Pojavnost akcesornih kanalića na srednjoj i koronarnoj trećini korijena prednjih zuba

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Sažetak

Lateralni kanalići na zubu mogu stomatologu stvarati probleme pri dijagnosticiranju pulpitičnih boli nakon endodoncije, a znanje o njima znatno olakšati rad. Ovo ispitivanje provedeno je da bi se proširile spoznaje o morfologiji zuba i time poboljšao rad stomatologa. Lateralni kanalići proučavani su na slučajnom uzorku od 110 trajnih, jednokorijenih, prednjih gornjih i donjih zuba. U ispitivanju upotrebljene su metode prebrojavanja, promatranja pod povećalom i bojenja. Utvrđeno je postojanje lateralnih kanalića koji se otvaraju na srednjoj trećini korijena kod 5 zuba (4,5%). Statističkom raščlambom utvrđeno je da ispitivanu pojavu možemo očekivati u populaciji s 95% vjerojatnosti u intervalu od 0,7% do 8,3%. Ispitivanu pojavu potrebno je potanje ispitati ne samo na prednjim zubima već i na svim skupinama zuba.

Ključne riječi: *akcesorni kanalić, lateralni kanalić.*

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Uvod

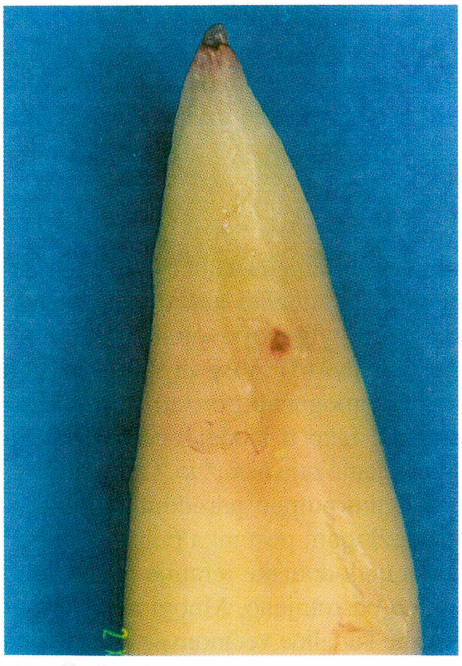
Zubna pulpa povezana je s parodontom preko apeksnog foramena, apeksne delte, akcesornih i lateralnih kanalića (1). Mišljenja autora o pojmu akcesornog i/ili lateralnoga kanalića se razlikuju. U starijoj literaturi, Njemirovskij (1) i Seltzer (2), smatraju da su lateralni kanalići oni kanalići koji polaze okomito od glavnoga korijenskog kanala, a akcesorni oni koji teku usporedno s glavnim kanalom. Po njihovu mišljenju lateralni kanalići javljaju se znatno češće u predjelu furkacija kutnjaka i u predjelu koronarne trećine korijena zuba, a akcesorni kanali češće su u apeksnoj trećini korijena (1). Volton (3) pak ne radi razliku između akcesornog i lateralnoga kanalića i definira ih kao kanaliće koji stvaraju komunikaciju između zubne pulpe i parodontnog ligamenta. Ti kanalići nastaju zarobljavanjem krvne žile u Hertwigovoj ovojnici tijekom razvoja zubnoga zametka (4). Više ih ima u mlađih ljudi, jer starenjem mogu obliterirati odlaganjem dentina ili cementa. Iako ti kanalići često obliteriraju, njihovo postojanje nije nevažno. Oni imaju važnu ulogu u nastanku pulpno parodontnog sindroma. Mogu biti i razlogom postanka pulpitičnih boli tijekom ili nakon endodontske terapije ako pulpno tkivo nije potpuno odstranjeno. Mnogi autori proučavali su akcesorne kanaliće većinom se osvrćući na apikalnu trećinu korijena gdje su i najčešći. Prema Seltzerovim (2) i Benderovim (1) podatcima lateralni se kanali javljaju u 16,9 % zuba. U novije vrijeme neki autori [Kartal (5,6) i Miyashita (7)] u sklo-

pu ispitivanja morfologije korijenskoga kanala zapažaju nastanak lateralnih kanalića i u srednjoj i cerviksnoj trećini, ali ih ne tumače.

