrđen je i interval poverenja ovog parametra. Rezultati su prikazani tabelarno i grafički.

Rezultati istraživanja

Rezultati dobijeni analizom profilnih telerentgenskih snimaka osoba sa malokluzijom II klase 2. odeljenja pokazuju veće vrednosti svih ispitivanih angularnih parametara kod osoba ženskog pola, dok su linearni parametri imali veće vrednosti kod osoba muškog pola. U poređenju sa standardnim vrednostima, kod oba pola postoje razlike ispitivanih parametara na različitom nivou značajnosti.

II group - females with class II division 2 malocclusion

There have been made profile cephalograms of all patients by way of apparatus of “Simens” make, power 90 KW and exposition of around 1 second. For all patients making shots was performed under the same conditions: head is fixed by way of cephalostat so that the frankfurt horizontal was parallel to the floor and the mean sagittal plane parallel to cassette and film. Exposition was adjusted as per age of patient. All profile cephalograms were analysed by combination of several methods (Schwarz, Steiner and Holdaway), by drawing of contours of soft tissues and osseous structures on the “paus” paper. There were analysed the following angles: SNA, SNB, ANB, SNPg, G-SN-PG, Holdaway angle and thickness of upper lip and soft tissue of the chin. Values of parameters obtained by analysis were entered into research cardboards and then statistically processed by computer program Microsoft Exel Me and compared mutually, between the groups. Also, there were performed comparisons as well with standard values of the same parameters for orthognat faces. With Holdaway angle and ANB angle due to high value of variation coefficient ($C_v > 30\%$) as per laws of statistics, existence of gender differences as well as difference in relation to standard values could not be determined by t-test like for other parameters but through statistical formula for intervals of confidence. Value of variation coefficient of G-SN-PG parameter at females is under 30%. However, in order to be able to compare this parameter with the same parameter of males (whose variation coefficient value is bigger than 30%) and thus determined existence of gender differences, there has been calculated confidence interval of this parameter as well. Results are shown tabularly and graphically.

Results of research

Results obtained by analysis of profile cephalogram of persons with class II division 2 malocclusion show bigger values of all examined angular parameters at females, while linear parameters had bigger values at males. In comparison with standard values there are with both sexes differences of examined parameters on various level of significance.

Angularni parametri

Polne razlike i razlike u odnosu na standardne vrednosti uglova SNA, SNB, SNPg ispitivane su t-testom, a uglova ANB, H i G-SN-PG komparacijom preko intervala poverenja.

Razlike vrednosti angularnih parametara osoba muškog pola i standardnih vrednosti (tabela 1).

Prosečna vrednost ugla SNA kod osoba muškog pola iznosi 78,8°, ugla SNB je 74,3° a ugla SNPg je 75,4°. Uglovi SNA, SNB i SNPg kod osoba muškog pola značajno su manji od standardnih vrednosti ovih uglova. Najveća razlika na nivou statističke signifikantnosti $p < 0,001$ postoji kod ugla SNB (*t-test* 7,76). Nešto manju razliku, ali na istom nivou značajnosti ($p < 0,001$) nalazimo kod ugla SNA (*t-test* 4,24) i kod ugla SNPg (*t-test* 3,55).

Razlike vrednosti angularnih parametara ženskog pola i standardnih vrednosti (tabela 2).

Prosečna vrednost ugla SNA kod osoba ženskog pola iznosi 81,84°, ugla SNB 76,3° a ugao SNPg kod osoba ženskog pola ima prosečnu vrednost 79,4°. Uglovi SNA, SNPg kod osoba ženskog pola ne razlikuju se značajno od standardnih vrednosti za te uglove – *t-test* 1,01(SNA); 1,43(SNPg). Razlike na vrlo visokom nivou signifikantnosti ($p < 0,001$) prisutne su kod vrednosti ugla SNB (*t-test* 6,50).

Polne razlike angularnih parametara (tabela 3).

Analizirani uglovi čije su razlike mogle biti ispitivane t-testom (SNA, SNB, SNPg) imali

Tabela 1. Razlike vrednosti uglova SNA, SNB, SNPg osoba muškog pola sa malokluzijom II klase 2. odelenja i standardnih vrednosti

Table 1. Differences of angles SNA, SNB, SNPg at males with Class II division 2 malocclusion and standard values

m	<SNA	<SNB	<SNPg
MIN	72	68	46
MAX	86	81	82
X	78.8	74.3	75.4
SD	3.5	3.4	7.4
CV	4.5	4.6	9.8
SE	0.8	0.7	1.6
STAND	82	80	81
t-test	4.24	7.76	3.55

Angular parameters

Gender differences and differences in relation to standard values of angles SNA, SNB, SNPg were examined by t-test and angles ANB, H and G-SN-PG by comparison through confidence interval.

Differences of value of angular parameters of males and standard values (table 1).

Mean value of SNA angle at males amounts to 78.8°, SNB angle is 74.3° and SNPg angle is 75.4°. Angles SNA, SNB and SNPg at males are significantly smaller than standard values of these angles. The biggest difference on the level of statistical significance $p < 0.001$ exists with SNB angle (*t-test* 7.76). Slightly smaller difference but the same significance level ($p < 0.001$) we find with SNA angle (*t-test* 4.24) and with SNPg angle (*t-test* 3.55).

