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Dental and Skeletal Age in Patients with Palatally Displaced Canines

Dentalna i skeletna dob pacijenata s palatinalno impaktiranim očnjacima

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Abstract

Objective: To determine potential associations between dental and skeletal maturation and palatally displaced canines (PDC) considering gender and chronological age. **Material and methods:** This study included pretreatment panoramic and lateral cephalometric radiographs of 43 subjects with PDCs and 203 randomly selected orthodontic subjects with normally erupted canines. Both groups were non syndromic patients. Chronological age of subjects was rounded and noted in years with decimal points and compared with chronological age according to Demirjian's dental age assessment. Skeletal maturation was determined by cervical vertebrae changes on cephalometric radiographs. **Results:** Female subjects with PDC were more affected by left side canine displacement than males (p=0.027) with five times higher odds ratio (OR = 4.9; 95% CIL=1.2-19.7). A comparison of chronologic and skeletal age indicated that PDC subjects were skeletally younger than unaffected groups with statistically significant differences at the age of 10, 12 and 13. (p=0.05). **Conclusion:** Young subjects with PDCs showed skeletal maturation delay compared to control group, indicating that skeletal maturation assessment could be one of unexplored predicting factors of a PDC, especially at the age between 10 and 13 years in both genders. Subjects with PDC showed intensive growth spurt after the age of 12 years in females, and after the age of 13 in males. Dental maturation delay showed no statistical significance in PDC prediction.

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Introduction

Maturational changes in the morphology of cervical vertebrae in normally growing children are proved to be biological indicators of skeletal maturity. Several authors have assessed modifications in dimension of the cervical vertebrae on lateral radiographs, routinely made in the diagnostic procedure of orthodontic anomalies. Nowadays, this method is the most popular one, since there is no need for taking hand-wrist radiographs (1, 2). Cervical Vertebral Maturation (CVM) method has proven to be effective in determination of the adolescent growth spurt, hence represents a diagnostic tool mandatory for accurate treatment planning (3, 4). Demirjian's method for children's dental age estimation is based on evaluation of the calcification stage of left mandibular teeth (except third molar). Teeth are given a mark from A to H, indicating the stage of development (5, 6).

The reported prevalence of palatally displaced canines (PDC) varies from 0.27 to 2.4%, depending on the population (7), with the most common crown position placed

Uvod

Promjene u morfologiji vratnih kralježaka tijekom rasta pacijenata biološki su pokazatelj skeletne zrelosti. Nekoliko autora procijenilo je promjene u dimenzijama vratnih kralježaka na rendgenskim kefalometrijskim snimkama rutinski snimljenima zbog dijagnostike ortodontskih anomalija. Danas je ta metoda najzastupljenija kad je riječ o procjeni skeletne zrelosti pacijenata jer isključuje potrebu za dodatnim rendgenskim zračenjem u svrhu snimanja rendgena šake (1, 2). Metoda cervikalne vertebralne maturacije (CVM) pokazala se učinkovitom u određivanju ubrzanja rasta adolescenata i zato je obvezni dijagnostički alat za točno planiranje ortodontske terapije (3, 4). Demirjianova metoda za određivanje dentalne dobi pacijenata temelji se na procjeni kalcifikacije zuba lijevoga kvadranta donje čeljusti (osim trećeg kutnjaka). Zubi su označeni slovima od A do H, što upućuje na stupanj razvoja (5, 6).

Prevalencija PDC-a varira od 0,27 do 2,4 %, ovisno o populaciji (7), s najčešćim položajem krune očnjaka blizu pala-

near the palatal surface of lateral or central incisor (8). Furthermore, PDC occurs twice as frequently in females than in males, while bilateral occurrence has been reported to be in the range of 19% to 45% (9). Zilberman et al. (10) have investigated possible correlations between PDC and development delays of the dentition combined with changes in the shape of the lateral incisors, which are known to be four times more frequent in patients with PDC than in the general population.

Although many comparative research of skeletal maturity and dental age have been made (11, 12, 13), the assessment of dental and skeletal age among patients with PDC compared to control groups has not yet been researched. Therefore, the aim of this study was to determine potential associations between dental and skeletal maturation and palatally displaced canines (PDC) considering gender and chronological age.

