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*IZVORNI ZNANSTVENI RAD*

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# Occlusal Radiographs in a Turkish Pediatric Subpopulation

# *Okluzalne rendgenske snimke u turskoj subpopulaciji dječje stomatologije*

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**Abstract**

**Objectives:** Dental radiographs are a useful diagnostic aid in the oral health care and dental treatment of children. The most commonly used radiographs are periapical and panoramic radiographs. Occlusal radiographs are preferred in more specific cases. The aim of this study was to retrospectively evaluate the reasons for obtaining occlusal radiographs in pediatric patients. **Material and methods:** Occlusal radiographs of patients aged 1-13 years who attended the Pediatric Dentistry Clinic of Ondokuz Mayıs University Faculty of Dentistry between 01 August 2015 and 01 August 2020 were retrospectively evaluated. Patients with syndromes and diseases that could cause cleft lip and palate and dental anomalies were not included in the study. The medical history of the 354 patients who were included in the study was provided by the automated system. **Results:** A total of 359 occlusal radiographs from these patients were analysed. The number of male patients included in the study was 208 and the number of female patients was 146. Occlusal radiographs of the maxilla of 312 patients were taken, of the mandible of 37 patients, and both the upper and lower jaws of 5 patients. It was found that occlusal radiographs were taken mostly for dental trauma in the permanent dentition (156), injuries in the primary dentition (68) and for the diagnosis of dental anomalies (57). **Conclusions:** Occlusal radiographs are taken for specific situations in pediatric dentistry and are particularly useful in the detection and diagnosis of primary and permanent tooth injuries.

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## Introduction

Radiographic techniques in dental practice are based on the principles of ionizing radiation, which requires controlled use (1). Following both extra-oral and intra-oral examinations, specific radiographic studies are performed when deemed necessary to obtain more detailed information, all in accordance with the As Low As Reasonably Practicable (ALARP) principle. This principle has been modified to As Low As Diagnostically Acceptable (ALADA), which emphasizes the trade-off between image quality and radiation dose. It focuses on minimizing radiation exposure to levels that are both safe and reasonably achievable (2). Recently, the new ALADAIP principle has been introduced. This means that As Low As Diagnostically Achievable principle is indication-based and patient-specific. The main idea is that each exposure should be justified and tailored to the individual patient and circumstances (2,3).

In pediatric dentistry, radiographic imaging techniques are mainly needed to diagnose caries lesions, assess dental injuries, detect developmental abnormalities in teeth, determine the presence of pathological conditions and estimate dental age (4-7). The 2-dimensional radiographic imaging

## Uvod

Radiološke tehnike u stomatološkoj praksi temelje se na principima ionizirajućeg zračenja, što zahtijeva kontroliranu primjenu (1). Poslije ekstraoralnoga i intraoralnoga pregleda provodi se specifična radiološka dijagnostika kada se to smatra potrebnim za dobivanje detaljnijih informacija, a sve u skladu s načelom *As Low As Reasonably Practicable* (ALARP). To je načelo preinačeno u *As Low As Diagnostical Acceptable* (ALADA), što ističe kompromis između kvalitete slike i doze zračenja. Usredotočuje se na smanjenje izloženosti zračenju do razina koje su sigurne i razumno dostižne (2). Nedavno je uveden novi ALADAIP princip. To znači da je onoliko nisko koliko je to dijagnostički moguće na temelju indikacija i specifičnosti pojedinih pacijenata. Glavna je zamisao da svako izlaganje treba biti opravdano i prilagođeno pojedinom pacijentu i okolnostima (2, 3).

U pedijatrijskoj stomatologiji postoji potreba za radiološkim slikovnim tehnikama uglavnom za dijagnosticiranje karijesnih lezija, procjenu dentalnih trauma, otkrivanje razvojnih anomalija zuba, utvrđivanje patoloških stanja i procjenu dentalne dobi (4 – 7). U dvodimenzionalne radiološke tehnike