Differences of value of angular parameters of females and standard values (table 2).

Mean value of SNA angle at females amounts to 81.84°, SNB angle 76.3° while SNPg angle at females has mean value of 79.4°. Angles SNA, SNPg at females do not differ significantly from standard values for those angles – *t-test* 1.01 (SNA); 1.43 (SNPg). Differences on very high level of significance ($p < 0.001$) are present with SNB angle value (*t-test* 6.50).

Gender differences of angular parameters (table 3).

There were analyzed angles whose differences could have been examined by t-test (SNA,

Tabela.2. Razlike vrednosti uglova SNA, SNB, SNPg osoba ženskog pola sa malokluzijom II klase 2. odelenja i standardnih vrednosti

Table 2. Differences of angles SNA, SNB, SNPg at females with Class II division 2 malocclusion and standard values

f	<SNA	<SNB	<SNPg
MIN	77	71	73
MAX	87	82	101
X	81.4	76.3	79.4
SD	2.8	2.8	5.5
CV	3.5	3.6	7.0
SE	0.6	0.6	1.1
STAND	82	80	81
t-test	1.01	6.50	1.43

su veće vrednosti kod osoba ženskog pola sa malokluzijom II klase 2. odeljenja. Visoki nivo značajnosti razlika ($p < 0,001$) nalazimo kod uglova SNA (*t-test* 11,73) i SNB (*t-test* 8,86) što govori o postojanju veoma izraženog polnog dimorfizma. Statistički značajna razlika na nešto nižem nivou značajnosti ($p < 0,05$) postoji kod ugla SNPg (*t-test* 2,67).

Komparacija preko intervala poverenja (tabela 4).

Ugao ANB. Kod osoba muškog pola dobijene vrednosti intervala poverenja za ugao ANB kreću se od $3,5^\circ$ do $5,5^\circ$. Očekivane vrednosti ugla ANB uglavnom su veće od onih u okviru intervala poverenja standardnih vrednosti, ali i jednake njima. Procentualna zastupljenost dis-

SNB, SNPg) had bigger values at females with class II division 2 malocclusion. High level of significance of differences ($p < 0.001$) we find with angles SNA (*t-test* 11.73) and SNB (*t-test* 8.86) which speaks of existence of a very expressed gender dimorphism. Statistically significant difference on a slightly lower level of significance ($p < 0.05$) exists with SNPg angle (*t-test* 2.67).

Comparison through confidence interval (table 4).

ANB angle. With persons of male gender the obtained values of confidence interval for ANB go from 3.5° to 5.5° . Expected values of ANB angle are mainly bigger than those within confidence interval of standard values, but the same as them as well. Percentile occurrence of

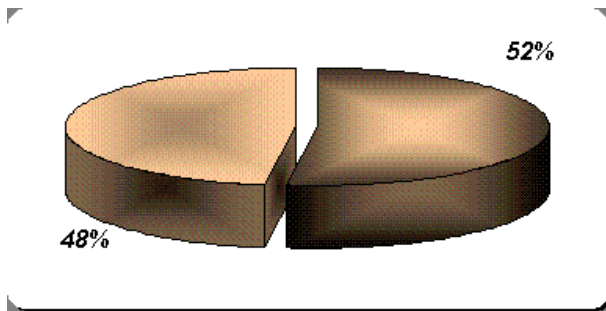
Tabela.3. Polne razlike uglova SNA, SNB, SNPg kod osoba sa malokluzijom II klase 2. odeljenja
Table 3. Gender differences of angles SNA, SNB, SNPg at patients with Class II division 2 malocclusion

	pol	N	<SNA	<SNB	<SNPg
MIN	f	25	77	71	73
	m	23	72	68	46
MAX	f	25	87	82	101
	m	23	86	81	82
X	f	25	81.4	76.3	79.4
	m	23	78.8	74.3	75.4
SD	f	25	2.8	2.8	5.5
	m	23	3.5	3.4	7.4
CV	f	25	3.5	3.6	7.0
	m	23	4.5	4.6	9.8
t-test			11.73	8.86	2.67

Tabela 4. Komparacija intervala poverenja osoba muškog i ženskog pola sa malokluzijom II klase 2. odeljenja i intervala poverenja standardnih vrednosti za uglove ANB, H i G-SN-PG

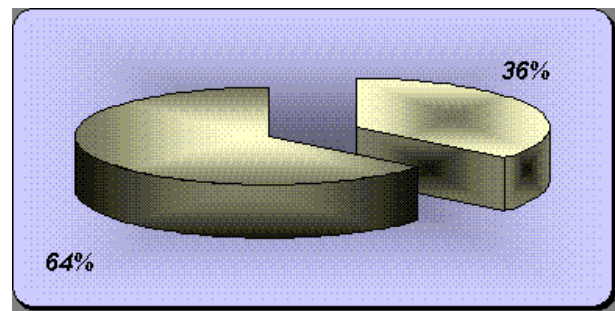
Table 4. Comparison between interval of confidence for females and males with Class II division 2 malocclusion and interval of confidence for standard values for angles ANB, H and G-SN-PG

	pol	N	<ANB	<H	<G-SN-PG
MIN	f	25	2	4	8
	m	23	0	-1.5	5
MAX	f	25	10	20.5	29
	m	23	10	26	34
X	f	25	5.1	12.1	18
	m	23	4.5	11.3	16.6
SD	f	25	1.8	4.4	4.75
	m	23	2.3	6.1	6.8
CV	f	25	36.1	36.8	26.36
	m	23	50.9	54.2	41.1
IP	f	25	4.4-5.8	10.2-13.9	16.04-19.96
	m	23	3.5-5.5	8.7-13.9	13.7-19.5
	STAND	/	0-4	5.0-11.0	8.0-16



