Fusion of Unerupted Mesiodens with a Regular Maxillary Central Incisor: a Diagnostic and Therapeutic Challenge

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Abstract
The mesiodens is the most frequent type of supernumerary tooth which can appear in the maxillary midline area. The etiology of mesiodentes is not fully understood. This report shows a case of incomplete fusion of an unerupted mesiodens with a permanent maxillary central incisor, aligned in the dental arch. Intraoral and radiographic examinations indicated fusion of the crown and cervical part of the root of the supernumerary tooth with the permanent incisor. The clinical situation was further complicated by the presence of another supernumerary tooth located palatally. The treatment approach has included two phase surgical therapy to extract the supernumerary teeth. Early diagnosis and appropriate surgical treatment of mesiodentes are important to decrease the risk of clinical complications. Pre-operative 3D imaging is strongly advisable since it allows accurate data to be obtained, and reduces the extent of surgery and the possibility of procedural complications. In most cases, a multidisciplinary collaboration is necessary for precise diagnosis and predictable treatment outcome.

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findings of gemination are double crowns and a single root. It is extremely difficult to differentiate between fusion and gemination when a supernumerary tooth bud is attached to the adjacent one; hence the term ‘double teeth’ is often used (4).

Millazzo and Alexander (7) suggested counting of teeth in a jaw and that the abnormal tooth should be counted as a single one. If we determine a normal number of teeth, it is gemination, and if it is a reduced number in dental arch then we diagnose fusion. The diagnosis established in this way can be wrong if it is a fusion of a normal and supernumerary tooth or if it is a gemination associated with hypodontia. However, those situations are really rare (8). Hagman (9) found only one described case of fusion with a supernumerary tooth. Badole, Shenoi and Parlikar (10) showed an endodontic treatment of fused permanent supernumerary tooth with divided root canals and a periapical process.

Knežević et al. (11) found the incidence of 0.2% of double teeth in a Croatian population. In a sample of Jordanian dental patients, the incidence of double teeth was 0.42%, and the maxillary central incisors were the most commonly affected with the incidence of 3.6% (12). Hamasha and Al-Khateeb (12) stated that recognizing the condition facilitates the prosthetic, periodontal, orthodontic, and surgical treatment. Multidisciplinary approach to planning and treatment contributes to a more successful therapy (13, 14). Published reports describe fusion of supernumerary with permanent teeth, mostly for teeth which are already completely erupted (13-17).

This study presents a case of incomplete fusion of an unerupted mesiodens with a permanent upper-central incisor placed in the dental arch. Another supernumerary tooth was placed palatally, which made the clinical procedure more complicated.

Case report

A 17-year-old boy was referred by orthodontist for further examination of the excessive teeth in a frontal region of the upper jaw with a recommendation for extraction. The medical history revealed that three years before he suffered from pain in a frontal region, which was taken care of by endodontic treatment of the tooth 21. The medical history confirmed that the patient was in good health. He denied hypersensitivity to drugs and anesthetic agents.

The intraoral examination revealed a labial displacement of the tooth 11, whereas supernumerary teeth were not erupted. A periapical radiological analysis confirmed the diagnosis of hyperdontia. The presence of osteolytic shadow in the periapical area of 11 and 21, was found (Figure 1). A clear case of tooth sensitivity 11 and 22 was determined by thermal test using ethyl-chloride spray (cold test). The patient was obviously concerned and mildly anxious. During the preoperative preparation the patient and his parents were informed about treatment objectives and procedures.

Surgical procedure was performed under local infiltration anesthesia with Ubistesin forte, containing Articain hydrochloride/Epinephrine 1/100 000 (3M ESPE, Seefeld, Germany). One-sided vestibular relieving incision along the edge of gingiva was performed, thus enabling visibility, and at the brojnjog zuba spoji sa susjednim, pa se često koristi izraz dvostruki zubi (4).

Millazzo and Alexander (7) predlažu da se izbroje zubi u čeljusti, a da se abnormalni zub broji kao jedan. Ako se pritom utvrdi normalan broj zuba, riječ je o geminaciji, a ako ih je manje u zubnom luku, dijagnosticira se fuzija. Tako postavljena dijagnoza može biti pogrešna ako se radi o nalazu fuzije normalnog i prekobrojnog zuba ili geminacije povezane s hipodontijom. No takve su situacije ekstremno rijetke (8). Hagman (9) je pronašao samo jedan opisani slučaj fuzije s prekobrojnim zubom. Badole, Shenoi i Parlikar (10) opisuju endodontski tretman prekobrojnoga i trajnoga zuba s fuzijom s razdvojenim korijskim kanalima i periapikalnim procesom.