Material and methods

This research was designed as a case-control study, comprising 246 subjects of both genders, aged 10-16 years (13.1±1.9).

The study group comprised the clinical files, pretreatment dental casts, panoramic and lateral cephalometric radiographs of 43 subjects (15 males and 28 females). It included non-syndromic orthodontic patients diagnosed with PDC (unilateral or bilateral) who were treated at the University Hospital Center Zagreb, Croatia in period from 2016 to 2021.

A control reference sample, randomly selected from orthodontic patients at the same University Clinic, comprised 203 (78 males and 125 females) panoramic and cephalometric radiographs of subjects with normally positioned canines, bilaterally erupted canines as diagnosed from their pretreatment plaster casts. The gender and age of the control group were matched with the sample of the study group. All the investigated subjects (both PDC and controls) were Caucasians.

The chronological age (CA) of the subjects was registered according to the date of the patient's birth until the day the panoramic radiograph was recorded. The taken values were rounded and noted in years and decimal points.

Demirjian's method for dental age (DA) estimation has been the most commonly used method in scientific research, as well as in clinical practice (14). Hence, a comparison of the chronological age and dental age of all subjects was made with the standard charts of Demirjian.

An eight-grade scale from A to H was used and each tooth was assigned with the value that represented its developmental stage. Standard tables, different for each gender, were used to assign the right numeric value to each evaluated stage. The sum was made for all given values, and the result indicated the dental age, derived from standard tables. To minimize the error regarding DA assessment, each panoramic radiograph was analyzed twice by the same investigator (L.L.)

Cervical vertebral maturation was determined on lateral cephalometric radiographs using cervical vertebrae matu-

tinalne površine lateralnoga ili središnjega sjekutića (8). Nadalje, PDC se pojavljuje dvostruko češće u ženskoj populaciji u usporedbi s muškarcima, a prevalencija obostranoga PDC-a zabilježena je u rasponu od 19 do 45 % (9). Zilberman i suradnici (10) istraživali su potencijalnu korelaciju između PDC-a i kašnjenja u razvoju denticije u kombinaciji s promjenama oblika lateralnih sjekutića koje četiri puta češće nastaju kod pacijenata s PDC-om nego u općoj populaciji.

Iako su provedena mnoga komparativna istraživanja skeletne i dentalne zrelosti (11, 12, 13), takva procjena kod pacijenata s PDC-om, u usporedbi s kontrolnom skupinom, još nije istražena pa je cilj ovoga istraživanja bio ustanoviti postoji li korelacija između dentalne i skeletne dobi te PDC-a s obzirom na spol i kronološku dob ispitanika.

Materijal i metode

Ovo istraživanje je retrospektivna studija ispitivanja parova koja je obuhvatila 246 ispitanika obaju spolova u dobi od 10 do 16 godina (13,1 ± 1,9).

Istraživanje je uključivalo analizu kliničkih kartoteka, dentalnih studijskih modela, ortopantomograma i rendgenskih kefalometrijskih snimki 43 ispitanika (15 muškoga i 28 ženskoga spola), pacijenata s dijagnozom PDC-a (jednostranoga ili obostranoga) liječenih u Kliničkome bolničkome centru Zagreb od 2016. do 2021. godine. Iz istraživanja su isključeni pacijenti kod kojih su dijagnosticirani sindromi i druge kraniofacijalne abnormalnosti.

Kontrolni uzorak činila je skupina od 203 nasumično odabrana ortodontska pacijenta (78 dječaka i 125 djevojčica) s normalno smještenim i obostrano izniknulim očnjacima, kako je dijagnosticirano na temelju rendgenskih snimki te studijskih modela. Spol i dob kontrolne skupine usklađeni su s uzorkom ispitivane skupine. Svi ispitanici (ispitanici s PDC-om i kontrolna skupina) bili su pripadnici bijele rase.

Kronološka dob (KD) ispitanika određena je prema datumu rođenja do dana snimanja ortopantomograma. Dobivene vrijednosti zaokružene su i zabilježene kao decimalni brojevi, a iskazane su u godinama. Za procjenu dentalne dobi (DD) najčešće korištena metoda, kako u znanstvenom tako i u kliničkom radu, jest Demirjianova metoda (14). U skladu s tim, za usporedbu kronološke i dentalne dobi u ovom su istraživanju korištene standardne Demirijanove tablice.