techniques commonly used in pediatric dentistry can be listed as periapical, bitewing, occlusal, lateral oblique, cephalometric, skull and panoramic. Other imaging modalities rarely used by dentists include radioisotope imaging, multidetector computed tomography (MSCT), cone beam computed tomography (CBCT), ultrasound and magnetic resonance imaging (MRI), which are occasionally used in pediatric dentistry (1,8). Panoramic radiographs are often used to view all of the teeth, jaws, maxillary region up to 1/3 upper part of the eye sockets, maxillary sinuses and the temporomandibular joint. Periapical and bite-wing radiographs are also frequently preferred in general and pediatric dental practice. Periapical radiographs show the entire tooth in detail, including the surrounding bone. Bite-wing images show crowns of teeth and adjacent alveolar crests. Occlusal radiographs are preferred in more specific situations in both adult and pediatric patients (9, 10). Occlusal images show a larger area of teeth and bone than periapical images. Thanks to occlusal radiography, which is one of the guiding methods especially for orthodontics and maxillofacial surgery, the development of bone structure and healthy development of teeth can be examined together with the position of the jaw. Occlusal radiographs can give a diagnostically important third dimension that is not usually available with periapical radiographs or standard panoramic imaging. An occlusal radiograph is indicated for painless examination of the region following an accident or injury in the anterior region, especially in children. Large size image receptors are needed to obtain occlusal radiographs. The size is 7.7cm x 5.8cm. The size of image receptor number 2 is 3.1cm x 4.1mm. Occlusal receptors consist only of conventional film and phosphor plates. CCD and CMOS sensors do not have this dimension. Occlusal radiography is divided into maxillary and mandibular radiography according to the area to be imaged. The maxillary occlusal projection shows the anterior maxilla and the teeth, the zygomatic processes of the maxilla, the anteroinferior surfaces of each antrum, the nasolacrimal ducts, the nasal septum, and the intermolar teeth (8). The mandibular occlusal projection shows the anterior part of the mandible and the soft tissue of the floor of the mouth (11).

The indications for occlusal radiography include anteroposterior and buccolingual/buco-palatinal widths of pathologies that may be encountered in the upper and lower jaw, localization of impacted teeth, residual roots, foreign bodies, periapical images for localization of supernumerary teeth, visualization of sublingual and submandibular salivary stone, detection of fractures in the mandible or maxilla, a complete examination of the maxillary sinus, and it is used in patients with trismus who cannot open their mouth (8,12).

There is limited information in the literature on occlusal radiographs. The aim of this study was to retrospectively evaluate digital occlusal radiographs which were taken from pediatric patients.

## Materials and methods

In this retrospective study, patients aged 1-13 years, who attended the Ondokuz Mayıs University, Faculty of Dentist-

snimanja koje se obično upotrebljavaju u pedijatrijskoj stomatologiji ubrajaju se periapikalne snimke, snimke s ugrizom u traku, okluzalne, lateralne kose i kefalometrijske snimke, snimke lubanje i ortopantomogrami. Drugi načini snimanja kojima se stomatolozi rijetko koriste obuhvaćaju radioizotopsko snimanje, multidetektorsku kompjutoriziranu tomografiju (MSCT), kompjutoriziranu tomografiju s koničnom zrakom (CBCT), ultrazvuk i magnetsku rezonanciju (MRI), a u pedijatrijskoj stomatologiji primjenjuju se povremeno (1, 8). Na panoramskim rendgenskim snimkama ili ortopantomogramu često se vide svi zubi, čeljusti, maksilarna regija do 1/3 gornjega dijela očnih šupljina, maksilarni sinusi i temporamandibularni zglob. Periapikalne RTG snimke i snimke sa zagrizom u traku također se često preferiraju u općoj i pedijatrijskoj stomatološkoj praksi. One detaljno prikazuju cijeli zub, uključujući i okolnu kost. Slike sa zagrizom u traku prikazuju krune zuba i susjedne alveolarne kreste. Okluzalnim RTG snimkama daje se prednost u specifičnijim situacijama i kod odraslih i kod dječjih pacijenata (9, 10). Okluzalne snimke pokazuju veće područje zuba i kosti nego periapikalne. Zahvaljujući okluzalnim RTG snimkama, a to je jedna od glavnih metoda posebno u ortodonciji i maksilofacijalnoj kirurgiji, može se pratiti razvoj koštane strukture i zdrav razvoj zuba zajedno s položajem čeljusti. Također mogu dati dijagnostički važnu treću dimenziju koja obično nije dostupna pri uporabi periapikalnih RTG snimki ili standardnih ortopanomograma. Indicirane su za bezbolni pregled regije nakon traume ili ozljede prednje regije, osobito kod djece. Za dobivanje okluzalnih RTG snimki potrebni su receptori slike velike veličine. Veličina je 7,7 cm x 5,8 cm. Veličina receptora slike broj 2 je 3,1 cm x 4,1 mm. Okluzalni receptori sastoje se samo od konvencionalnog filma i fosfornih ploča. CCD i CMOS senzori nemaju tu dimenziju. Okluzalne RTG snimke dijele se na maksilarne i mandibularne prema području koje se snima. Maksilarna okluzalna projekcija prikazuje prednju maksilu i zube, zigomatične nastavke maksile, anteroinferiorne površine svakog antruma, nazolakrimalne kanale, nosni septum i intermolarne zube (8). Mandibularna okluzalna projekcija prikazuje prednji dio mandibule i meko tkivo dna usne šupljine (11).