Knežević i suradnici (11) ustanovili su u hrvatskoj populaciji pojavnost dvostrukih zuba od 0,2 %. U uzorku jordanskih stomatoloških pacijenata učestalost dvostrukih zuba bila je 0,42 %, a maksilarni središnji sjekutići imali su najčešće incidenciju od 3,6 % (12). Hamasha i Al-Khateeb (12) smatraju da rana dijagnostika navedenih stanja olakšava protokol, parodontološku, ortodontsku i kiruršku terapiju. Multidisciplinarni pristup u planiranju i liječenju pridonosi uspješnijoj terapiji (13, 14).

U objavljenim izvještajima opisana je fuzija prekomjernog zuba s trajnim zubom u zubnome luku. Dijagnosticiran je još jedan palatalno smješten prekobrojni zub koji je dodatno zakomplicirao kliničku sliku.

Prikaz slučaja

Sedamnaestogodišnjega pacijenta B. S. ortodont je poslao na pregled s kliničkim i radiološkim nalazom dvaju nezini- knutih prekobrojnih zuba u frontalnoj regiji gornje čeljusti i s preporukom za ekstrakciju. Iz anamneze je bilo jasno da je unatrag tri godine triplo bolove u frontalnoj regiji koji su tada završili endodontskim liječenjem zuba 21. Anamneza je potvrdila da je pacijent dobrog zdravlja. Negrirao je alergije i preosjetljivost na lijekove.

Intraoralnim pregledom ustanovljen je labijalni pomak zuba 11, a prekobrojni zub nisu bili vidljivi u usnoj šupljini. Analizom panoramske radiološke snimke potvrđena je uputna dijagnoza hiperodontije. Ustanovljena je i osteolitička sjena u periapikalnoj regiji 11 i 21 (slika 1.). Uredan nalaz senzibilitet zuba 11 i 12 dobiven je ispitivanjem hladnoćom s pomoću etil-kloridnog spreja (test hladnoćom). Pacijent je bio vidno zaborinut i blago anksiozan. Tijekom predoperacijske pripreme pacijent i njegovi roditelji obavijestili su o ciljevima i postupcima liječenja.

Kirurški postupak proveden je u lokalnoj infiltracijskoj anesteziji dvjema ampulama anestetika Ubistesin forte koje sadržavaju Artikain hidroklorid/Epinefrin 1/100 000 (3M ESPE, Seefeld, Njemačka). Jednostrani rasterećeni vestibularni rez uz rub gingive omogućio je vestibularnu preglednost
same time lifting of the palatal flap that gave maximum intra-
operative insight and a quick closure of surgical wound. De-
taching the supernumerary tooth from the surrounding bone
on the palatal side was performed with physio dispenser de-
vice INTRASurg 300 (KaVo, Biberach, Germany) using 0.9
% solution of sodium chloride for cooling. The bone open-
ing from vestibular side was made with care due to squeezed
incisors and the fact that substantial deficit of bone struc-
ture may cause the problem during the postoperative recov-
ery process. The finding on the panoramic radiograph more
clearly showed an excessive tooth that was placed palatally
and later extracted with a Bein lever. By accessing it from the
vestibular side, the tooth descended through the palatal re-
leased mucosal and bone opening. The supernumerary tooth
had a similar morphology as a maxillary canine (Figure 2).

One supernumerary tooth was rotated, positioned vestib-
ularly and interincisally, and it seemed to be connected with
the endodontically treated tooth 21. It was attached to crown
region and cervical part of root (Figure 3). Such intraoperative
finding was not expected. Consequently, it was not our inten-
tion to disrupt a good surgical cooperation with the patient
by unplanned prolongation of the surgical procedure. It was
also assumed that detaching and extraction of vestibularly po-
sitioned supernumerary tooth would lead to a larger bone de-
struction, and consequently, unwanted recession of interinci-
sal papilla in frontal area. We used intraoperative insight for a
better planning, and the vestibularly positioned supernumerary
tooth was not extracted during this visit. The first surgical
procedure was completed after extraction of the palatally posi-
tioned supernumerary tooth, and sutures were placed.

The patient’s postoperative recovery went normally. The
patient was monitored multiple times after the surgical pro-
cedure. A targeted periapical radiograph showed interincisal
vertical position of the second supernumerary tooth (Figure
3). During the follow-up examinations a significant interinci-
sal withdrawal of gingiva was found. After radiographic anal-
ysis, it was clearly possible to confirm the fusion of the un-
erupted mesiodens in dentition. After full recovery of soft
and hard tissues in the area and several consultative exami-
nations with the pediatric dentist and orthodontist, the next
surgical procedure started. During the second operative pro-
cedure, the Nowak Peter incision was applied, which allowed
the overview of the entire crown and part of the root of su-
pernumerary tooth (Figure 4).