Dijagram 1. Procentualna zastupljenost neutralnog i distalnog odnosa vilica kod osoba muškog pola sa malokluzijom II klase 2. odeljenja. 52% neutralni odnos, 48% distalni odnos

Diagram 1. Percentile representation of neutral and distal jaw relationship at males with Class II division 2 malocclusion: 52% neutral, 48% distal



Dijagram 2. Procentualna zastupljenost neutralnog i distalnog odnosa vilica kod osoba ženskog pola sa malokluzijom II klase 2. odeljenja: 36% neutralni odnos, 64% distalni odnos

Diagram 2. Percentile representation of neutral and distal jaw relationship at females with Class II division 2 malocclusion: 36% neutral, 64% distal

distalnog odnosa vilica kod osoba muškog pola iznosi 48% a neutralnog odnosa 52% (dijagram 1). Interval poverenja za ugao ANB kod osoba ženskog pola kreće se od 4,4° do 5,8°. Vrednosti ugla ANB dobijene na ispitivanom uzorku osoba ženskog pola sa malokluzijom II klase 2. odeljenja mada veće, ne odstupaju statistički značajno od vrednosti u okviru intervala poverenja standardnih vrednosti za ovaj ugao. Procentualna zastupljenost vrednosti ugla ANB koja ukazuje na distalni odnos vilica iznosi 64%, a neutralni odnos 34% (dijagram 2).

Individualne varijacije vrednosti ugla ANB, posmatrajući koeficijente varijacija, veće su kod osoba muškog pola nego kod osoba ženskog pola. Interval poverenja kod osoba ženskog pola unutar kojeg možemo očekivati da je vrednost ugla ANB uži je od intervala poverenja za ovaj ugao kod osoba muškog pola, ali se ti intervali delimično i poklapaju, pa se može reći da ne postoje značajne polne razlike za vrednosti ugla ANB.

Individualne varijacije vrednosti uglova H i G-SN-PG veće su kod osoba muškog pola, za razliku od osoba ženskog pola gde je koeficijent varijacije niži i varijabilnost vrednosti ovog parametra manja.

Ugao H. Interval poverenja za ugao H kod osoba ženskog pola iznosi od 10,2° do 13,9° i nalazi se unutar skupa koji je definisan kao interval poverenja za ugao H kod osoba muškog pola koji ima vrednosti od 8,7° do 13,9°. Posmatrajući interval poverenja za ugao H kako kod osoba muškog tako i kod osoba ženskog pola može se uočiti da su očekivane vrednosti uglavnom veće od onih u okviru intervala poverenja standardnih vrednosti za ugao H, ali i jednake njima.

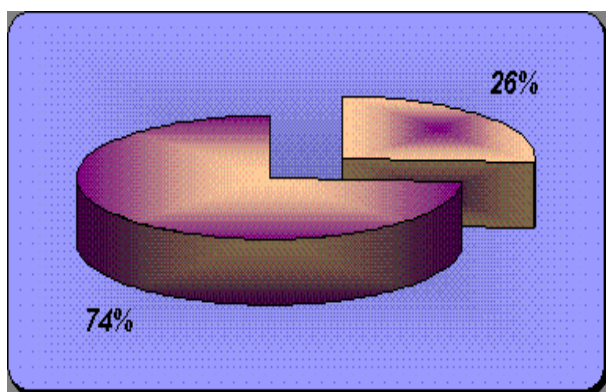
distal relationship of jaws at males amounts to 48% and neutral relationship 52% (diagram 1). Confidence interval for ANB angle at females amounts from 4.4° to 5.8°. Values of ANB angle, obtained on females with class II division 2 malocclusion although bigger, do not diversify statistically significantly from values within confidence interval of standard values for this angle. Percentile occurrence of value of ANB angle, which points to distal relationship of jaws, amounts to 64% and neutral relationship 34% (diagram 2).

Individual variations of ANB angle value, observing variations coefficients, are bigger at males than at females. Confidence interval at females within which we can expect value of ANB angle is narrower than confidence interval for this angle at males but those intervals partially overlap, so that one can say that there are no significant gender differences for values of ANB angle.

Individual variations of value of angles H and G-SN-PG are bigger at males as a difference from females where variation coefficient is lower and variability of value of this parameter is smaller.

H angle. Confidence interval for H angle at females amounts from 10.2° to 13.9° and is found inside the group which is defined as confidence interval for H angle at males which has values from 8.7° to 13.9°. Observing confidence intervals for H angle both at males and females, there can be noted that the expected values are mainly bigger than those within confidence interval of standard values for H angle but the same with them as well.