Indikacije za okluzalne RTG snimke uključuju anteroposteriornu i bukalno-lingvalnu/bukalno-palatinalnu širinu patologija koje se mogu naći u gornjoj i donjoj čeljusti, lokalizaciju impaktiranih zuba, zaostalih korijena, stranih tijela, periapikalne snimke za lokalizaciju prekobrojnih zuba, vizualizaciju kamenca u sublingvalnoj i submandibularnoj slinovnici, otkrivanje prijeloma mandibule ili maksile, kompletan pregled maksilarnog sinusa i primjenu kod pacijenata s trizmom koji ne mogu otvoriti usta (8, 12).

U literaturi postoje ograničeni podatci o okluzalnim RTG snimkama. Cilj ovog istraživanja bio je retrospektivna procjena digitalnih okluzalnih RTG snimki pedijatrijskih pacijenata.

## Materijali i metode

U ovo retrospektivno istraživanje bili su uključeni pacijenti u dobi od 1 do 13 godina koji su se prijavili u Zavod za

ry, Department of Pedodontics between August 1, 2015 and August 1, 2020 were included.

Inclusion criteria in the study were as follows: No systemic disease or syndrome; High quality of occlusal radiographs.

Exclusion criteria: Presence of a systemic disease and syndrome; Cleft lip and cleft palate; Radiotherapy and chemotherapy in head and neck; Radiographs of low quality.

Occlusal radiographs were taken using a digital x-ray unit (Sirona Dental systems heliodent plus D3507 intraoral x-ray, Sirona Dental Company, Germany) at 70 kVp, 7 mA, and 0.25 second exposure time. Occlusal radiographs of 354 patients (208 boys, 146 girls) who met the inclusion criteria were evaluated on digital film. Occlusal radiographs were analyzed for jaw fractures, dental trauma, dental anomalies (number, size, shape, position, eruption), odontogenic cysts, tumors and infections, and control. When the study groups were formed, if there were fewer than about ten reasons for taking occlusal radiographs, the groups were combined.

This study was based on retrospectively evaluating radiographs. The parents of the patients had given informed consent before the radiographs were taken. The authors conducted the study in accordance with the principles of the Declaration of Helsinki, including all modifications and revisions.

The Chi-square test ($\chi 2$) was used to analyze the data. $P<.05$ was accepted as the level of significance. All statistical calculations were performed using the statistical package program SPSS 17.0 V.

## Results

Patients aged 1-13 years who had occlusal radiographs were included in this study. The mean age of the patients was 7.48 ± 2.59 years for females and 7.76 ± 2.41 years for males. It was determined that 359 occlusal radiographs were taken from 354 patients included in the study. These occlusal radiographs were taken from the upper jaw of 312, the lower jaw of 37, and both the lower and upper jaws of 5 patients. The number of male patients was 208, and the number of female patients was 146. It was found that more occlusal radiographs were taken in male patients, but according to the results of the chi-squared test, no statistical difference was observed between the genders in terms of the reasons for taking occlusal radiographs ($\chi 2$ (5) = 3,123; p> 0.05), and occlusal radiographs were mostly taken in eight-year-old patients, in both females and males.

The reasons for taking occlusal radiographs from the patients and their distribution by age are shown in Table 1. It was found that the most common reason for taking occlusal films was permanent tooth trauma (156), followed by primary tooth trauma (68). Number anomaly was the most common dental anomaly (57). Jaw fracture was noted in only one patient, talon tubercle in two patients, and dens in dente in two patients. Occlusal radiographs were taken for control in 35 patients. (Figures 1a-f)

pedodonciju Stomatološkog fakulteta Sveučilišta Ondokuz Mayıs između 1. kolovoza 2015. i 1. kolovoza 2020.

Kriteriji za uključivanje u istraživanje: nepostojanje sistemskih bolesti ili sindroma; visoka kvaliteta okluzalnih RTG snimki.

Kriteriji za isključivanje: sistemske bolesti ili sindromi; rascjep usne i rascjep nepca; radioterapija i kemoterapija glave i vrata; RTG snimke loše kvalitete.

Okluzalne RTG snimke napravljene su digitalnom rendgenskom jedinicom (Sirona Dental Systems Heliodent Plus D3507 za intraoralne rendgenske snimke, Sirona Dental Company, Njemačka) pri 70 kVp, 7 mA i vremenu ekspozicije od 0,25 sekunda. Okluzalne RTG snimke 354 pacijenta (208 dječaka, 146 djevojčica) koji su zadovoljili kriterije za sudjelovanje procijenjene su na digitalnom filmu. Analizirane su na prijelome čeljusti, dentalne traume, dentalne anomalije (broj, veličina, oblik, položaj, nicanje), odontogene ciste, tumore i infekcije te kontrolu. Kada su formirane ispitivane skupine, ako je bilo manje od desetak razloga za snimanje okluzalne RTG snimke, skupine su se kombinirale.