Korištena je osmorazredna ljestvica od A do H. Svakom je zubu dodijeljena vrijednost koja označava njegov razvojni stupanj. Standardne tablice, različite za svaki spol, korištene su za dodjelu numeričke vrijednosti svakom stupnju razvoja zuba. Sve su dobivene vrijednosti zbrojene, a rezultat je pokazivao dentalnu dob ispitanika iščitanu iz Demirijanovih tablica. Kako bi se smanjila pogreška u određivanju DD-a, svaki je ortopantomogram dva puta analizirao isti istraživač (L. L.).

Stupanj sazrijevanja cervikalnih kralježaka određivan je na lateralnim rendgenskim kefalometrijskim snimkama CVM metodom (4, 15, 16). Studiju je odobrilo Etičko povjerenstvo Stomatološkog fakulteta Sveučilišta u Zagrebu.

ration stages (CVM) method (4, 15, 16). The study was approved by the Ethics Committee of the University of Zagreb School Of Dental Medicine.

Statistical analysis

A statistical analysis was performed with Statistical Package for Social Sciences (SPSS Inc., Chicago, Illinois, USA) and Statistica 7.1 (StatSoft Inc., Tulsa OK, USA). P values less than 0.05 were considered significant.

To study the differences between the examined groups, the Mann-Whitney and Fisher's exact tests were used. The Spearman rank correlation coefficient (R) was used to assess the association between the CVM (cervical stage), dental calcification stages in both study and control group, regarding gender.

By applying Fisher's r-to-z transformation the z score was used to evaluate the differences between correlation coefficients between subjects and control group regarding gender.

Results

The number and percentage of subjects with PDC regarding gender are presented in Table 1. Fisher's test revealed a statistically significant occurrence in displacement of left maxillary canine in females compared to males (p=0.027), with five times more odds ratio (OR = 4.9; 95% CIL = 1.2 – 19.7).

Scatter plots confirmed that the subjects with PDC were skeletally younger in early ages than the controls in both genders and there was a tendency that the PDC group was growing intensively mature compared to controls (Figure 1).

Although, analysis of the differences between dental and chronological age showed dentally more mature subjects in the control group when compared to subjects in the PDC group (0.5±1.5 years; p=0.016, η2=0.023), these results are not statistically significant (Figure 2). Furthermore, there is a tendency that with growing this difference diminishes.

Correlations of chronological age with dental and skeletal age, by Spearman correlation, were significant, linear and

Statistička analiza

Statistička analiza provedena je u programima Statistical Package for Social Sciences (SPSS Inc., Chicago, Illinois, SAD) i Statistica 7.1 (StatSoft Inc., Tulsa OK, SAD). Značajnima su smatrane P vrijednosti manje od 0,05.

Za određivanje razlika između ispitivanih skupina korišteni su Mann-Whitneyjev i Fisherov egzaktni test. Spearmanov koeficijent korelacije (R) korišten je za procjenu povezanosti između CVM stupnjeva i faza kalcifikacije zuba u ispitivanoj i kontrolnoj skupini, s obzirom na spol. Primijenjena je Fisherova **r - z** transformacija, u kojoj je **z** rezultat korišten za procjenu razlika između koeficijenata korelacije između ispitanika i kontrolne skupine s obzirom na spol.

Rezultati

Broj i postotak ispitanika s PDC-om, s obzirom na spol, nalazi se u tablici 1. Fisherov test pokazao je češću pojavu lijevoga PDC-a kod ispitanica u usporedbi s ispitanicima (p = 0,027), s pet puta većim omjerom izgleda (OR = 4,9; 95 % CIL = 1,2 – 19,7).

Dijagrami raspršenosti potvrđuju da su ispitanici s PDC-om bili skeletno mlađi u ranijoj dobi od kontrolne skupine u oba spola te je postojala tendencija da je skupina s PDC-om intenzivnije rasla u usporedbi s kontrolnom skupinom (slika 1.).

Iako je analiza razlike između dentalne i kronološke dobi pokazala dentalno zrelije ispitanike u kontrolnoj skupini u usporedbi s ispitanicima s PDC-om (0,5 ± 1,5 godina; p = 0,016, η^2 = 0,023), navedeni rezultati nisu statistički značajni (slika 2.) te postoji tendencija da se s rastom ta razlika smanjuje.