Percentile occurrence of harmonized profiles, as per values of H angle, is bigger at females and amounts to 60%, while at males



Dijagram 3 Procentualna zastupljenost harmoničnih i disharmoničnih profila kod osoba muškog pola sa malokluzijom II klase 2. odeljenja 26% harmonični profili 74% disharmonični profili

Diagram 3 Percentile representation of harmonious and disharmonious profiles at males with Class II division 2 malocclusion 26% harmonious profiles 74% disharmonious profiles

Procentualna zastupljenost harmoničnih profila, po vrednostima ugla H, je veća kod osoba ženskog pola i iznosi 60%, dok kod osoba muškog pola harmonični profili su prisutni u nižem procentu -26% (dijagrami 3 i 4).

Po intervalima poverenja ugla H oba pola nije prisutan polni dimorfizam.

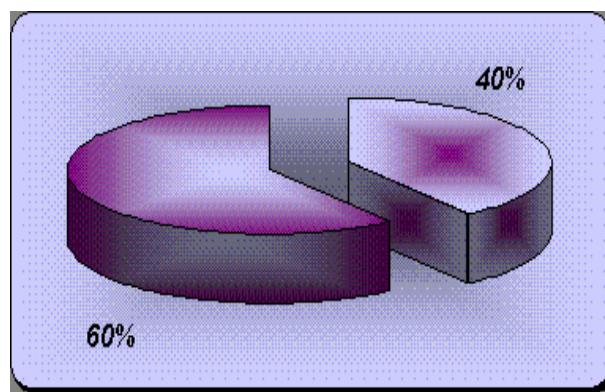
Ugao G-SN-PG. Interval poverenja za ovaj ugao je kod osoba muškog pola od $13,7^\circ$ do $19,5^\circ$ a kod osoba ženskog pola iznosi od $16,04^\circ$ do $19,96^\circ$. Posmatrajući interval poverenja za ugao G-SN-PG kod osoba muškog pola, uočava se da su očekivane vrednosti uglavnom veće od onih u okviru intervala poverenja standardnih vrednosti, ali i jednake njima. Procentualna zastupljenost konveksnih i konkavnih profila ukazuje na dominaciju konveksnih profila, kako kod osoba ženskog pola -88% tako i kod osoba muškog pola -74% (kružni dijagrami 5 i 6).

Očekivane vrednosti ugla G-SN-PG kod osoba ženskog pola se nalaze unutar intervala poverenja ovog ugla kod osoba muškog pola, te ne postoji polni dimorfizam.

Linearni parametri

Razlike vrednosti linearnih parametara muškog pola i standardnih vrednosti (tabela 5).

Kod osoba muškog pola prosečna vrednost debljine mekog tkiva brade PG-Pg iznosi 12,8 mm a prosečna vrednost debljine gornje usne LS-Pr iznosi 18,5 mm. Isti, veoma visoki nivo razlika u odnosu na standardne vrednosti ($p < 0,001$) imamo kod debljine mekog



Dijagram 4 Procentualna zastupljenost harmoničnih i disharmoničnih profila kod osoba ženskog pola sa malokluzijom II klase 2. odeljenja 40% harmonični profili 60% disharmonični profili

Diagram 4 Percentile representation of harmonious and disharmonious profiles at females with Class II division 2 malocclusion 40% harmonious profiles 60% disharmonious profiles

harmonized profiles are present in a lower percentage -26% (circular diagrams 3 and 4).

As per confidence intervals of H angle, there is no present gender dimorphism.

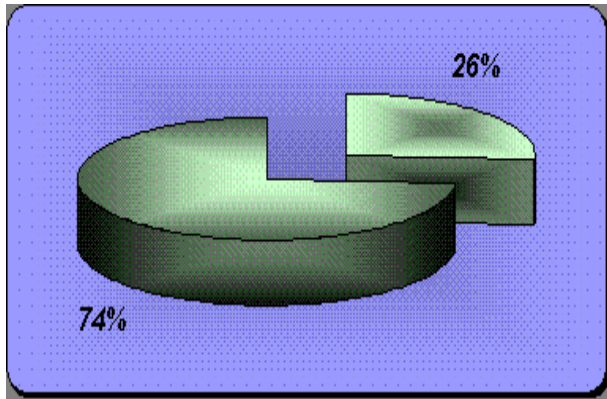
G-SN-PG angle. Confidence interval for this angle is at males from 13.7° to 19.5° and at females amounts from 16.04° to 19.96° . Observing confidence interval for G-SN-PG angle at males, it is noted that expected values are mainly bigger than those within confidence interval of standard values and the same with them. Percentile occurrence of convex and concave profiles points to domination of convex profiles both at females - 88% and males - 74% (diagrams 5 and 6).

Expected values of G-SN-PG angle at females are found within confidence interval of this angle at males so there is no gender dimorphism.