Ovo istraživanje temeljilo se na retrospektivnoj procjeni RTG snimki. Roditelji pacijenata dali su prije snimanja informirani pristanak. Autori su obavili istraživanje u skladu s načelima Helsinške deklaracije, uključujući sve izmjene i revizije.

Za analizu podataka korišten je hi-kvadrat test ($\chi 2$). $P < 0,05$ prihvaćen je kao razina značajnosti. Svi statistički izračuni obavljeni su korištenjem statističkog paketa programa SPSS 17.0 V.

## Rezultati

U ovo istraživanje bili su uključeni pacijenti u dobi od 1 do 13 godina koji su imali okluzalne RTG snimke. Prosječna dob bila je 7,48 ± 2,59 godina za djevojčice i 7,76 ± 2,41 godina za dječake. Utvrđeno je da je snimljeno 359 okluzalnih RTG snimki od 354 pacijenta uključena u istraživanje. Te okluzalne RTG snimke snimljene su s gornjom čeljusti kod 312 pacijenata, s donjom čeljusti kod njih 37 te donjom i gornjom čeljusti kod 5 pacijenata. Broj pacijenata bio je 208, a pacijentica 146. Utvrđeno je da je više okluzalnih RTG snimki učinjeno za pacijente, ali prema rezultatima hi-kvadrat testa nije uočena statistička razlika između spolova u odnosu na razloge snimanja ($\chi 2$ (5) = 3,123; $p > 0,05$). Okluzalne RTG snimke uglavnom su snimane za osmogodišnje pacijente i kod djevojčica i kod dječaka.

Razlozi za snimanje okluzalnih RTG snimki pacijenata i njihova raspodjela prema dobi nalaze se u tablici 1. Utvrđeno je da su najčešći razlozi bili trauma trajnih zuba (156), a zatim trauma mliječnih zuba (68). Anomalija broja bila je najčešća dentalna anomalija (57). Fraktura čeljusti zabilježena je samo kod jednog pacijenta, talon tuberkula kod dva, a *dens in dente* također kod dva pacijenta. Okluzalna RTG snimka zatražena je kao kontrola za 35 pacijenata (slike 1. a – f).