The crown of the vestibularly interincisally located me-
siodens was detached from the permanent tooth 21 by using
the flat end taper long diamond bur (EDENDA AG-Swiss,
St Galen, Switzerland). After separation, the supernumerary
tooth was extracted completely (Figure 5). In the area of fu-
sion of two crowns on the tooth 21 the excess of fusion ma-
terial remained and was estimated by the consistency as den-
tin and enamel (Figure 6). The tooth 21 was morphologically
shaped and polished by a beveled diamond shaped bur cylin-
der (EDENDA AG-Swiss, St. Galen, Switzerland) and addi-
tionally polished by fine flame-shaped polisher (Figure 7). At
the very top of incisal flap, a submucosal periosteal graft was
prepared and transferred to the interincisal papilla position.
It was covered by a raised mucosal flap. The surgical proce-
iostodobno odizanje palatalnog režnja, maksimalni intra-
operativni uvid i brzo zatvaranje kirurške rane. Oslobađanje
zuba od okolne kosti sa palatalne strane učinjeno je fiziodis-
penzerskim aparatom Intrasurg 300 (KaVo, Biberach, Nje-
mačka), uz hlađenje izotoničnom 0,9-postotnom otopinom
natrijeva klorida (NaCl). Kost je s vestibularne strane otvo-
rena pažljivo zbog stisnutih sjekutića i činjenice da značajan
deficit koštane strukture može prouzročiti problem tijekom
postijelooperacijskoga oporavka. Na panoramskoj rendgenskoj
slici jasno se vidi palatalno postavljen prekobrojni zub koj
ja izvadjen Beinovom polugom. Pristupajući mu s vestibular-
ne strane zub je spušten kroz noprano oslobodeni otvor slu-
znice i kosti. Prekomerni zub bio je slične morfologije kao i
maksilarni očnjak (slika 2.).

Jedan prekobrojni zub je rotiran, postavljen je vestibular-
no i interincisalno i činilo se da je povezan s endodontski li-
ječnim zubom 21. Pričvršćen je za područje krune i cervi-
kalni dio korijena (slika 3.). Takoška intraoperativni nalaz nije
bio očekivan. Zbog toga nije bila namjera porušiti dobru kiruršku suradnju s pacijentom neplaniranim produljenjem
kirurškog postupka. Pretpostavilo se da će razdvajanje i ek-
strakcija vestibularno postavljenoga prekobrojnog zuba sada
znatno više oštetiti kost te će se posljedično pojaviti recesi-
ja interincisalne papile u fronti, što se nastojalo izbjeći. In-
traoperativni uvid iskorišten je za bolje planiranje, a vesti-
bularno postavljeni prekobrojni zub nije ekstrahiran u prvom
zahvatu. Ekstrakcijom palatalno smještena prekobrojnog
zuba završio je prvi kirurški postupak i postavljeni su šavovi.

Postijelooperacijski oporavak pacijenta protekao je uredno.
Pacijent je kontroliran više puta poslije kirurškog postupka.
Snimljen je ciljani retroalveolarni RTG koji je pokazao inte-
rcinalni vertikalni položaj drugoga prekobrojnog zuba (sli-
ka 3.). Na kontrolnim pregledima ustanovljeno je značajno
interincisalno povlačenje gingive. Sada se mogla jasno potvr-
diti već vidljiva fuzija nezrasloga prekobrojnoga zuba i u zub-
nom nizu lijevog inciziva. Nakon potpuna postijelooperaci-
skoga oporavka mekih i tvrdih tkiva u području, nekoliko
konzultacijskih pregleda sa specijalistima za dječju stomato-
logiju i pregleda ortodonta, pristupilo se drugom kirurškom
postupku. Tijekom tog zahvata učinjen je Nowakov rez koji
je omogućio pregled cijele krune i dijela korijena prekobroj-
nog zuba (slika 4.). Kruna vestibularno, interincisalno smje-
štena prekobrojnog zuba separirana je od trajnoga zuba 21
dijamantnim turbinskim svrdlom (EDENDA AG-Swiss, St
Galen, Švicarska).