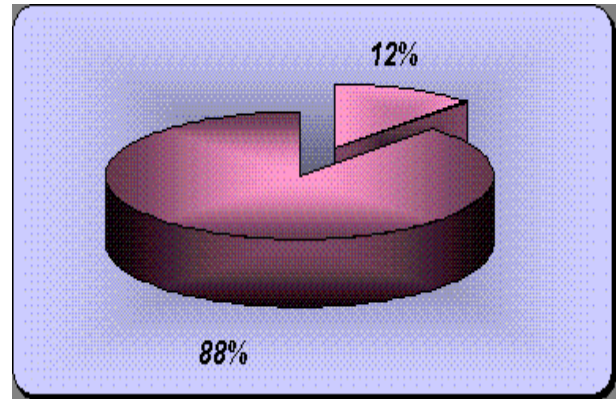
Linear parameters

Differences of values of linear parameters of males and standard values (table 5).

With persons of male gender the mean value of thickness of soft tissue of chin PG-Pg amounts to 12.8 mm and mean value of thickness of upper lip LS-Pr amounts to 18.5 mm. The same, very high level of differences in relation to standard value ($p < 0.001$) we have with thickness of soft tissue of the chin (*t*-test 4.69) and thickness of upper lip (*t*-test 13.67). Both parameters have values significantly bigger in relation to standard value of those parameters.



Dijagram 5. Procentualna zastupljenost konveksnih i konkavnih profila kod osoba muškog pola sa malokluzijom II klase 2. odeljenja 74% konveksnih profila 26% konkavnih profila
Diagram 5. Percentile representation of convex and concave faces at males with Class II division 2 malocclusion 74% convex 26% concave



Dijagram 6. Procentualna zastupljenost konveksnih i konkavnih profila kod osoba ženskog pola sa malokluzijom II klase 2. odeljenja 88% konveksnih profila 12% konkavnih profila
Diagram 6. Percentile representation of convex and concave faces at females with Class II division 2 malocclusion 88% convex 12% concave

tkiva brade (*t-test* 4,69) i debljine gornje usne (*t-test* 13,67). Oba parametra imaju vrednosti značajno veće u odnosu na standardnu vrednost tih parametara.

Razlike vrednosti linearnih parametara ženskog pola i standardnih vrednosti (tabela 6).

Kod osoba ženskog pola prosečna debljina mekog tkiva brade PG-Pg iznosi 12,2 mm, a prosečna vrednost debljine gornje usne LS-Pr je 16,7 mm. Ovi parametri imaju vrednosti značajno veće u odnosu na standardnu vrednost (debljina gornje usne *t-test* 12,89; debljina mekog tkiva brade *t-test* 6,30) i razlike u odnosu na standardnu vrednost su na visokom nivou značajnosti - $p < 0,001$.

Polne razlike linearnih parametara (tabela 7).

Kod osoba ženskog pola prosečna debljina mekog tkiva brade PG-Pg je manja u odnosu na srednju vrednost ovog parametra kod osoba muškog pola, ali vrednost *t-testa* 1,10 govori o odsustvu polnog dimorfizma. Postoje značajne polne razlike debljine gornje usne LS-Pr u korist osoba muškog pola (*t-test* 3,63) pri čemu je nivo značajnosti razlika $p < 0,01$.

Diskusija

Rezultati analize delimično potvrđuju nalaze autora koji su u svojim studijama malokluzije II klase 2. odeljenja (ne proučavajući razlike među polovima) našli postojanje normognatizma^(13,14) pa i retrognatizma maksile^(15,16).

Difference of values of linear parameters of females and standard values (table 6)

With persons of female gender the mean thickness of soft tissue of chin PG-Pg amounts to 12.2 mm and mean value of thickness of upper lip LS-Pr is 16.7 mm. These parameters have values significantly bigger in relation to standard value (thickness of upper lip *t-test* 12.89; thickness of soft tissue of chin *t-test* 6.30) and differences in relation to standard value are at high level of significance - $p < 0.001$.

Gender differences of linear parameters (table 7).

With persons of female gender the mean thickness of soft tissue of chin PG-Pg is smaller in relation to mean value of this parameter at males, but value of *t-test* 1.10 speaks of absence of gender dimorphism. There are significant gender differences of thickness of upper lip LS-Pr in favor of males (*t-test* 3.63) whereupon level of significance of differences is $p < 0.01$.

Discussion

Results of analysis partially confirm findings of authors who in their studies of class II division 2 malocclusion (not studying differences between genders) found existence of normognatism^{13,14} even retrognatism of maxilla as well^{15,16}. However, Meskov¹⁷ in his study finds existence of normognatism of upper jaw as characteristic of females which is in accordance with results of this examination.

With both genders there is retrognatism of lower, but males expressed it in a higher degree in relation to females.

Međutim, Meškov¹⁷ u svojoj studiji nalazi postojanje normognatizma gornje vilice kao karakteristike osoba ženskog pola, što je u saglasnosti sa rezultatima ovog ispitivanja.

Kod oba pola postoji retrognatizam donje vilice, s tim da je kod osoba muškog pola izražen u većem stepenu u odnosu na osobe ženskog pola.

Uobičajen nalaz retrognatizma mandibule kod malokluzije II klase 2. odelenja u literaturi^{13,14,15,17,18,19,20} potvrđuje nalaze ove analize.