Korelacija kronološke dobi s dentalnom i skeletnom zrelošću, prema Spearmanovoj korelaciji, bila je značajna, line-

Table 1 Number and percentage of patients with PDC regarding gender
Tablica 1. Distribucija pacijenata s PDC-om s obzirom na spol

			Gender • Spol		Total • Zbroj	Sig.*	OR (95% CIL)
			M	F • Ž			
Canine 13 • Očnjak 13	Not Displaced • Normalno smješten	N	2	10	12		
		%	13.3%	35.7%	27.9%		
	Displaced • PDC	N	13	18	31		
		%	86.7%	64.3%	72.1%	0.164	0.3 (0.1-1.5)
Canine 23 • Očnjak 23	Not Displaced • Normalno smješten	N	11	10	21		
		%	73.3%	35.7%	48.8%		
	Displaced • PDC	N	4	18	22		
		%	26.7%	64.3%	51.2%	**0.027**	**4.9 (1.2-19.7)**
Single canine • Jednostrano		N	13	20	33		
		%	86.7%	71.4%	76.7%		
Both canines • Obostrano		N	2	8	10		
		%	13.3%	28.6%	23.3%	0.451	2.6 (0.5-14.2)
Total • Zbroj		N	15	28	43		
		%	100.0%	100.0%	100.0%		

* Fisher's exact test

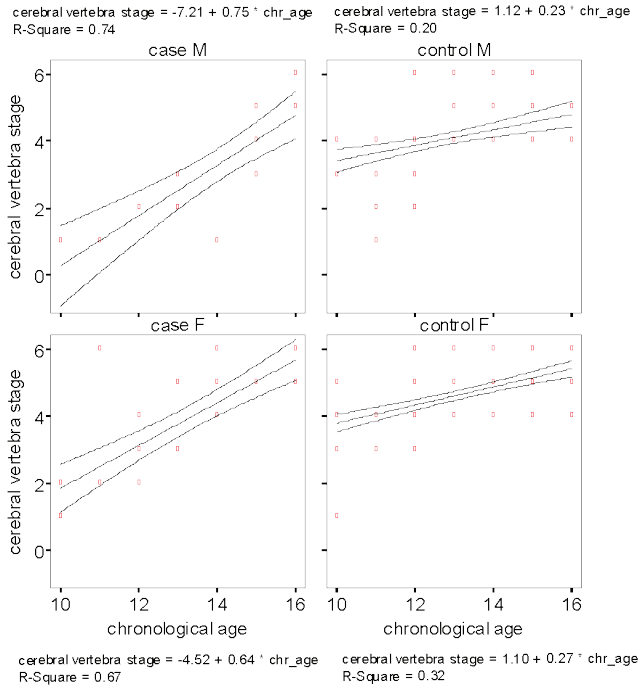

Figure 1 The relationship between chronological age (CA) and cervical stage (CS) in PDC and control group regarding gender
Slika 1. Odnos kronološke dobi i stupnja skeletne maturacije u skupini ispitanika s PDC-om u usporedbi s kontrolnom skupinom s obzirom na spol

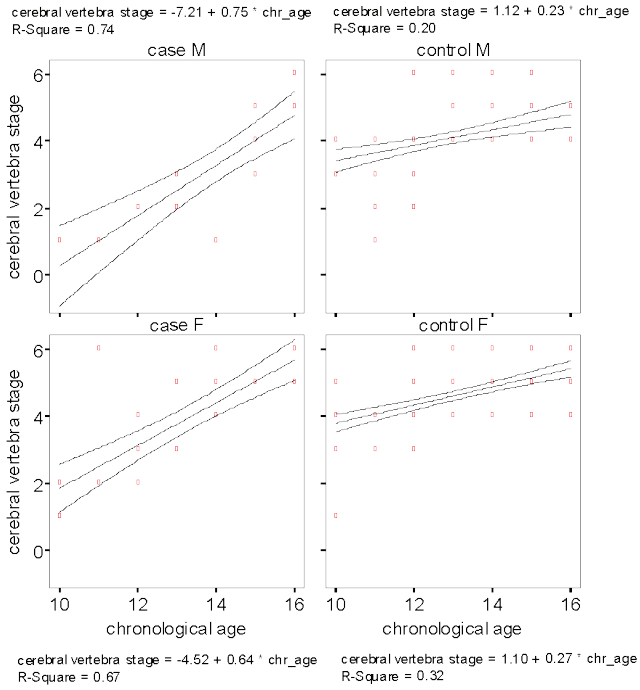

Figure 2 The relationship between chronological age (CA) and dental age (DA) in PDC and control group regarding gender
Slika 2. Odnos kronološke i dentalne dobi u skupini ispitanika s PDC-om u usporedbi s kontrolnom skupinom s obzirom na spol

