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CASE REPORT

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Taurodontizam svih kutnjaka: prikaz neobičnog slučaja

Taurodontism Affecting all Molars: Report of an Unusual Case

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Sažetak
Taurodontizam je morfološka varijacija kod koje je povećan trup zuba, a korijeni su skraćeni. Takvi zubi imaju veliku pulpnu komoricu i apikalno smještenu furkaciju te nisu cervikalno suženi u području caklinsko-cementnog spojišta. Najčešće je taurodontizmom zahvaćena trajna denticija i to stražnji zubi, uglavnom kutnjaci. U pojedinom kvadrantu može zahvatiti jedan ili nekoliko zuba. Taurodontni zubi klinički izgledaju normalno, a tijekom stomatološkog liječenja otkrivaju se rendgenskim snimanjem. U ovom prikazu predstavljamo zanimljiv slučaj – naime, svi su kutnjaci u oba zubna luka bili taurodontni, što se vrlo rijetko događa. Dan je i osvrt o različitim mogućnostima kirurškoga i endodontskoga liječenja.

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Ključne riječi
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Uvod

Taurodontizam je razvojna anomalija, a rezultira promjenom oblika višekorijenskih zuba (1). Svojstveni su mu nedostatak normalnog cervikalnog suženja na caklinsko-cementnom spojištu, dugačak trup korijena, apikalni pomak dna pulpne komorice i vrlo kratki korjenovi. Taurodontni zubi su na rendgenogramu pravokutnog oblika, s ekstremno velikom pulpnom komoricom povećane apiko-okluzalne visine i s apikalnim pomakom furkacijskog područja (2).

Godine 1913. *Sir* Arthur Keith predložio je naziv taurodontizam, izraz sastavljen od grčkih riječi '*tauros*' - govedo i '*odontos*' – zub, zbog sličnosti

Introduction

Taurodontism is a developmental dental anomaly showing change in the shape of multi-rooted teeth (1). The term 'Taurodontism' was coined by Sir Arthur Keith in 1913 (1,2). Taurodontism is characterized by the absence of normal cervical constriction at the cemento enamel junction (CEJ), tall root trunk, apical shift of pulpal floor and very short roots along with enlarged body and pulp chambers. Taurodont teeth are rectangular in shape radiographically, having extremely large pulp chamber with increased apico-occlusal height and apical displacement of furcation area (2).

sa zubima preživača (1,3). To je obilježje bilo često kod neandertalaca (3). Etiologija nije razjašnjena, a smatra se da nastaje zato što na odgovarajućoj horizontalnoj razini nema invaginacije Hertwigove epitelne korijenske ovojnice (1,4).

Smatralo se za taurodontizam da ga se može pronaći uz mnoge sindrome kao što su Downov, Klinefelterov (KS) i ostali (1,2). Identifikacija pacijenata s mezo- ili hipertaurodontizmom može pomoći u ranom otkrivanju sindroma i tako oboljelima znatno poboljšati kvalitetu života (3).

Osim toga ta se anomalija povezuje s Amelogenesis imperfecta (AI-om), ektodermalnom displazijom i prekobrojnim zubima. Taurodontizam je češći kod pacijenata s rascjepima usne i nepca (4,5).

Nawa i suradnici (6) istaknuli su u svojoj studiji povezanost Van der Woudeova sindroma (VWS-a) i taurodontizma na uzorku od 13 slučajeva. A Tomona i suradnici (7) na 15 su slučajeva sa Smith-Magenisovim sindromom (SMS-om), uporabom dentalnih i kraniofacijalnih rendgenograma i trodimenzionalnog fotoprikaza lica, pronašli 13 taurodontizama i ageneza zuba.

Danas se taurodontizam smatra varijacijom normalne anatomije zuba, a ne anomalijom (1). Češće pogađa trajnu denticiju negoli mliječnu i može se naći jednostrano ili obostrano - većinom na kutnjacima, a rijetko na pretkutnjacima. Uglavnom je zahvaćen samo jedan zub (1,3).

Prema stupnju apikalnog pomaka dna pulpne komorice, taurodontizam je klasificiran u tri podkategorije (3):

1. blagi à hipotaurodontizam
2. umjereni à mezotaurodontizam
3. izraziti à hipertaurodontizam.

Shifman i Channanel izračunali su indeks za mjerenje stupnja izraženosti taurodontizma na radiogramima (8). Kruna zuba klinički izgleda normalno, a taurodontizam se otkriva rutinski na rendgenogramima te ne utječe na uobičajene restaurativne zahvate, ali otežava nekiruršku endodontsku terapiju – lokaciju ulaza u korijenske kanale, instrumentaciju i opturaciju (4).