Na osnovu dobijenih rezultata, može se konstatovati da je bimaksilarni retrognatizam karakteristika kraniofacijalnog tipa osoba muškog pola sa malokluzijom II klase 2. odelenja, dok je kod osoba ženskog pola zastupljena kombinacija normognatizma gornje sa retrognatizmom donje vilice.

Posmatrajući intervale poverenja za ugao ANB, dobijene vrednosti su veće od standardnih i to kod oba pola i ukazuju na postojanje distalnog odnosa vilica. Međutim, kako se interval poverenja kod osoba muškog pola delimično poklapa, a kod osoba ženskog pola je blizak intervalu poverenja za standardne vrednosti ugla ANB, može se reći da ne postoje značajne razlike u odnosu na standardne vrednosti, što potvrđuje nalaze nekih autora^{13,19,21}, ali su u suprotnosti sa rezultatima drugih^{14,16,22,23}. Očekivane vrednosti ugla ANB kod osoba ženskog pola su veće u odnosu na muški sa višim procentom zastupljenosti distalnog odnosa vilica u okviru ispitivane grupe (64%), dok je kod osoba muškog pola procenat osoba sa distalnim odnosom vilica niži – 47,82%. Ipak, nema značajnih polnih razlika.

Veće očekivane vrednosti ugla ANB kod osoba ženskog pola verovatno su posledica prisutnog normognatizma gornje i retrognatizma donje vilice, dok je kod osoba muškog pola prisutan bimaksilarni retrognatizam, pa je i razlika uglova SNA i SNB manja.

Kao i ugao SNB, ugao SNPg govori o sagitalnom položaju mandibule, a zajedno sa ovim uglom ukazuje na isturenost protuberancije mentalis, što je bitno u diferencijalnoj dijagnozi slučajeva distookluzije.

Kod ispitivanih osoba ženskog pola prosečna vrednost ovog ugla se ne razlikuje značajno od standardne vrednosti, ali su zato razlike u odnosu na muški pol veće. Kod osoba muškog pola prosečna vrednost ugla SNPg potvrđuje izražen retrognatizam donje vilice. Ovi rezultati su u sa-

Common finding of mandible retrognatism with class II division 2 malocclusion in literature^(13,14,15,17,18,19,20) confirms findings of this analysis.

Based on obtained results, it can be stated that bimaxillary retrognatism is characteristic of craniofacial type of males with class II division 2 malocclusion, while at females there is represented combination of normognatism of upper jaw with retrognatism of lower jaw.

Observing confidence intervals for ANB angle, obtained values are bigger than standard being with both genders and point to existence of distal relationship of jaws. However, since confidence interval at males partially overlap and at females is close to confidence interval for standard values of ANB angle, it can be said that there are no significant differences in relation to standard values which confirms findings of some authors^{13,19,21} but they are contrary to results of others^{14,16,22,23}. Expected values of ANB angle at females are bigger in comparison with males, with higher percentage of occurrence of distal relationship of jaws in the framework of examined group (64%), while at males the percentage of persons with distal relationship of jaws is lower – 47.82%. Nevertheless, there are no significant gender differences.

Bigger expected values of ANB angle at females are probably consequence of present normognatism of upper and retrognatism of lower jaw while at males it is present bimaxillary retrognatism, so difference of angles SNA and SNB is smaller.

Just like SNB angle, SNPg angle speaks of sagittal position of mandible and along with this angle it points to protrusion of protuberance mentalis which is essential in differential diagnosis of cases of distal occlusion.

With examined persons of female gender, mean value of this angle does not differ significantly from standard value, but therefore differences in relation to males are bigger. With persons of male gender mean value of SNPg angle confirms expressed retrognatism of lower jaw. These results are in accordance with results of Pancherz et al.¹⁵, but they do not agree with results of Fisher-Brandies et al.¹² who find pogonion in normal position.

Mean value of angle G-SN-PG at females with class II division 2 malocclusion is significantly bigger than standard value. Although coefficient of variation is very high the biggest

glasnosti sa rezultatima Pancherz i sar.¹⁵, ali se ne slažu sa rezultatima Fisher-Brandies i sar.¹² koji nalaze pogonion u normalnom položaju.

Prosečna vrednost ugla G-SN-PG kod osoba ženskog pola sa malokluzijom II klase 2. odeljenja značajno je veća od standardne vrednosti. Iako je koeficijent varijacije jako visok, najveći broj osoba ženskog pola ima vrednosti ugla G-SN-PG koje idu u prilog konveksnosti njihovih profila i distalnog skeletnog i dentoalveolarnog odnosa. Kod osoba muškog pola vrednost ovog parametra je jako varijabilna, ali je najveći procenat ispitanika imao vrednosti koje opisuju konveksna lica. Iz ovog razloga ne postoje razlike u odnosu na ženski pol. Nalaz konveksnih profila kod oba pola poklapa se sa nalazima Meškova.¹⁷

Po rezultatima primenjene analize, lica osoba sa malokluzijom II klase 2. odeljenja su u celini konveksna, što je u skladu sa vrstom nepravilnosti (odnosno, distalnim odnosom vilica).