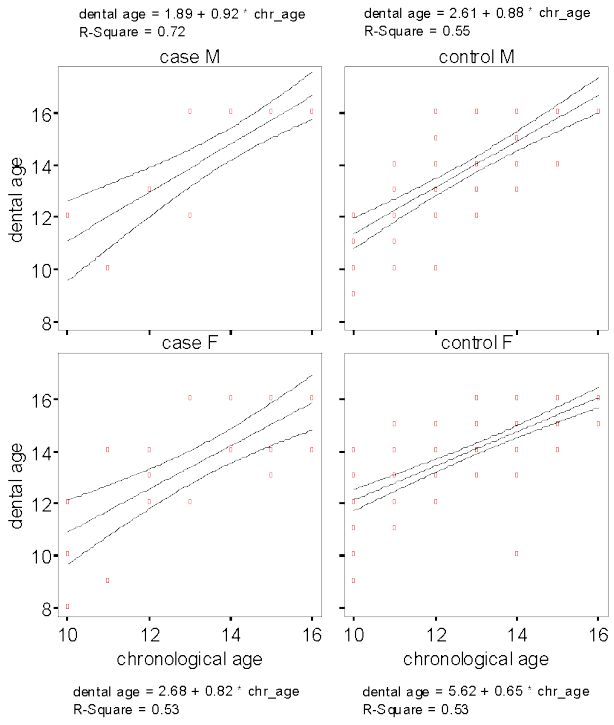

Figure 3 Comparison of dental age and chronological age regarding case and control group
Slika 3. Usporedba dentalne i kronološke dobi ispitanika s PDC-om i onih iz kontrolne skupine

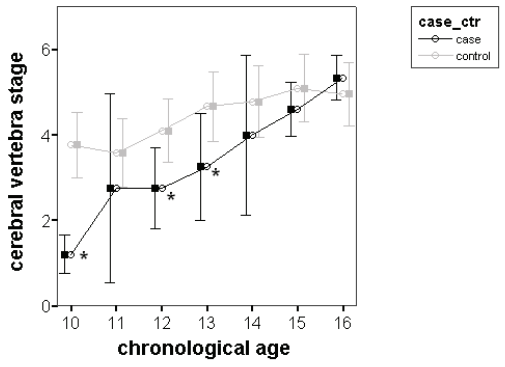

Figure 4 Comparison of cerebral vertebra age and chronological age regarding case and control group
Slika 4. Usporedba stupnja skeletne maturacije i kronološke dobi ispitanika s PDC-om i onih iz kontrolne skupine

positive. There is a tendency that the correlation in PDC group was higher between chronological age and skeletal age in males, while in controls between chronological and skeletal age it was similar in both genders. Low levels of correlation coefficient revealed greater variability (Figure 3, Figure 4).

A significantly stronger correlation was present between chronological age and cervical stage in PDC group in males (rho = 0.911) then in controls (rho = 0.516; p = 0.003), which has confirmed the fact that there was a higher biological variability in the control group (Table 2).

In some age groups there was only one subject or few subjects, thus the analysis of the differences regarding gender was not performed. Instead, the scatter plot was done.

arna i pozitivna. Postoji tendencija da je korelacija u skupini ispitanika s PDC-om veća između kronološke dobi i skeletne zrelosti kod dječaka, dok je u kontrolnoj skupini korelacija između kronološke i skeletne zrelosti bila slična u oba spola. Niske razine koeficijenta korelacije pokazale su veću varijabilnost (slike 3. i 4.).