Malo je podataka o postojanju akcesornih ili lateralnih kanalića koji završavaju na površini srednje i koronarne trećine korijena zuba. Kako smatramo da je potrebno znati za taj problem, odlučili smo ispitati čestoću nastanka pojave akcesornih kanalića u srednjoj i koronarnoj trećini korijena zuba. Dobiveni rezultati pomoći će kliničarima u svakodnevnoj praksi jer će, obaviješteni o toj problematici, lakše dijagnosticirati uzrok pulpitičnih boli tijekom ili nakon endodontske terapije ili pri razvoju pulpno parodontnog sindroma i tako omogućiti bolji uspjeh terapije.

Materijal i metode

Ispitivanje je provedeno na slučajnom uzorku od 110 izvađenih, trajnih, jednokorijenih, prednjih gornjih i donjih zuba. Razvrstani su u sljedeće skupine: gornji srednji sjekutići, gornji bočni sjekutići, gornji očnjaci, donji srednji sjekutići, donji bočni sjekutići i donji očnjaci.



Slika 1. *Zub s otvorom lateralnoga kanala na srednjoj trećini korijena zuba*

Figure 1. *Teeth with lateral canal opening on the middle thrid of the root surface*

Zubi su čuvani u 10%-tnoj otopini formalina. Očišćeni su pod mlazom tekuće vode s dezinfekcijskim sredstvom. Na taj su način odstranjeni meki i tvrdi ostatci parodontnog tkiva. Ulazi u prostore pulpnih komorica trepanirani su turbinskom vrtaljkom s fisurnim dijamantnim svrdlom. Uz pomoć svrdala za instrumentaciju korijenskoga kanala prikazani su ulazi u korijenske kanale. Kerr iglom broj 10 ispitana je prohodnost korijenskoga kanala i odstranjeni su ostatci pulpnoga tkiva. Injekcijskom štrcaljkom ukapavana je organska boja metilensko modrilo (Metilenblau, Kemika) dok se nije pojavila boja na vanjskim otvorima kanalića (Slika 1). Tako pripremljeni zubi promatrani su pod povećalom povećanja 5x i jakim osvjetljenjem.

Na uzorku smo izračunali standardnu devijaciju proporcije i odredili smo granice pouzdanosti.

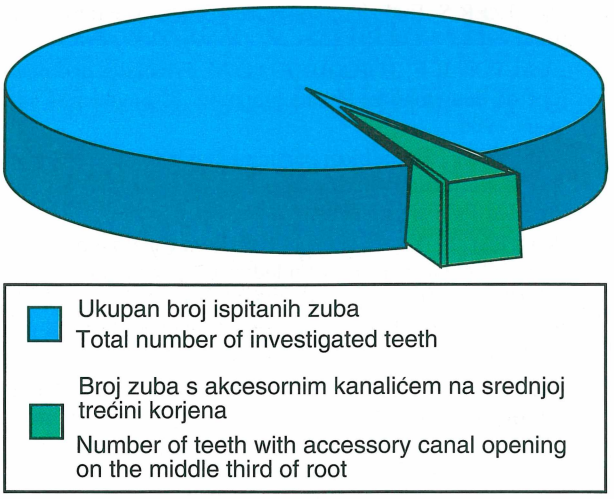
Rezultati

Temeljem raščlambe čestoće akcesornih kanalića u srednjoj i koronarnoj trećini korijena zuba na uzorku od 110 izvađenih, trajnih, jednokorijenih prednjih zuba utvrdili smo otvore akcesornoga kanalića u srednjoj trećini kod 5 zuba (Tablica 1, Slika 2). Lateralni kanalići u srednjoj trećini korijena zuba najčešće se pojavljuju kod gornjih očnjaka i to u 10,52% slučajeva. (Slika 3.) U koronarnoj trećini korijena zuba nismo našli otvore akcesornih kanalića.