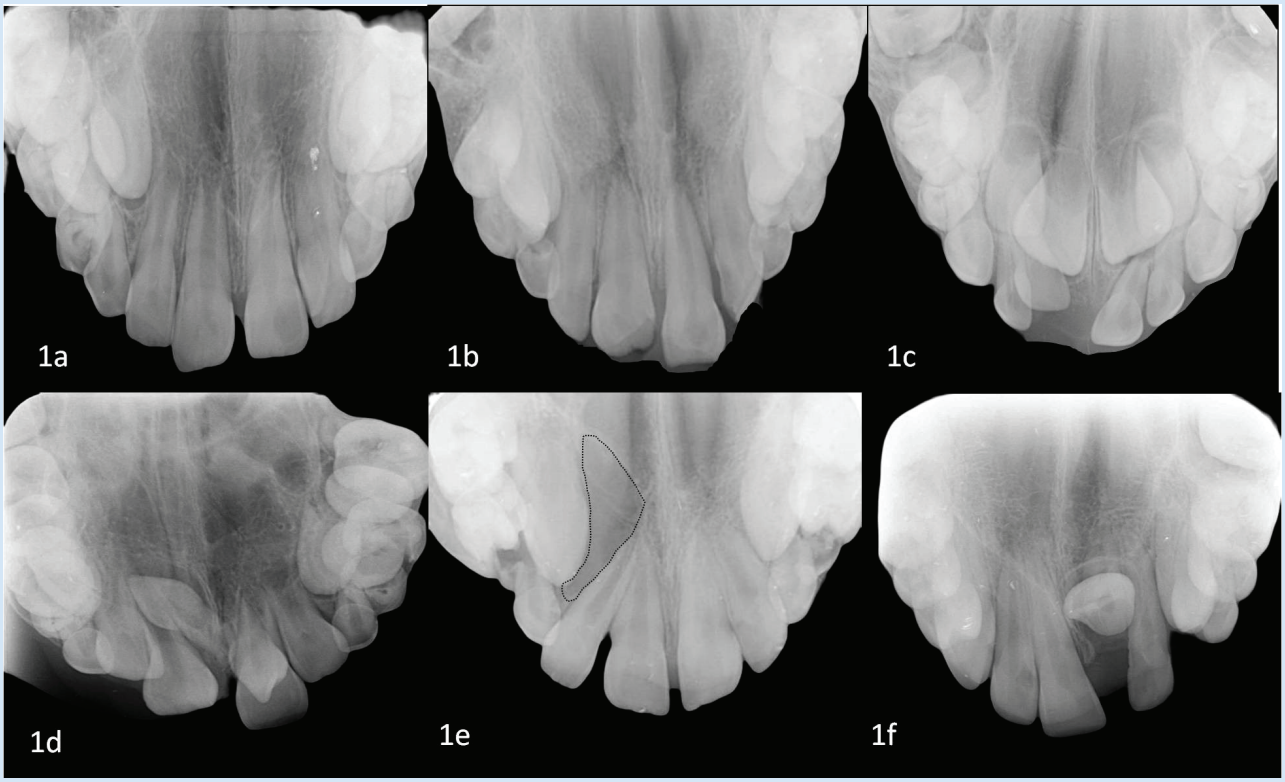


**Figure 1** **a** Talon cusp in a tooth #22, **1b** Dental trauma in two permanent teeth # 11, 21, **1c** Dental trauma in two primary teeth #51, 61, **1d** Supernumerary teeth in the upper jaw, **1e** Lesion in the right maxillary canine tooth region, **1f E**ruption disorder in a tooth #21.
**Slike 1.** **a.:** Akcesorna kvržica na zubu 22; **1b.** Trauma trajnih zuba 11, 21, **1c;** Dentalna trauma mliječnih zuba 51, 61; **1d.** Prekobrojni zubi u gornjoj čeljusti; **1e.** Lezija u području gornjega desnog očnjaka; **1f.** Poremećaj u nicanju zuba 21

**Table 1** Reasons for occlusal radiography and age distribution
**Tablica 1.** Razlozi okluzalnih rtg snimaka i dobna distribucija

| Reasons • Razlozi | Total • Ukupno | Male • Muško | Female • Žensko | Lower • Dole | Upper • Gore | Both upper and lower • Gore i dole | 1y | 2y | 3y | 4y | 5y | 6y | 7y | 8y | 9y | 10y | 11y | 12y | 13y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jaw fracture | 1 (0.28%) | 1 (0.48%) | | 1 (2.7%) | | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| Talon cusp | 2 (0.56%) | 1 (0.48%) | 1 (0.68%) | | 2 (0.64%) | - | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - |
| Gemination | 1 (0.28%) | 1 (0.48%) | | | 1 (0.32%) | - | - | - | - | - | - | - | - | 1 | - | - | - | - | |
| Dens in dente | 2 (0.56%) | 2 (0.96%) | - | 1 (2.7%) | 1 (0.32%) | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - | |
| Crown malformation | 3 (0.85%) | 2 (0.96%) | 1 (0.68%) | | 3 (0.96%) | - | - | - | - | - | - | - | - | 1 | - | 1 | 1 | - | |
| Ectopic eruption | 5 (1.41%) | 3 (1.44%) | 2 (1.37%) | - | 5 (1.6%) | - | - | - | - | 1 | - | - | 1 | 1 | 1 | 1 | - | - | - |
| Odontogenic cyst, tumor, infection | 9 (2.54%) | 5 (2.40%) | 4 (2.74%) | 2 (5.41%) | 7 (2.24%) | - | - | - | - | - | 2 | 3 | 1 | - | - | 2 | - | 1 | - |
| Trauma in primary dentition | 68 (19.2%) | 35 (16.8%) | 33 (22.6%) | 4 (10.8%) | 62 (19.9%) | 2 (40%) | 1 | 10 | 11 | 12 | 14 | 16 | 4 | - | - | - | - | - | - |
| Trauma in permanent dentition | 156 (44.1%) | 93 (44.7%) | 63 (43.1%) | 19 (51.4%) | 137 (43.9%) | - | - | - | - | - | - | 5 | 19 | 38 | 39 | 29 | 18 | 6 | 2 |
| Anomalies of number (Supernumerary tooth) | 57 (16.1%) | 37 (17.8%) | 20 (13.7%) | 1 (2.7%) | 56 (17.9%) | - | - | 1 | 2 | 1 | 2 | 5 | 12 | 14 | 9 | 7 | 3 | 2 | - |
| Delay in tooth eruption | 15 (4.24%) | 9 (4.33%) | 6 (4.11%) | | 15 (4.81%) | - | - | - | - | - | - | - | 6 | 5 | 1 | 2 | - | 1 | - |
| Diagnosis and control | 35 (9.89%) | 19 (9.13%) | 16 (11%) | 9 (24.3%) | 23 (7.37%) | 3 (60%) | - | 1 | 1 | - | 5 | 6 | 5 | 4 | 4 | 5 | 2 | - | 1 |
| | 354 (100%) | 208 (100%) | 146 (100%) | 37 (100%) | 312 (100%) | 5 (100%) | 1 | 12 | 14 | 14 | 23 | 36 | 49 | 64 | 55 | 49 | 24 | 10 | 3 |