Debljina gornje usne je značajno veća kod osoba muškog pola, dok je debljina mekog tkiva brade približno ista kod oba pola. Međutim, u odnosu na standardne vrednosti oba ispitivana parametra imaju značajno veće vrednosti.

Povećana debljina mekih tkiva kod osoba sa malokluzijom II klase 2. odeljenja jedna je od specifičnih karakteristika ove nepravilnosti. Izraženi dentoalveolarni retrognatizam kod pacijenata sa malokluzijom II klase 2. odeljenja delimično je kompenzovan povećanom debljinom gornje usne. U slučaju smanjene debljine gornje usne izgled profila osoba sa malokluzijom II klase 2. odeljenja u predelu donje trećine lica bio bi izrazito konkavan. Povećana debljina mekog tkiva brade ublažava konveksitet profila koji postoji kod osoba sa ovom nepravilnošću kao posledica distalnog odnosa vilica.

Holdaway ugao opisuje odnos profila mekih tkiva u odnosu na koštane strukture i njime se definiše postojanje ili odsustvo harmoničnog profila lica. Vrednosti ovog ugla su kod obe ispitivane grupe jako varijabilne. Po intervalima poverenja ne može se reći da postoje jako izražene polne razlike. U poređenju sa intervalom poverenja za standardne vrednosti, razlike su prisutne i intervali poverenja se malo poklapaju, što znači da očekivane vrednosti kod oba pola ukazuju da profili lica osoba sa malokluzijom II klase 2. odeljenja nisu harmonični.

amount at females has values of angle G-SN-PG which go in favor of their profiles being convex and distal skeletal and dentalveolar relationship. With persons of male gender the value of this parameter is very variant however the biggest percentage of males had value, which describe convex faces. For this reason there are no differences in relation to females. Finding of convex profiles with both genders coincide with findings of Meskov¹⁷.

As per results of applied analysis, faces of persons with class II division 2 malocclusion are convex on the whole which is in accordance with kind of irregularity (distal jaws relationship respectively).

Thickness of upper lip is significantly bigger at males while thickness of soft tissue of the chin is approximately the same with both genders. Meanwhile, in relation to standard values both examined parameters have significantly higher values.

Increased thickness of soft tissues at persons with class II division 2 malocclusion is one of specific characteristics of this irregularity. Expressed dentalveolar retrognatism at patients with class II division 2 malocclusion is partially compensated by increased thickness of upper lip. In case of lessened thickness of upper lip, the looks of profile of persons with class II division 2 malocclusion in the region of lower third of the face would be explicitly concave. Increased thickness of soft tissue of the chin reduces the convexity of profile which exists at persons with this irregularity, as consequence of distal relationship of jaws.

Holdaway angle describes relationship of soft tissues profile in relation to osseous structure and it defines with it existence or absence of harmonized face profile. Values of this angle are with both examined groups very variant. As per confidence intervals it cannot be said that very expressed gender differences exists. In comparison with confidence interval for standard values, differences are present and confidence intervals slightly overlap which means that expected values with both gender show that profiles of persons with class II division 2 malocclusion are not harmonized.

However, 40% of females have values of H angle which go in the framework of confidence interval for well-formed faces, while at males that percentage is lower and amounts to 26%. Therefore one can expect that harmonized pro-

Međutim, 40% osoba ženskog pola ima vrednosti ugla H koje se kreću u okviru intervala poverenja za skladna lica, dok je kod osoba muškog pola taj procenat niži i iznosi 26%. Zato se može očekivati da su harmonični profili osoba ženskog pola sa malokluzijom II klase 2. odelenja češće prisutni.

Komparirajući međusobno profile lica osoba ženskog i osoba muškog pola sa malokluzijom II klase 2. odelenja, može se zaključiti da izraženiji retrognatizam kod osoba muškog pola kamuflira povećana debljina mekih tkiva, naročito povećana debljina gornje usne. Takođe, nešto manje povećanje debljine mekog tkiva brade, slabije izražen mezijalni položaj pogoniona u odnosu na bazalni deo donje vilice daje profil koji, po Holdawayu odstupa od harmoničnog profila.

Kod osoba ženskog pola prisutno je manje povećanje debljina gornje usne, ali za razliku od osoba muškog pola, i više je izražen mezijalni položaj pogoniona u odnosu na bazalni deo donje vilice. Tako se dobija profil koji po Holdawayu više odstupa od harmoničnog, u poređenju sa osobama muškog pola.

Zaključak

Na osnovu dobijenih rezultata kefalometrijske analize profila osoba sa malokluzijom II klase 2. odelenja mogu se izvesti sledeći zaključci:

Bimaksilarni retrognatizam je karakteristika kraniofacijalnog tipa osoba muškog pola, dok je kod osoba ženskog pola zastupljena kombinacija normognatizma gornje sa retrognatizmom donje vilice.

Prema vrednostima ugla ANB, oba pola imaju blaže izražen distalni odnos vilica sa velikom varijabilnošću vrednosti ovog parametra. Veće očekivane vrednosti kod ženskog pola verovatno su posledica prisutnog normognatizma gornje i retrognatizma donje vilice, dok je kod muškog pola prisutan bimaksilarni retrognatizam, pa zato i niže vrednosti ugla ANB.