Rezultati pokazuju statistički značajnu korelaciju između kronološke dobi i skeletne zrelosti dječaka s PDC-om (rho = 0,911), za razliku od kontrolne skupine (rho = 0,516; p = 0,003) što potvrđuje veću biološku varijabilnost kontrolne skupine (tablica 2.).

U pojedinim dobnim skupinama bio je samo jedan ispitanik ili nekoliko njih i zato nije provedena analiza razlika prema spolu. Umjesto toga napravljen je dijagram raspršenja.

Table 2 Correlations of chronological with dental and skeletal age regarding gender in PDC and controls (Spearman rank correlation coefficient)
Tablica 2. Korelacija kronološke dobi s dentalnom i skeletnom zrelošću ispitanika s PDC-om i onih iz kontrolne skupine s obzirom na spol

		Palatally displaced canine • Skupina s PDC-om		Control • Kontrolna skupina	
		Chronological age male • Kronološka dob ispitanika	Chronological age female • Kronološka dob ispitanica	Chronological age male • Kronološka dob ispitanika	Chronological age female • Kronološka dob ispitanica
Dental age • Dentalna dob	rho	0.775	0.651	0.744	0.744
	p	0.001	<0.001	<0.001	<0.001
	N	15	28	78	125
Cerebral vertebra • CVM	rho	0.911	0.735	0.516	0.584
	p	<0.001	<0.001	<0.001	<0.001
	N	15	28	78	125

Discussion

Early diagnosis of PDC saves the treatment time, surgical procedure, patient discomfort and money. There is much evidence to support a genetic etiology for the palatally displaced canine (PDC) (17, 18, 19) but, apart from agenesis status, there has been no strong predictive factors (20, 21).

The prevalence of females exhibiting PDC, as a proof of an unequal distribution between genders, is characteristic and well documented in the literature (22, 23). This research showed no significant differences between males and females in all chronological groups. Female subjects were more affected by left canine displacement than male subjects and the difference was statistically significant (P=0.027) with even five times higher risk (OR = 4.9; 95% CIL = 1, 2- 19.7). Chung and al. (24) also reported a greater percentage of palatal canine displacement in female subjects with left-side dominance.

Patients with palatally displaced canines didn't show statistically significant differences in dental development rate when compared to the control group. Różyło-Kalinowska et al. (25) have found that there was no difference in the dental development rate among patients with palatally displaced canines compared to the patients with buccally displacement canines. The delay in dental development was found in less than half of patients in both groups. Newcomb (26) also reported a significantly delayed dental development in patients with palatally displaced canines. Becker and Chaushu (27) reported an abnormal dental development in Caucasian groups of patients with palatal canine displacement. They found a

Rasprava

Rana dijagnoza PDC-a skraćuje ortodontsku terapiju, olakšava kirurški zahvat, smanjuje nelagodu pacijenata i štedi novac. Mnogo je dokaza da je etiologija PDC-a genetskoga podrijetla (17, 18, 19), ali, osim statusa ageneze lateralnih sjekutića, nema jake prediktivne čimbenike (20, 21).

Iako se u literaturi spominje da je prevalencija PDC-a češća među ženskom populacijom (22, 23), ovo istraživanje nije pokazalo značajnu razliku između muškaraca i žena u svim kronološkim skupinama. Kod ispitanica češće je bio impaktiran lijevi očnjak u usporedbi s ispitanicima (P = ,027), s čak pet puta većim rizikom (OR = 4,9; 95 % CIL = 1,2 – 19,7). Chung i suradnici (24) također su izvijestili o većem postotku palatinalne impakcije očnjaka kod ispitanica, češće na lijevoj strani.

Pacijenti s palatinalno impaktiranim očnjacima nisu pokazali statistički značajne razlike u dentalnoj zrelosti u usporedbi s kontrolnom skupinom. Różyło-Kalinowska i suradnici (25) navode da nema razlike u dentalnoj zrelosti pacijenata s palatinalno impaktiranim očnjacima u usporedbi s pacijentima s vestibularnom impakcijom. Zastoj u razvoju zuba pronađen je kod manje od polovine ispitanika u obje ispitivane skupine. Newcomb (26) je također izvijestio o značajno odgođenom razvoju zuba kod pacijenata s palatinalno impaktiranim očnjacima. Becker i Chaushu (27) uočili su abnormalan razvoj zuba u skupinama bijelaca s PDC-om. Utvrdili su tendenciju zakašnjeloga razvoja s visokom statističkom značajnošću (p = 0,001). Zaključili su da je otprilike 50 % ispitanika kasnilo s razvojem denticije u prosjeku za godinu i pol.