**y:** year • godina

## Discussion

Radiology in dentistry is an integral part of a holistic approach to diagnosis and treatment. Although the oral clinical examination and the patient's medical history bring the clinician closer to the treatment, a comprehensive view cannot be provided without any radiological support. Occlusal projection, which is one of the radiographic techniques, is also a special technique that is needed in many cases. However, there has been no study in the Turkish population on the purpose of using occlusal radiographs in children. This study attempted to fill the gap in this area to some extent.

Tooth and jaw development, as an integral part of body integrity, is affected by systemic diseases and syndromes (13, 14). Therefore, the patients with such syndromes were not included in the study. Since radiation and chemotherapy treatments received during childhood affect the bony structures, the patients undergoing such treatments were also excluded from the study (15) In terms of standardization; all digital occlusal radiographs in the study were taken with a single X-ray unit.

Post-traumatic occlusal radiographs are as effective as periapical radiographs and allow a wider area to be examined. They are particularly efficient and effective in imaging foreign bodies embedded in soft tissue (16). Occlusal radiographs were taken following dental trauma in 63.3% of cases. 44.1% of these radiographs were taken after permanent dental trauma. Consistent with a study by Schüler et al. on the frequency of intraoral radiographs, the most common indication for intraoral radiographs was trauma (28.7%), followed by caries (22.7%) and apical diagnosis (17). Although the results of our study are valid for occlusal radiographs, it can be concluded that trauma is the most common indication for all types of intraoral radiographs. Injuries due to trauma to permanent teeth increase between the ages of 8-10 years (18). Consistent with this, it was found that most occlusal radiographs were taken at the age of 9 years in children, the age group in which most injuries occur. Approximately 3/5 of the patients are male, while the remaining 2/5 are female. Maxillary central teeth are the most commonly injured teeth due to trauma (18, 19). This is supported by the fact that 89.5% of the occlusal radiographs taken due to permanent tooth trauma were taken from the maxilla.

The rate of occlusal radiographs taken for primary dental trauma was 19.2%. Occlusal radiography, which is often used because of its ease of use and acceptability, especially in the evaluation of tight contacts and trauma in young children, is more tolerable and provides a wider view in children aged 0-7 years compared to periapical radiography (20). It was found that approximately 61.8% of patients undergoing radiography for primary tooth trauma were aged 4-6 years.

This study found that another reason for taking occlusal radiographs in pediatric patients was the number anomalies in the teeth with a rate of 16.1%. The reason for using occlusal radiographs, especially in the presence of supernumerary teeth, is the 3rd dimensional data that allows us to understand the exact position of the supernumerary tooth. 98% of the radiographs taken for the detection of supernumerary

## Rasprava

Radiologija u stomatologiji sastavni je dio holističkog pristupa dijagnostici i liječenju. Iako oralni klinički pregled i povijest bolesti pacijenta približavaju kliničara dijagnozi i odgovarajućoj terapiji, cjelovita slika ipak nije moguća bez radiološke potpore. Okluzalna projekcija, kao jedna od radiografskih tehnika, posebna je tehnika koja je potrebna u mnogim slučajevima. No nije bilo istraživanja u turskoj populaciji o svrsi korištenja okluzalnih RTG snimki kad je riječ o djeci. U ovom istraživanju pokušala se donekle popuniti praznina u tom području.

Na razvoj zuba i čeljusti, kao sastavnog dijela tjelesnog integriteta, utječu sistemske bolesti i sindromi (13, 14). Zato takvi pacijenti nisu bili uključeni u istraživanje. Budući da terapija zračenjem i kemoterapija primljeni tijekom djetinjstva utječu na koštane strukture, ti su pacijenti također isključeni iz istraživanja (15). U smislu standardizacije, sve digitalne okluzalne RTG snimke u ovom istraživanju snimljene su istim rendgenskim uređajem.