Tablica 1. *Zubi s akcesornim kanalićem na srednjoj trećini korjena zuba*
** zubi su označeni dvojnim sustavom označavanja*

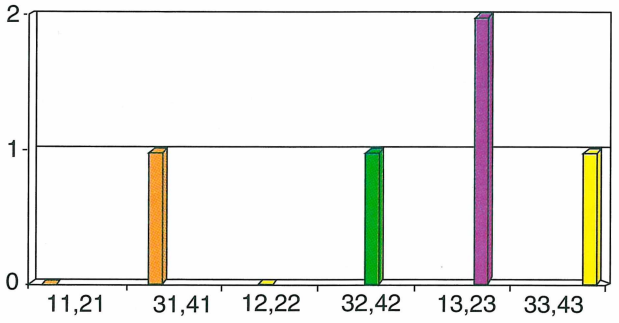
Table 1. *Teeth eith accesory canal on the middle third of the root surface*
** teeth are marked with dual system*

ZUB TOOTH	BROJ OTVORA NUMBER OF OPENINGS	BROJ ZUBA NUMBER OF TEETH
11,12	-	5
31,41	1	19
12,22	-	27
32,42	1	19
13,23	2	19
33,43	1	21
Σ S	5	110



Slika 2. *Akcesorni kanalići srednje trećine korijena zuba u ukupnom uzorku*

Figure 2. *Accessory canals of the middle third of the root surface in total sample*



Slika 3. *Akcesorni kanalići srednje trećine korijena, pojedine skupine zuba prikazane su dvojnim sustavom označavanja zuba*

Figure 3. *Accessory canals of the middle third of the root surface, some groups of teeth and marked by dual system*

$$P = 0{,}045,\ q = 0{,}95,\ Sp = 0{,}0195$$

$$P - 1{,}96\ sp < \Pi < p + 1{,}96\ Sp;$$
$$0{,}007 < \Pi < 0{,}083 \text{ uz } 95\% \text{ vjerojatnosti}$$

Uz 95% vjerojatnosti možemo tvrditi da se nastanak lateralnoga kanalića na prednjim trajnim zubima javlja u populaciji u intervalu od 0,7% do 8,3%.

Rasprava

Dobro poznavanje morfologije endodontskoga sustava, uključujući moguće varijacije, važno je da bi zahvati na zubima bili izvedeni *lege artis* i bez naknadnih komplikacija.

Kod svakoga zuba s bolesnom pulpom, bilo da se radi o upali, nekrozi ili gangreni potrebno je izvršiti endodontski zahvat. Cilj endodontskog zahvata jest da se iz korijenskoga kanala odstrane sva patološki promijenjena tkiva i da se kanal zatvori kako ne bi bilo doticaja s florom usne šupljine (1).

U takvim slučajevima zubni cement može zatvoriti foramen, te zub zadovoljava u funkcijskom i estetskom smislu. Korijenski se kanal puni sa svrhom da se zatvori kanal i pripadajuće kanaliće kako bi se spriječila eksudacija *"ex vacuo"* i kemijsko - toksičke iritacije periapeksa (8). Prije endodontskog zahvata uvijek je potrebno s pomoću rendgenograma ispitati morfologiju radikularnoga dijela endodontskog prostora, informirati se o broju, položaju, dužini i obliku korijenova i korijenskih kanala, te o prohodnosti korijenskih kanala. Time želimo osigurati pravilnu intraradikularnu instrumentaciju: čišćenje, širenje te konačno punjenje kanala, bez mogućih komplikacija.