Kod ispitivanih osoba ženskog pola prosečna vrednost ugla SNPg ne razlikuje se značajno od standardne vrednosti, ali su zato razlike standardnih vrednosti u odnosu na muški pol veće, što govori o izraženom retrognatizmu donje vilice kod muškog pola.

Značajno je povećana debljina mekih tkiva brade i gornje usne kod osoba sa malokluzijom

files of females with class II division 2 malocclusion are more frequently present.

Comparing mutually profiles of females and males with class II division 2 malocclusion, it can be concluded that more expressed retrognatism at males camouflages increased thickness of soft tissues especially increased thickness of upper lip. In addition, slightly smaller increase of thickness of soft tissue of the chin, less expressed mesial position of pogonion in relation to basal part of lower jaw gives profile which, according to Holdaway, diversifies from harmonized profile.

With persons of female gender there is present smaller increase of thickness of the upper lip, but as different from males, there is more expressed mesial position of pogonion in relation to basal part of lower jaw. Derived profile, according to Holdaway, diversifies more from harmonized one in comparison with males.

Conclusion

Based on obtained results of cephalometric analysis of profile of persons with class II division 2 malocclusion, there may be produced the following conclusions:

Bimaxillary retrognatism is a characteristic of craniofacial type of males while at females there is represented combination of normognatism of upper with retrognatism of lower jaw.

As per values of ANB angle, both genders have less expressed distal relationship of jaws with big variability of value of this parameter. Greater expected values at females are probably consequence of present normognatism of upper and retrognatism of lower jaw while at males there is present bimaxillary retrognatism and therefore also lower values of ANB angle.

With examined persons of female gender, the mean value of SNPg angle does not differ significantly from standard value, but differences of standard values compared to males are greater, which speaks of expressed retrognatism of lower jaw at males.

There is significantly increased thickness of soft tissues of the chin and upper lip in favor of males. Increased thickness of soft tissues is one of specific characteristics of this irregularity and partially compensates expressed dentalveolar retrognatism at persons with class II division 2 malocclusion.

As per values of G-SN-PG angle, faces of persons with class II division 2 malocclusion for both genders are, in accord with kind of irregularity (distal relationship of the jaws re-

II klase 2. odelenja u odnosu na standardne vrednosti. Ne postoje polne razlike u debljini mekog tkiva brade ali je značajno povećana debljina gornje usne u korist muškog pola. Povećana debljina mekih tkiva jedna od specifičnih karakteristika ove nepravilnosti i delimično kompenzuje izraženi dentoalveolarni retrognatizam kod osoba sa II klase 2. odelenja.

Po vrednostima ugla G-SN-PG, lica osoba sa malokluzijom II klase 2. odelenja kako ženskog, tako i muškog pola su, u skladu sa vrstom nepravilnosti (odnosno, distalnim odnosom vilica), u celini konveksna, bez polnih razlika, mada kod muškog pola postoje velike individualne varijacije.

Vrednosti Holdaway ugla su kod obe ispitivane grupe jako varijabilne. Po intervalima poverenja ne može se reći da postoje izražene polne razlike. U poređenju sa intervalom poverenja za standardne vrednosti, razlike su prisutne i intervali poverenja se malo poklapaju. Očekivane vrednosti kod oba pola ukazuju da profili osoba sa malokluzijom II klase 2. odelenja nisu harmonični.

Na osnovu rezultata naše analize veća debljina mekih tkiva i slabije isturen pogonion kod osoba muškog pola daje skladniji profil nego kod osoba ženskog pola.

Međutim, treba imati u vidu da dobijena vrednost ugla H kod osoba muškog pola ima veoma široko polje varijacije. Veća procentualna zastupljenost vrednosti ugla H koji opisuje postojanje harmoničnih profila kod osoba ženskog pola sa malokluzijom II klase 2. odelenja govori da su skladniji profili kod njih češći nego kod osoba muškog pola, iako prosečne vrednosti to ne potvrđuju.

Zbog širokog polja varijacije vrednosti Holdaway ugla, dobijene rezultate treba posmatrati sa oprezom. Takođe, treba imati na umu i da lica koja strogo prate prosečne skeletne i dentalne norme, nisu uvek realno harmonična i uravnotežena.

spectively) convex on the whole, without gender differences although at males there are big individual variations.

Values of Holdaway angle are with both examined groups very variant. As per confidence intervals, it cannot be said that there are expressed gender differences. In comparison with confidence interval for standard values, differences are present and confidence intervals overlap a little. Expected values with both genders show that profiles of persons with class II division 2 malocclusion are not harmonized.

On the basis of results of our analysis, greater thickness of soft tissues and less protruded pogonion at males gives a better-formed profile than at females.

However, it should be taken into consideration that obtained value of H angle at males has a very wide field of variation. Bigger percentile occurrence of H angle value which describes existence of harmonized profiles at females with class II division 2 malocclusion, speaks that well-formed profiles are more frequent with them than at males although mean values do not confirm that.

Due to a wide field of variation of Holdaway angle value, obtained results should be observed with caution. In addition, one should keep in mind too, that faces which strictly follow average skeletal and dental norms, are not always realistically harmonized and well balanced.

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