Posttraumatske okluzalne RTG snimke jednako su učinkovite kao periapikalne i omogućuju pregled šireg područja. Posebno su učinkovite u prikazivanju stranih tijela u mekom tkivu (16). Okluzalne RTG snimke traže se u 63,3 % slučajeva nakon dentalne traume, a 44,1 % takvih snimki zahtijeva se poslije trajne dentalne traume prema istraživanju Schülera i suradnika. Kad je riječ o učestalosti intraoralnih RTG snimki, najčešća indikacija za takve snimke bila je trauma (28,7 %), zatim karijes (22,7 %) i periapikalna dijagnostika (17). Iako rezultati našeg istraživanja vrijede za okluzalne RTG snimke, može se zaključiti da je trauma najčešća indikacija za sve vrste intraoralnih RTG snimanja. Ozljede zbog traume trajnih zuba češće su u dobi od 8 do 10 godina (18). Sukladno tomu, utvrđeno je da je većina okluzalnih RTG snimki snimljena kod djece u dobi od 9 godina, dobne skupine u kojoj se događa najviše ozljeda. Otprilike 3/5 pacijenata su dječaci, a preostale 2/5 su djevojčice. Središnji gornji zubi najčešće su ozlijeđeni u slučaju traume (18, 19). Tomu u prilog govori i podatak da je 89,5 % okluzalnih RTG snimki, učinjenih zbog traume trajnog zuba, bilo za maksilu.

Stopa okluzalnih RTG snimki snimljenih zbog primarne dentalne traume bila je 19,2 %. Okluzalne RTG snimke, koje se često koriste zbog jednostavnosti i prihvatljivosti, posebice u evaluaciji tijesnih kontakata i trauma male djece, podnošljivije su i omogućuju širi pregled djece od 0 do 7 godina u usporedbi s periapikalnim RTG snimkama (20). Utvrđeno je da je približno 61,8 % pacijenata podvrgnutih radiološkoj dijagnostici zbog traume primarnoga zuba bilo u dobi od 4 do 6 godina.

Ovo istraživanje otkrilo je da je još jedan razlog za snimanje okluzalnih RTG snimki, kad je riječ o pedodontskim pacijentima, broj anomalija zuba sa stopom od 16,1 %. Razlog za korištenje okluzalnih RTG snimki, posebno u slučaju prekobrojnih zuba, jest trodimenzionalni podatak koji omogućuje da shvatimo točan položaj prekobrojnog zuba. Ukupno 98 % RTG snimki učinjenih za detekciju prekobrojnih zuba snimljeno je u maksili. To korelira s podatkom da su prekobrojni zubi oko 10 puta češći u gornjoj čeljusti (21).

teeth were taken from the maxilla. This correlates with the information that supernumerary teeth are approximately 10 times more common in the upper jaw (21).

It is likely that occlusal radiographs taken due to odontogenic cysts, tumors and similar lesions can be clearly visualized by providing the third dimension of pathological lesions that expand spatially or extend beyond anatomical boundaries (11).

Delayed eruption can be caused by many reasons (22). In this study, regardless of the cause, the rate of occlusal radiographs taken to detect dental eruption delay was 4%. Occlusal radiographs, which provide a wide-area assessment of the level of development of the teeth, their roots and their supporting tissues, are a good alternative when local factors need to be investigated after systemic factors have been eliminated.

There are some limitations of our study. The first limitation is that the study was conducted at one location and the patient population consisted only of patients who attended the Ondokuz Mayıs University Faculty of Dentistry, Pediatric Dentistry Clinic. Since the study population consisted of patients who presented to the clinic, it does not fully reflect the general population. Furthermore, all data were taken from the digital system, and there were no manual data to analyze.

## Conclusion

Occlusal radiographs are used for specific conditions in pediatric patients. Occlusal radiographs in pediatric dental practice are most frequently used in cases of dental trauma and are mostly taken from the upper jaw. There is a need for more comprehensive studies including adult patients with occlusal radiography of the lower or upper jaw.

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**Ethical approval:** All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5).

All authors declare that written informed consent was obtained from the patients' parents prior to any radiograph or intra/extra-oral examination. Informed consent had been obtained before each standard examination.

**Author's contribution:** Conceptualization and design: **B.O** and **N.B.A.** Literature review: **N.B.A.** and **B.O.** Methodology and validation: **B.O** and **N.B.A.** Formal analysis: **N.B.A.** and **B.O.** Investigation and data collection: **N.B.A.** and **B.O.** Resources: **N.B.A.** and **B.O.** Data analysis and interpretation: **N.B.A.** and **B.O.** Writing-original draft preparation: **N.B.A.** and **B.O.** Writing-review & editing: **N.B.A.** Supervision: **B.O.** Project administration: **B.O** and **N.B.A.** Funding acquisition: **N.B.A.** and **B.O.**

Vjerojatno je da se okluzalne RTG snimke snimljene zbog odontogenih cista, tumora i sličnih lezija mogu jasno vizualizirati pružanjem treće dimenzije patoloških lezija koje se šire prostorno ili se protežu izvan anatomskih granica (11).