Ako endodontskim zahvatom ne odstranimo pulpno tkivo iz lateralnih ili akcesornih kanalića, mogu nastati promjene na parodontu. Danas je još uvijek prihvaćeno mišljenje da se lateralni i akcesorni kanalići te apikalna delta ne mogu očistiti. Da bismo smanjili lezije periradikularnoga tkiva potrebni su određeni stimulansi (9). Srećom, lateralni kanalići nisu toliko česta pojava; rezultati ovog ispitivanja pokazuju postojanje lateralnih kanalića kod prednjih gornjih i donjih zuba od 4,5%. Ali komplikacije koje oni mogu izazvati značajne su pa je potrebno stomatologa praktičara obavijestiti o čestoći nastanka lateralnih kanalića. Do sada je malo podataka u literaturi o tome problemu, pa tako Kartal (5) na 100 donjih sjekutića zapaža kod njih 5 otvore lateralnih kanalića u srednjoj trećini korijena, a u drugom ispitivanju na 88 gornjih drugih premolara pronašao je 6 lateralnih kanalića koji se otvaraju u cerviksnoj trećini i 11 koji završavaju u srednjoj trećini korijena (6). Miyashita (7) je pronašao lateralne kanaliće kod donjih sjekutića u 7% slučajeva. Rezultate ovog istraživanja nije moguće kvalitetno usporediti s prijašnjim ispitivanjima jer u literaturi ne postoje podatci o pojavnosti akcesornog ili lateralnoga kanalića na srednjoj i koronarnoj trećini korijena zuba za skupinu prednjih zuba.

Zaključak

Ispitivanje je provedeno na 110 trajnih, jednokorijenih, gornjih i donjih prednjih zuba.

Ustanovljeno je postojanje lateralnih kanalića koji završavaju s otvorom na srednjoj trećini površine korijena od 4,5%. Na cerviksnoj trećini korijena nismo našli otvore akcesornih kanalića. Problem pojavnosti lateralnih kanalića potrebno je potanje istražiti da bi stomatolog praktičar u svojemu radu bio što uspješniji i da lakše postavi dijagnozu pulpitične boli koja se javlja nakon endodontskog zahvata.

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Accessory Canals of the Middle and Cervical Third of the Root Surface on the Frontal Teeth

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Summary

Although accessory canals can cause problems in diagnosing post endodontic pulpal pain adequate knowledge about it can make the work easier. This investigation was carried out in order to improve knowledge about teeth morphology and to improve the work of dentists. Accessory canals were investigated on a accident sample of 110 permanent, singlerooted, frontal upper and lower teeth. Methods used in this investigation were: counting, magnifying, observing and colouring. It was established that accessory canals appear on the middle third of the root surface on upper and lower frontal, permanent, singlerooted teeth in 4.5% cases (5 teeth). Statistically, it was established that we could expect the frequency of accessory canals on the middle third of the root surface in the population ranging from 0.7% to 8.3%, with 95% probability. The problem investigated should be thoroughly studied in the future, not only on frontal teeth but all groups of teeth.

Key words: *accessory canal, lateral canal.*

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Introduction

Dental pulp is connected to periodontic tissue by the apical foramen, apical delta, accessory and lateral canals. (1) Some authors disagree on the definition of the accessory and/or lateral canal. Older literature, Njemirovskij (1) and Seltzer (2), say that lateral canals are canals which go vertically from the major root canal, and accessory canals are those which are abreast with the main root canal. These authors say that lateral canals are more often in the position of molar furcation and coronal third of the tooth root, while accessory canals are more often in the apical third of the root (1). Volton (3) does not differentiate between the accessory and lateral canals and defines them as canals of comunication between dental pulp and periodontal ligament. These canals originate when a blood vessel is captured in Hertwig's membrane during tooth development (4). They are present in younger people in larger numbers because they can obliterate aging by dentin or cementum delay. Although those canals are often obliterate, their presence is not irrelevant. They have an important role in the pulp - periodontal syndrome. Also they could be the reason for pulpal pain during or after endodontic therapy, if the whole pulp was not properly removed. Many authors have investigated accessory canals, mostly looking at the apical third of the tooth root, where they are most frequent. According to Seltzer (2) and Bender (1) lateral canals appear in 16.9% of teeth. Recentley other authors [Kartal (5,6) and Miyashita (7)] who-

le investigating root canal morphology, found lateral canals in the middle and cervical third of the root, but no explanation was given.

There are few data on accessory or lateral canals which end in the middle and coronal third of the root surface. Thus, we recognized the need for better knowledge of this problem and decided to investigate the frequency of accessory canals in the middle and coronal third of the tooth root. The results will help clinicians in their daily practice, because the data obtained will facilitate easier diagnosis, of the cause of pulpitic pain during or after endodontic therapy, such as development of pulp - periodontal syndrome. Thus, clinicians could improve their therapeutic success.