Prikaz slučaja

Osamnaestogodišnja djevojka upućena je na Stomatološku kliniku zbog gnojnog eksudata u području donjih lijevih stražnjih zuba, zapaženog unatrag mjesec dana. Tijekom pregleda liječnik je pronašao intraoralnu oteklinu i otvor fistule u području drugoga lijevog mandibularnog kutnjaka. Zub je bio osjetljiv na perkusiju, a pacijentica je u povijesti bo-

The term taurodontism comes from words '*tauros'* and '*odontos'*, meaning 'bull tooth', a condition that has been found in ancient Neanderthals where the teeth resemble that of cud chewing animals (3). The etiology of this condition is unclear and thought to be due to failure/defect of Hertwig's epithelial root sheath (HERS) diaphragm to invaginate at proper horizontal level (1,4).

Previously it was related to be associated with many syndromes such as Down syndrome, Klinefelter's syndrome (KS) and others (1,2). A recent report suggests that taurodontism is one of many dentofacial manifestations of KS and identification of such patients may help in early recognition of the disorder and helps in improvement of the quality of life (3). In addition, it has been associated with Amelogenesis imperfecta (AI), Ectodermal Dysplasia and supernumerary teeth. Increased frequency of taurodontism is also reported in patients with cleft palate/ lip (4,5).

Today, it is considered as a variation of normal anatomy of the tooth rather than a dental anomaly[1]. Taurodontism more frequently affects permanent dentition than deciduous and may be seen unilaterally or bilaterally, mostly involving molars or premolars. In majority of cases a single tooth is affected (1,3).

Taurodontism has been classified[3] into three subtypes according to the degree of apical displacement of the pulpal floor as:

1. Mild à Hypotaurodont
2. Moderate à Mesotaurodont
3. Severe à Hypertaurodont.

Clinically, the crown appears as normal tooth and taurodontism is detected by routine radiography (4). Even though taurodontism is uncommon, it may influence the success of the treatment rendered to the patient.

Taurodontism doesn't interfere with routine restorative procedures, but complicates non surgical endodontic therapies mainly in locating canal orifices, instrumentation and obturation of root canals.

Case report

An 18 year old female reported to the clinic complaining of pus discharge in lower left posterior region since the preceding one month. On clinical examination, a small intra oral swelling and sinus tract were seen in mandibular left second molar area. The tooth was sensitive to percussion and the patient also gave a history of recurrent swelling and pain in

lesti navela oticanje i bol u tom području u posljednjih šest mjeseci. Periapikalna snimka pokazala je okruglu radiolucentnu leziju (Slika 1.). Drugi mandibularni kutnjak i susjedni zubi imali su obilježja taurodontizma.

Na prvim i drugim donjim kutnjacima u oba su kvadranta bile pronađene duboke karijesne lezije. U gornjoj čeljusti karijes je bio okluzalno na svim kutnjacima. Na intraoralnoj periapikalnoj slici desnih donjih kutnjaka vidjela su se obilježja taurodontizma (Slika 2.). Osim tih nalaza na zubima nije bilo ostalih patoloških obilježja. Kosti, nokti i kosa pacijentice izgledali su normalno. Medicinska povijest bolesti i obiteljska anamneza isključili su bolesti i patološka stanja koja se javljaju uz taurodontizam.

the same area for about six months. A periapical radiograph showed a round radiolucent lesion at the apex. The mandibular second molar along with adjacent teeth showed features of taurodontism.

Deep carious lesions were noted in the mandibular first and second molars of both quadrants. In the maxilla, all molars had occlusal caries. Features of taurodontism were evident in intra oral periapical radiograph of right mandibular molars (Figure 1).

On observing these rare, unusual findings of taurodontism, a panoramic radiograph was taken which confirmed hyper taurodontism affecting all molars of the dentition (Figure 2).

Complete intra oral examination revealed no change in the number, color or structure of teeth in

Slika 1. Intraoralna snimka pokazuje periapikalni abses na zubu 37 i duboki karijes na zubu 47 sa hipertaurodontnim kutnjacima
Figure 1 Pre operative Intra oral periapical radiograph showing periapical abscess irt 37 and deep caries irt 47 along with hypertaurodonts of all permanent molars.

Slika 2. Hipertaurodontni svi trajni kutnjaci u obje čeljusti vidljivi na OPG-u nakon zahvata
Figure 2 Post operative Ortho pentamograph (OPG) showing hypertaurodonts of all permanent molars in both jaws.