Zakašnjela erupcija može biti prouzročena mnogim razlozima (22). U ovom istraživanju, bez obzira na uzrok, stopa okluzalnih RTG snimki snimljenih za otkrivanje odgođenog nicanja zuba bila je 4 %. Okluzalne RTG snimke koje omogućuju široku procjenu razine razvoja zuba, korijena i potpornih tkiva, dobra su alternativa kada je potrebno istražiti lokalne čimbenike nakon što su eliminirani sistemski.

U našem istraživanju postoje neka ograničenja. Prvo je da je provedeno na jednoj lokaciji i da se populacija pacijenata sastojala samo od onih koji su došli u Kliniku za dječju stomatologiju Stomatološkog fakulteta Sveučilišta Ondokuz Mayıs. Kako se populacija sastojala od pacijenata koji su se došli liječiti u klinici, ona ne odražava u cijelosti opću populaciju. Nadalje, svi podatci preuzeti su iz digitalnog sustava, nije bilo ručnih podataka za analizu.

## Zaključak

Okluzalne RTG snimke upotrebljavaju se za specifična stanja pedodontskih pacijenata. U dječjoj stomatologiji uglavnom se primjenjuju u slučaju dentalne traume i uglavnom se rade u gornjoj čeljusti. Potrebna su sveobuhvatnija istraživanja u koja bi bili uključeni odrasli pacijenti s okluzalnim RTG snimkama donje ili gornje čeljusti.

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**Etičko odobrenje:** Svi provedeni postupci bili su u skladu s etičkim standardima odgovornog odbora za pokuse na ljudima (institucionalnog i nacionalnog) i Helsinškom deklaracijom iz 1975., revidiranom 2008.

**Informirani pristanak:** Svi autori izjavljuju da je od roditelja pacijenata dobiven potpisani informirani pristanak prije bilo kakvog radiološkog ili intra/ekstraoralnog pregleda. Prije svakog standardnog pregleda dobiven je informirani pristanak.

**Doprinos autora:** **B. O. i N. B. A.** – konceptualizacija i dizajn; **N. B. A. i B. O.** – pregled literature; **B. O. i N. B. A.** – metodologija i validacija; **N. B. A. i B. O.** – formalna analiza; **N. B. A. i B. O.** – istraživanje i prikupljanje podataka; **N. B. A. i B.O.** – resursi; **N. B. A. i B. O.** – analiza i interpretacija podataka; **N. B. A. i B. O.** – pisanje, priprema izvornog nacrta; **N. B. A.** – pisanje, recenzija i uređivanje; **B. O.** – nadzor; : **B. O. i N. B. A.** – administracija projekta **N. B. A. i B. O.** – financiranje.

**Sažetak**

**Svrha istraživanja:** Dentalne rendgenske snimke (RTG) korisna su dijagnostička pomoć u očuvanju oralnoga zdravlja djece i u njihovu stomatološkom liječenju. Najčešće se koriste periapekalne i ortopantomogram. Okluzalnim RTG snimkama daje se prednost u specifičnijim slučajevima. Cilj ovog istraživanja bio je retrospektivno procijeniti razloge za snimanje okluzalnih RTG snimki kad je riječ o pedijatrijskim pacijentima. **Materijali i metode:** Retrospektivno su procijenjene okluzalne RTG snimke pacijenata u dobi od 1 do 13 godina koji su se prijavili u Kliniku za dječju stomatologiju Stomatološkog fakulteta Sveučilišta Ondokuz Mayıs između 1. kolovoza 2015. i 1. kolovoza 2020. U istraživanje nisu bili uključeni pacijenti sa sindromima i bolestima koje bi mogle prouzročiti rascjep usne i nepca ili dentalne anomalije. Informacije o povijesti bolesti 354 uključena pacijenta osigurao je automatizirani sustav. **Rezultati:** Analizirano je ukupno 359 okluzalnih RTG snimki pacijenata. U istraživanju je sudjelovalo 208 pacijenata i 146 pacijentica. Okluzalne RTG snimke gornje čeljusti snimljene su za 312 pacijenata, donje čeljusti za njih 37, a gornje i donje čeljusti za 5 pacijenata. Utvrđeno je da su okluzalne RTG snimke najčešće snimane zbog traume zuba u trajnoj denticiji (156), trauma mliječne denticije (68) te za dijagnostiku dentalnih anomalija (57). **Zaključci:** Okluzalne RTG snimke zahtijevaju se za specifične situacije u dječjoj stomatologiji, a posebno su korisne u otkrivanju i dijagnozi ozljeda mliječnih i trajnih zuba.

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**MeSH pojmovi:** dentalna radiografija; dijagnostičko snimanje; ozljede zuba; dijete
**Autorske ključne riječi:** dijagnoza; okluzalna RTG snimka; dječja stomatologija; periapikalne RTG snimke; trauma

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