tendency for delayed development with high statistical significance (p=0.001). They have concluded that approximately 50% of patients had delays in the dentition development by a mean of 1.5 years. Sajnani and King (28) reported that 42.2% of the patients with buccally displaced canines and only 30% of those with a palatally displaced canine showed either a delay in dental development or development coinciding with their chronological age. Most of their patients exhibited accelerated dental development. A possible explanation for different results in the literature, and the one from this study, could be ethnic differences among subjects.

Skeletal age differences were significant in the female group at the age of 10 and 12 and in male group at the age of 12 and 13. Subjects with palatally displaced canines were skeletally younger than those in the control group, with no difference in skeletal maturation in the largest group at the age of 15. Considering the fact that PDC group mature intensively with growing and that skeletal differences diminish with years, skeletal maturation delay in early chronological age can be considered as a predicting factor for palatally displaced canines.

There are many authors who have researched the efficacy of primary canine extraction as a treatment of choice for successful eruption of PDC in young individuals (29, 30, 31, 32, 33). Even though chronological age, suggested for this prevention procedure, coincides with the results of skeletal maturation delay in this research, Benson et al. found no certain evidence that this procedure will help the eruption of PDC without surgical approach (34).

A diagnosis of palatally displaced canine is usually determined at age of 13 or higher. Taking into consideration the fact that the case sample consisted of patients aged 10-16, this research included old panoramic and cephalometric radiographs that had been taken for another reason years before palatally displaced canines occurred. Insufficient anamnestic and radiographic history of young children explains a relatively small number of patients that were included in this study. Due to the lack of similar research, these results are not fully comparable, and in the future they need to be extended to a larger sample size. However, they should be taken into consideration when treating patients with PDC since they have shown greater skeletal maturation delays. In terms of that, orthodontists should consider choosing removable orthodontic appliances, quadhelix, transpalatal arch (35) and headgear (36) prior to fixed orthodontic appliances and thus be more effective in achieving positive skeletal growth of the dental arch and, consequently, good treatment results.

Conclusions

PDC subjects are skeletally less mature at younger chronological age, but there is a tendency that they mature more rapidly than non-affected subjects. Skeletal maturation delay in early chronological age should alert clinicians that there is a higher likelihood of experiencing developmental delays and growth deficits such as palatally displaced canines later in life.

Sajnani i King (28) u svojem istraživanju navode da je 42,2 % ispitanika s vestibularno impaktiranim očnjacima i samo 30 % onih s palatinalno impaktiranima kasnilo s razvojem zuba ili se razvoj podudara s očekivanim stupnjem za njihovu kronološku dob. Većina njihovih pacijenata imala je ubrzani razvoj zuba. Moguće objašnjenje za različite rezultate u literaturi i rezultate u ovoj studiji, mogle bi biti etničke razlike među ispitanicima.

Razlike u skeletnoj zrelosti bile su značajne među ispitanicima u dobi od 10 do 12 godina te u skupini ispitanika u dobi od 12 do 13 godina. Ispitanici s palatinalno impaktiranim očnjacima bili su skeletno mlađi od onih u kontrolnoj skupini, bez razlike u skeletnoj zrelosti u najvećoj dobnoj skupini od 15 godina. S obzirom na to da skupina s PDC-om intenzivno sazrijeva s rastom i da se razlike u stupnju skeletne maturacije smanjuju s godinama, kašnjenje u skeletnome sazrijevanju u ranoj kronološkoj dobi može se smatrati čimbenikom predviđanja za PDC.

Mnogo je autora koji su istraživali učinkovitost ekstrakcije mliječnoga očnjaka kao tretman izbora za uspješnu erupciju PDC-a kod mlađih pacijenata (29, 30, 31, 32, 33). Iako se kronološka dob, predložena za ovaj interceptivni postupak, poklapa s rezultatima kašnjenja u skeletnome sazrijevanju u ovom istraživanju, Benson i suradnici nisu pronašli siguran dokaz da će taj postupak pomoći erupciji PDC-a bez kirurške intervencije (34).