Pacijentica je dobila antibiotike i analgetike za olakšavanje bolova i osjetljivosti prouzročenih dubokim karijesnim lezijama. U idućim posjetima na zubu 37 bili su instrumentirani korijenski kanali uporabom ručnih NiTi instrumenata i *step back* tehnikom. Zub je bio anesteziran 2-postotnim lidokainom s epinefrinom. Prije instrumentacije bio je oblikovan pristupni kavitet i ekstirpirana pulpa iz svih triju kanala. Inicijalna i konačna radna duljina bila je određena endometrom Root ZX-II (J Morita, Japan). Mezijalni kanali instrumentirani su do iglice br. 30, a distalni do broja 45. Tijekom liječenja pacijentica se za ispiranje usne šupljine koristila sterilnom fiziološkom otopinom i 3-postotnim natrijevim hipokloritom. Tijekom tjedan dana u kanalima je bio ostavljen premaz kalcijeva hidroksida, a zatim su tehnikom lateralne kondenzacije napunjeni gutaperkinim štapićima i pastom (Pulp canal sealer, Kerr Sybron, SAD). Autori su imali teškoća tijekom ekstirpacije pulpe, instrumentacije i punjenja, jer su kanali bili veliki s apikalnim pomakom furkacijskog područja. Kod preparacije pristupnog kaviteta

the entire dentition. Other than these dental findings, no other pathologic features were noted. The patient's bones, fingernails and hair appeared normal. The patient's medical history and family history ruled out other diseases/pathologies occurring in association with taurodontism.

A course of antibiotics and analgesics were prescribed to relieve the pain and tenderness associated with the deep carious lesion. In subsequent visits, root canal treatment was done for 37 using Niti hand instruments and step back technique.

The tooth was anesthetized using 2% lidocaine with epinephrine. The access cavity was completed and pulp extirpation was done from all three canals before instrumentation. Mesio-buccal and mesio-lingual root canals were instrumented using #20 sized K-file. Instrumentation of the distal canal was done by means of # 30 sized K-file. Calcium hydroxide closed dressings were given for one week. Both initial and final working lengths were determined. Master apical files #30 and #40 were used for final preparation of canals before obturation.

i lokacije otvora korijenskih kanala nije bilo teškoća. Nakon endodontskog liječenja bio je napravljen ortopantomogram koji je potvrdio punjenje triju kanala na zubu 37 i otkrio taurodontizam na svim kutnjacima obaju zubnih lukova (Slika 3.).

Mjesec dana nakon endodontskog liječenja pacijentica više nije imala bolove, ali bila je ustanovljena blaga osjetljivost zuba na pritisak te submandibularna limfadenopatija. Nakon mišljenja kirurga obavljena je apikotomija. Histopatološka dijagnoza bila je „periapikalni granulom s akutnim upalnim promjenama".

Rasprava

Premda nije čest, taurodontizam se mora moći prepoznati zbog njegova utjecaja na različite postupke stomatološkog liječenja. Istaknuto je da ekstrakcija takvih zuba ne mora biti kompliciranа, osim u slučaju da korijeni široko divergiraju. Ipak, autori su mišljenja da hipertaurodontni kutnjaci mogu stvarati problem kod ekstrakcije zbog apikalnog pomaka furkacije te teškoća u pozicioniranju kliješta. Taj se problem može riješiti pravilnom uporabom kirurških poluga.

Budući da taurodontizam rijetko zahvaća sve kutnjake trajne denticije, ovaj je slučaj pokušaj da se ustanovi njegovo kliničko značenje. Endodontsko liječenje mnogobrojnih taurodontnih zuba vrlo je zahtjevno (1).U najnovijem radu Jafarzadeha i suradnika (9) kaže se da - unatoč izazovima endodontskog liječenja - kliničari rijetko posvećuju pozornost taurodontizmu. Također je istaknuto da je tijekom endodontskog liječenja takvog zuba potrebno uzeti u obzir složenost sustava korijenskih kanala, obliteraciju i oblik kanala te mogućnost da postoje i prekobrojni korijenski kanali.

Suprotno tome, Durr i suradnici (10) smatraju da taurodontizam ne utječe na rutinske stomatološke postupke, ali da morfologija može spriječiti lokalizaciju ulaza u korijenske kanale i uzrokovati teškoće kod instrumentacije i punjenja.

Tsesis i suradnici (1) uspješno su obavili endodontsko liječenje taurodontnoga prvoga gornjeg kutnjaka. Uspjeh su pripisali uporabi povećala, jer su mogli lokalizirati ulaze četiriju korijenskih kanala. Slično tome, u novijem radu Josepha (3) opisane su mnogobrojne komplikacije tijekom endodontskog liječenja triju taurodontnih kutnjaka. Uporaba kirurškoga operacijskog mikroskopa omogućila je dobru vizualizaciju, pa tako i instrumentaciju te opturaciju kanala anatomski varijabilnih taurodontnih kutnjaka.