Material and methods

A random sample of 110 extracted, permanent, singlerooted, frontal upper and lower teeth was examined. Teeth were classified in the following groups: upper central incisors, upper lateral incisors, upper canines, lower central incisors, lower lateral incisors and lower canines.

Teeth were kept in 10% formalin solution. They were cleaned under a jet of liquid water with a desinfecium. In this way, soft and hard remains of periodontal tissue were removed. Entrances to pulp chambers were made with a turbine engine and fissure diamant burr. With the help of burrs for root canal instrumentation root canal entrances were represented. Root canal patency was probed with a Kerr needle number 10, pulp tissue remains were also removed. The organic die metilen blue (Metilenblau, Kemika) was poured out in drops by an injection syringe utill its appearance on outer canal entrances (Figure 1). The prepared tooth was observed under a microscope with 5x enlargement and intensive light. Standard deviation proportions were calculated and reliability limits determined.

Results

By analysing the frequency of accessory canals in the middle and coronal third of the tooth root on a sample of 110 extracted, permanent, singlerooted frontal tooth we established the occurrence of accessory canal openings in the middle third of the tooth root in 5 teeth (Table 1, Figure 2). Upper canines are the most frequent teeth with lateral canals in the middle third of the tooth root with a frequency of 10.52% (Figure 3). We did not find any accessory canal opening in the coronal third of the tooth root.

$$P = 0.045,\ q = 0.95,\ Sp = 0.0195$$

$$P - 1.96\ sp < \Pi < p + 1.96\ Sp;$$

$$0.007 < \Pi < 0.083 \text{ with } 95\% \text{ of probability}$$

With 95% probability we can claim that lateral canals on frontal permanent teeth occur in the population (in interval) from 0.7% to 8.3%.

Discussion

Knowledge of the morphology of the endodontic system, including possible variations, is very important so that operations performed on teeth can be accomplished lege artis and without subsequent complications.

Any tooth with a diseased pulp, no mather if it is inflammation, necrosis or gangrene, requires endodontic treatment. The aim of every endodontic treatment is to remove all the pathologically changed tissue from the root canal and to seal the root canal so that there is no contact with the oral cavity flora (1).

In such cases dental enamel is capable of closing and sealing the foramen, so that the tooth is functionally and esthetically satisfactory. The object of root canal filling is to seal the canal to accessory canals also, so that exudation "ex vacuo" and chemically - toxic irritations of periapical tissue, can be stopped (8).

It is necessary to investigate the morphology of the radicular part of the endodontic space by X-ray before endodontic treatment. We must be aware of the number, position, length and shape of the root and root canals and also the patency of root canals. Thus the correct intraradicular instrumentation is ensured: cleaning, shaping and final filling of canals, without possible complications.

If the pulp tissue is not completely removed from the lateral or accessory canals changes on periodontal tissue may occur. Today it is still considered that lateral and accessory canals such as apical delta can-

not be cleaned. In order to decrease lesions of periradicular tissue certain stimulants are necessary (9). Fortunately, lateral canals are not often ; the results of our investigation indicate a frequency of 4.5% lateral canals of frontal upper and lower teeth. However the complications of which they can cause are so important that it is necessary for every dentist to be informed of the frequency of lateral canals. Until now there have been scarce data in literature on this problem. Kartal (5) on a sample of 100 lower incisors, noticed lateral canals on the middle third of the root of 5 teeth. In another investigation, carried out on 88 upper second premolars he found 6 lateral canal openings in the cervical third and 11 in the middle third of the tooth root (6). Miyashita (7) found lateral canals in 7% of investigated teeth at lower incisors. Results of this investigation cannot be compared with previous investigations because there are no data on the appearance of accessory or lateral canals in the middle and coronal third of the tooth root for the group of frontal teeth.

Conclusion

This investigation was carried out on 110 permanent, singlerooted, upper and lower frontal teeth. The frequency of lateral canal openings on the middle third of the root surface was determined in 4.5%. Accessory canal openings were not found on the cervical third of the root surface. The problem of lateral canal occurrence should be thoroughly investigated which would help the dentist in his daily work and to facilitate diagnosis of pulpal pain, which appears after endodontic treatment.