Dijagnoza palatinalne impakcije očnjaka obično se postavlja u dobi od 13 ili više godina. S obzirom na to da ispitivani uzorak čine pacijenti u dobi od 10 do 16 godina, ovo istraživanje uključivalo je ortopantomograme i rendgenske kefalometrijske snimke učinjene iz drugog razloga kada se nije mogla postaviti dijagnoza PDC-a. Nedovoljna anamnestička i radiografska anamneza male djece objašnjava razmjerno mali broj pacijenata koji su bili uključeni u ovo istraživanje. Zbog nedostatka sličnih istraživanja, ovi se rezultati ne mogu potpuno usporediti i u budućnosti ih je potrebno proširiti na veći uzorak, no treba ih uzeti u obzir pri planiranju terapije pacijenata s PDC-om. Budući da su ispitanici s palatinalno impaktiranim očnjacima više kasnili u skeletnoj maturaciji, ortodonti bi trebali u planiranju terapije razmotriti odabir mobilnih ortodontskih naprava, quadhelixa, transpalatinalnoga luka (35) i headgeara (36). Tako bi bili učinkovitiji u postizanju pozitivnog razvoja zubnoga luka i posljedično, u postizanju boljih ortodontskih rezultata.

Zaključak

Ispitanici s PDC-om imali su niži stupanj skeletne maturacije u ranijoj dobi, ali s tendencijom kasnijega bržeg sazrijevanja, u odnosu prema kontrolnoj skupini. Niži stupanj skeletnoga razvoja u ranoj kronološkoj dobi trebao bi upozoriti kliničare na potencijalnu palatinalnu impakciju očnjaka.

Conflict of interest

The authors report no conflict of interest.

Authors' contributions: **L.L.H.** – participated in designing the research, performed all measurements, wrote this article; **M.S.** – participated in interpretation of results; **S.A.M.** – participated in the experimental design; **S.M.** – mentor, advisor at all phases of conducting the research and writing the article.

Sukob interesa

Autori nisu bili u sukoba interesa.

Doprinosi autora: **L. L. H.** – osmišljavanje istraživanja, obavljanje mjerenja, pisanje članka; **M. S .** – interpretacija rezultata; **S. A. M.** – projektiranje eksperimenta; **S. M.** – mentoriranje, sudjelovanje u svim fazama istraživanja i pisanja članka.

Sažetak

Cilj: Željelo se ustanoviti postoji li korelacija između dentalne i skeletne dobi te palatinalne impakcije očnjaka (PDC) s obzirom na spol i kronološku dob ispitanika. **Materijali i metode:** U ovoj studiji analizirani su ortopantomogrami i rendgenske kefalometrijske snimke 43 pacijenta s PDC-om i 203 nasumično odabrana ortodontska pacijenta s normalnim položajem očnjaka. Njihova kronološka dob zaokružena je i zabilježena kao decimalni broj izražen u godinama te uspoređena s dentalnom dobi koja je određena prema Demirjianovoj procjeni. Stupanj skeletne maturacije određen je prema morfološkim promjenama vratnih kralježaka na rendgenskim kefalometrijskim snimkama. **Rezultati:** Kod ispitanica s PDC-om češći je nalaz palatinalne impakcije lijevoga očnjaka u usporedbi s ispitanicima (p = 0,027), s pet puta većim omjerom izgleda (OR = 4,9; 95 % CIL = 1,2 – 19,7). Usporedba kronološke dobi i skeletne maturacije pokazala je da su ispitanici s PDC-om bili skeletno mlađi od onih s normalnim položajem očnjaka u dobi od 10, 12 i 13 godina (p = 0,05). **Zaključak:** Kod ispitanika s PDC-om zabilježeno je kašnjenje u skeletnoj maturaciji u odnosu prema kontrolnoj skupini, što upućuje na to da bi procjena stupnja skeletne maturacije mogla biti jedan od neistraženih čimbenika predviđanja PDC-a, posebno u dobi između 10 i 13 godina u oba spola. Djevojčicama s PDC-om intenzivno je ubrzan rast poslije 12. godine, a kod dječaka je zabilježen poslije 13. godine. Kašnjenje u dentalnoj zrelosti pacijenata nije pokazalo statističku značajnost u predviđanju PDC-a.

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