Nakon separacije prekobrojnog zuba je u cijelosti izvađen
(slika 5.). U području fuzije dviju kruna na trajnom zubu 21
ostao je suvišak fuzijske mase koja se vizualno procijenila kao
denteska i caklinska (slika 6.) pa se zub 21 morfološki mo-
delirao i polirao turbinskim koničnim finirerskim svrdlom
(EDENDA AG-Swiss, St Galen, Švicarska) i dodatno polirao
gumicom za poliranje (slika 7.). U samome vrhu incizijsko-
ga režnja prepariran je submukozno periostalni transplantat
i premješten je na mjesto papile interincisalno. Prekritten je
podignutom mukoznim režnjem. Kontrolirajući postavljen
transplantat, kirurški je postupak završio šivanjem (slika 8.).

Nakon što su poslije osam dana izvanašni šavovi, estetika
interincisalne regije bila je zadovoljavajuća (slika 9.).}
Figure 1 Panoramic radiograph showing the osteolytic shadow in the periapical region of teeth 11, 21, which overlaps with the structures of the nasal region and two supernumerary teeth.

Slika 1. Panoramska radiografija – osteolitička sjena u periapikalnom području zuba 11, 21 koja se preklapa sa strukturama nosne regije i dvama prekobrojnim zubima

Figure 2 Palatally located right supernumerary tooth after extraction.

Slika 2. Palatinalno smješten desni prekobrojni zub nakon ekstrakcije

Figure 3 Periapical radiograph showing a mesiodens in the interincisal region, and indicating the possibility of fusion with the crown of the tooth 21.

Slika 3. Periapikalna radiološka snimka — prekobrojni zub smješten je interincizalno i upućuje na moguće spajanje s krunom zuba 21

Figure 4 Vestibular incision was performed according to Nowak Peter, which allowed the overview of the entire crown and part of the root of supernumerary tooth.

Slika 4. Vestibularni rez učinjen prema Peteru Nowaku omogućio je pregled cijele krune i dijela korijena prekobrojnog zuba

Figure 5 Vestibularly located mesiodens after separation and extraction.

Slika 5. Vestibularno smješten prekobrojni zub nakon odvajanja i ekstrakcije

Figure 6 Excess of fusion material left on tooth 21 was assessed as dentin and enamel.

Slika 6. Na zubu 21 ostao je suvišak fuzijske mase — vizualno je procijenjena kao dentinska i caklinska

Figure 7 Polished tooth 21 after removal of residual enamel and dentine.

Slika 7. Polirani zub 21 nakon uklanjanja zaostale cakline i dentina

Figure 8 Submucosal periosteal graft was placed interincisally on the position of the papilla, covered by raised mucosal flap, and secured with sutures.

Slika 8. Submukozno periostalni transplantat postavljen je na mjesto papile interincizalno, prekriven je podignutim mukoznim režnjem i postavljen su šavovi

Figure 9 Eight days after surgery, there is a visible wound healing process.

Slika 9. Osam dana poslije operacije s vidljivim procesom cijeljenja rane

Figure 10 Six weeks later, the healing of the papilla and surrounding mucosa is visible in interincisal region.

Slika 10. Nakon šest tjedana u interincizalnoj regiji uočava se cijeljenje zubne papile i okolne mukoze
dure was completed by suturing and controlling the placed graft (Figure 8).

Eight days later, the stitches were removed and the esthetics of interincisal region was satisfactory (Figure 9). Six weeks later, healing of the dental papilla and the surrounding mucosa was visible in the interincisal region (Figure 10).

Discussion

Fusion between the unerupted supernumerary tooth and the erupted permanent tooth is a rare occurrence (8, 9, 11, 12). In the presented case, the clinical examination could not determine fusion because both supernumerary teeth were unerupted. Later on, it was not easy to distinguish the fusion line on panoramic and targeted periapical radiographs. According to European Academy of Pediatric Dentistry (EAPD) guidelines (15) it seems reasonable that cone beam computed tomography (CBCT) could be applied in cases of unerupted, impacted and ectopic teeth. Its use could be considered in cases where it is likely to influence the management and where conventional radiographs fail to provide sufficient information (15, 16).

Rajab and Hamdan (17) estimated by clinical and radiological examination that 18.4% of the patients with hyperdontia had two supernumerary teeth among children aged 5-15 years in Jordan. Srivastava (18) stated that the occurrence of supernumerary teeth or fusion is not so rare among the population in India. Nevertheless, the occurrence of fusion of two supernumerary teeth in primary dentition is very rare (18). Cho (19) stated that in Hong Kong double teeth are more often seen in deciduous dentition than in permanent dentition. Knežević et al. (11) showed that there is a higher frequency of supernumerary teeth in the upper (71.4%) than in the lower jaw (28.6%) in population of Croatia, and that anomalies were more frequent unilaterally (85.7%) than bilaterally (14.3%).