The canals were obturated with 2% gutta percha using lateral condensation technique. Sterile normal saline and 3% sodium hypochlorite were used as irrigating solutions during the treatment.

One month after root canal therapy, patient had no pain but mild tenderness on occlusion was noted. Tenderness on percussion and mild left submandibular lymphadenopathy was also found. As per the surgeon's opinion, the radiolucent lesion at the apex of the root was treated with apicectomy. Diagnosis of *'periapical granuloma with acute inflammatory changes'* was made based on histopathologic examination of the tissue.

Discussion

Shifman and Channanel have formulated an index to measure the degree of taurodontism as seen in radiographs (6). There are several reports of taurodontism as a part of many syndromes (2,7). Some are also associated with the Amelogenesis imperfecta (AI), hypodontia, supernumerary teeth and cleft lip/palate (2-4). Nawa H et al have noted the association between Van der Woude syndrome (VWS) and taurodontism in a clinical study consisting of a sample of 13 cases (8). Another study done by Tomona N et al in 15 cases of Smith-Magenis syndrome (SMS) using dental and craniofacial radiographs and three-dimensional facial photoimaging showed taurodontism and tooth agenesis in 13 cases (9).

Very recently, Jafarzadeh et al. have reported that despite the clinical challenges in endodontic therapy, taurodontism has received little attention from clinicians. They have also noted that one should appreciate the complexity of the root canal system, canal obliteration and configuration, and the potential for additional root canal systems while performing root canal treatment on such teeth (10).

On the contrary, Durr et al (11) have said that the taurodont form does not interfere with routine operative procedures, but it is suggested that the morphology might hamper the location of orifices and could create difficulties in instrumentation and obturation in endodontic treatment.

The frequency of occurrence of taurodontism may vary in different ethnic and population groups. This is analogous to non-metric dental traits used by dental anthropologists. Hence, population based studies of this polymorphism can prove useful in anthropological and forensic identification. It appears that no previous literature on taurodontism have been published on hypertaurodontism affecting all molars of the permanent dentition (7,11).

Taurodontizam može kod različitih naroda i populacija varirati analogno nemetričkim zubnim obilježjima, što proučavaju dentalni antropolozi. Zbog toga populacijske studije toga polimorfizma mogu biti korisne u slučaju antropološke i forenzične identifikacije.

Zaključci

Taurodontizam je nepravilnost u razvoju zuba – naime, takvi zubi nemaju invaginaciju Hertwigove epitelne ovojnice na odgovarajućoj horizontalnoj razini. Karakteristična obilježja su: povećana pulpna komorica, apikalni pomak dna pulpne komorice i nema suženja u području caklinsko-cementnog spojišta. To je najčešće izolirana anomalija, ali je opisana i uz nekoliko sindroma te poremećaja. Ovaj prikaz opisuje taurodontizam koji zahvaća sve kutnjake.

Na kraju, vrlo je važno da opći stomatolog bude obaviješten o taurodontizmu, ne samo zbog kliničkih komplikacija nego i zbog postupaka u takvim slučajevima. Taurodontizam može biti dragocjeni "ključ" za otkrivanje mnogobrojnih sindroma i poremećaja.

Zahvala

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Taurodontism, although not very common has to be emphasized due to its influence on various dental treatments. It is reported that extraction of such teeth may not be a problem unless the roots are not widely divergent. However, the authors believe that hypertaurodonts may pose some problem during extraction because of apical shift of furcation and also due to difficulty in placement of forcep beaks. This can be resolved by proper usage of surgical tooth elevators.

Conclusion

Due to the rarity of taurodontism affecting all the molars of permanent dentition, present case is an attempt to find out its clinical importance. Endodontic treatments of many of these teeth are challenging (1). Recently, taurodontism affecting only 6 molars of both arches has been reported (2).

To conclude, it is very important for a general dental practitioner to be familiar with taurodontism not only with regards to clinical complications but also its management. Taurodontism also provides a valuable clue in detecting its association with many syndromes and other systemic conditions.

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Abstract
Taurodontism is a morphologic variation in which the body of the tooth is enlarged and the roots are reduced in size. Taurodont teeth have large pulp chambers and apically positioned furcation area along with absence of cervical constriction at the cemento-enamel junction (CEJ). This mainly affects permanent dentition and the involved teeth are posteriors, mostly molars. One or several teeth in the same quadrant are affected. Clinically, taurodonts appear as normal teeth and are detected by routine radiographic examination during dental treatments. Interestingly, in the current case report all molars of both arches were hypertaurodonts which is a very rare finding. Hence this case is presented with the various surgical and endodontic treatment options.

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