KARTIRANJE RELAKSACIJSKEGA ČASA T_2 KOT ORODJE ZA OCENO ZOBNE PULPE

T_2 MAPPING AS A TOOL FOR ASSESSMENT OF DENTAL PULP

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IZVLEČEK

Uvod: Standardna klinična diagnostika odziva zobne pulpe na napredovanje kariesa trenutno poteka na osnovi posredne ocene, saj temelji na osnovi kliničnih simptomov, ki so subjektivni in precej odvisni od bolnikove dovzetnosti za prag bolečine. Dodatno oceno omogočajo tudi klasične filmske in digitalne radiografske tehnike ter računalniška tomografija z usmerjenim snopom (CBCT), ki pa sicer podajajo le informacije o trdih zobnih tkivih. Nasprotno MRI omogoča tudi jasen prikaz zobne pulpe.

Namen: S študijo smo želeli preveriti, ali je mogoče v pogojih in vivo metodo kartiranja relaksacijskega časa T_2, ki je bila generirana na osnovi standardnih MRI zaporedij in na standardnem kliničnem MRI sistemu, uporabiti za kvantitativno oceno odziva zobne pulpe na napredovanje kariesa.

Metode: V študijo smo vključili 74 zob, izmerjenih na sistemu MRI 3T (Philips Achieva) in ocenili karies. Iz izračunanih map relaksacijskega časa T_2 smo analizirali T_2 profile vzdolž posameznih koreninskih kanalov (od krone do vrha), profili pa so bili razvrščeni glede na vrsto zob (enokoreninski oz. večkoreninski) in oceno napredovanja kariesa.

Rezultati: Pri vseh zobnih pulpah, ki so bile vključene v študijo, smo opazili znižanje vrednosti relaksacijskega časa T_2 z napredovanjem kariesa. V enokoreninskih zobeh je bilo znižanje vrednosti T_2 približno konstantno glede na globino prizadetosti zobne pulpe, pri večkoreninskih zobeh pa smo opazili v kronskem delu zvišane, proti koreninskemu delu pa znižane vrednosti T_2.

Zaključek: Uporaba in vivo MRI na osnovi standardnih MRI zaporedij dokazuje, da je z metodo kartiranja relaksacijskega časa T_2 možno podati zanesljivo kvantitativno oceno odziva zobne pulpe na napredovanje kariesa.

Ključne besede: zobna pulpa; karies; Kartiranje relaksacijskega časa T_2

ABSTRACT

Introduction: Currently, standard clinical diagnostics of dental pulp response to caries progression relies on indirect evaluation based on clinical symptoms that are subjective and highly influenced by patients' threshold for pain. In addition, film-based or digital conventional radiographic techniques and cone beam computed tomography (CBCT) provide information on hard dental tissues only. In contrast, MRI enables clear visualization of dental pulp.

Purpose: This study tested whether *in vivo* MRI based on standard MRI sequences run on a standard clinical MRI system can be used to quantify dental pulp response to caries progression using the T_2 mapping method.

Methods: In the study, 74 teeth were scanned on a 3T MRI system and caries was assessed. The T_2 maps were processed to obtain T_2 profiles along selected root canals (from crown to apex), and the profiles were sorted according to both tooth type (single-rooted vs. multi-rooted) and caries progression score.

Results: In all the examined dental pulps it was found that T_2 values decrease with caries progression. In single-rooted teeth, T_2 values were found approximately constant as a function of dental pulp depth, while in multi-rooted teeth, they were found to be increasing in the coronal part and decreasing towards the root apex.

Conclusion: In vivo MRI based on standard MRI sequences run on a standard clinical MRI system confirms that T_2 mapping of dental pulp can be used to reliably quantify its response to caries progression and that it has the potential to become a complementary diagnostic tool.

Keywords: dental pulp; caries; T_2 mapping

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