During the treatment plan development, multidisciplinary consultations with orthodontist, pediatric dentist, and periodontist were held, including suggestions for orthodontic extraction of fused and rotated supernumerary teeth after separation. The orthodontist proposed the extraction of endodontically treated tooth 21 which was already aligned in the dental arch, but the surgeon and the pediatric dentist didn’t agree and proposed two-phase extraction of supernumerary teeth. However, after evaluating different approaches to the treatment plan, it was decided to implement therapeutic procedure that would be uncomplicated and with a predictable outcome. According to all the statements in the literature, multidisciplinary approach was needed to establish the most appropriate treatment plan (13-14, 16). A two-phase treatment was useful because post-operative bone recovery was enabled after the first surgical procedure, which created a solid base on which the interincisal papilla could be formed in a better way. By using the two-phase surgical procedure,esthetic and functional criteria were met. The patient was satisfied with the final outcome of the therapy.

Rasprava

Fuzija neizniknuloga prekobrojnoga i izniknuloga trajnoga zuba rjadak je nalaz (8, 9, 11, 12). U opisanom slučaju liječničkim se pregledom nije mogla utvrditi fuzija jer oba prekobrojna zuba nisu iznikla u usnu šupljinu. Poslije nije bilo jednostavno razlučiti kako odrediti liniju fuzije na panoramskim i ciljanim perikalnim radiogramima. Prema smjernicama Europske akademije za dječju stomatologiju (EAPD) (15), čini se razumnim da se računalna tomografija konusnih zraka (CBCT) može primijeniti u slučaju neizniknutih, impaktiranih i ektoperičnih zuba. Njegova se uporaba mogla razmotriti i kada se pretpostavlja da će utjecati na način liječenja i kada konvencionalni radiografi ne daju dovoljno podataka (15, 16).

Rajab i Hamdan (17) procijenili su liječničkim i radiološkim pregledom među djecom u dobi od 5 do 15 godina u Jordanu da je 18,4 % pacijenata sa hiperdoncijom imalo dva prekobrojna zuba. Srivastava (18) je pokazao da pojava prekobrojnih zuba ili fuzija nije tako rijetka u indijskoj populaciji. Ipak, fuzija dvaju prekobrojnih zuba u primarnoj dentitiji vrlo je rijetka (18). Cho (19) je izjavio da se u Hong Kongu dvostruki zubi češće vide u mliječnoj nego u trajnoj dentitiji. Knežević i ostali (11) pokazali su da je u hrvatskoj populaciji veća učestalost prekobrojnih zuba u gornjoj čeljusti (71,4 %) nego u donjoj (28,6 %), a anomalije su češće jednostrano (85,7 %) nego obostrano (14,3 %).

Tijekom razrade plana liječenja obavljene su multidisciplinarne konzultacije s ortodontom, dječjim stomatologom i parodontologom, uključujući i prijedloge za ortodontsko važenje srasloga i rotiranoga prekobrojnoga zuba nakon separacije. Ortodont je predložio vađenje endodontskih zuba 21 koji već bio u rubnom nizu, ali kirurg i dječji stomatolog nisu se složili i predložili su dvofazno vađenje prekobrojnih zuba. No nakon procjene različitih pristupa plan liječenja, odlučeno je primijeniti za pacijenta manje zahtjevne terapijske postupak s predvidljivim ishodom. Prema svim opismima u literaturi, multidisciplinski pristup bio je potreban za pripremu najprikladnijega plana liječenja (13 – 14, 16). Dvofazni rad bio je koristan jer je nakon prvoga kirurškog zahvata omogućen poslijeoperativski oporavak kostiju, što je stvorilo čvrst podlogu na kojoj se bolje formirala interincisalna papila. Dvofaznim kirurškim postupkom zadovoljeni su estetski i funkcionalni kriteriji. Pacijent je bio zadovoljan konačnim ishodom terapije.
Conclusions
This report shows a case of fusion of an unerupted mesiodens with a permanent maxillary central incisor and one additional supernumerary tooth located palatally. The treatment approach has included two phase surgical extractions of supernumerary teeth. Early diagnosis and appropriate surgical treatment of mesiodentes are important to decrease the risk of orthodontic, periodontal, endodontic, and esthetic problems. Excellent functional and esthetic results obtained in this case are attributable to team work, where specialized experts contributed to the selection of the most appropriate treatment.

Conflict of interest
The authors declare no conflict of interest.

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