

RAČUNALNIŠKO TOMOGRAFSKE IN MAGNETNORESONANČNE LASTNOSTI KRVNIH STRDKOV PRI ISHEMIČNI MOŽGANSKI KAPI

COMPUTED TOMOGRAPHIC AND MAGNETIC RESONANCE CHARACTERISTICS OF BLOOD CLOTS IN ISCHEMIC STROKE

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IZVLEČEK

Uvod in namen: Ishemično možgansko kap povzročajo trombi, katerih lastnosti vplivajo na izid zdravljenja. Optimiziranje protokola obravnave kapi je nujno za boljši izid zdravljenja, kjer za slikovno diagnostiko večinoma uporabljamo CT, čeprav se je MR izkazal za boljšo metodo. Ne glede na slikovno diagnostiko doslej ni bilo poudarka na ugotavljanju lastnosti trombov. Z namenom nadaljnjega optimiziranja protokola obravnave kapi smo raziskali možnost CT in MR meritev za določanje strukture umetnih trombov, hkrati smo te ugotovitve umestili tudi v klinično okolje.

Metode: Najprej smo preiskovali učinkovitost CT in MR analize pri definiranju strukture umetnih trombov. V kliničnem delu so bili obravnavani pacienti s potrjeno ishemično možgansko kapjo, pri katerih so uspešno odstranili trombe in jih analizirali z MR ter histološko. Od pacientov smo pridobili še klinične podatke in podatke zdravljenja ter obdelali CT slike, kjer smo pridobili *in vivo* HU meritve trombov. Vse smo ustrezno statistično obdelali.

Rezultati: Računalniško tomografske in magnetnoresonančne difuzijske meritve umetnih trombov so uspešno razlikovale med eritrocitnimi in trombocitnimi trombi, hkrati so bile vse meritve občutljive na spremembe v deležu eritrocitov. V klinični študiji smo ugotovili pomembne korelacije med variabilnostjo difuzije in trajanjem mehanske rekanalizacije, odstopanjem v povprečnem številu HU in številom prehodov pri trombektomiji, dolžino tromba, deležu eritrocitov in drugimi dejavniki.

Razprava in zaključek: CT in MR uspešno razlikujeta med različnimi sestavami umetnih trombov. S klinično študijo smo ugotovili, da nekateri CT in MR slikovni parametri korelirajo s kliničnimi parametri in parametri zdravljenja. Na podlagi ugotovitev naše raziskave je nadaljnje optimiziranje obravnave kapi mogoče in prav naša raziskava je lahko podlaga za nadaljnjo raziskovalno delo na tem področju, kjer napredek v CT (spektralni CT) in MR diagnostiki nakazuje, da se lahko bolj osredotočimo tudi na lastnosti trombov.

Ključne besede: CT, MR, trombi, možganska kap, klinični parametri kapi, mehanska trombektomija

ABSTRACT

Introduction and purpose: Ischemic stroke is caused by thrombi, whose properties can affect treatment outcome. Optimising stroke protocol is essential for better results, where CT is most commonly used in imaging diagnostics, although MR is more efficient. Regardless of the imaging modality, no emphasis is placed on the characterisation of thrombi. With the aim of further optimising stroke protocol, we investigated the possibility of CT and MR measurements in defining the structure of artificial thrombi. We also applied these findings clinically.

Methods: We first investigated effectiveness of CT and MR analysis in defining the structure of artificial thrombi. In the clinical part, patients with confirmed ischemic stroke had successfully removed thrombi, which were later analysed by MR and histology. Clinical and treatment data were also obtained, as well as HU from the corresponding CT images of thrombi. All data were appropriately statistically analysed.

Results: CT and MR diffusion measurements of artificial thrombi successfully differentiated between RBC and platelet thrombi, while all measurements were sensitive to changes in RBC proportion. During our clinical study, we found significant correlations between the variability of diffusion and the duration of mechanical recanalization, deviation in mean HU and the number of passes with the thrombectomy device, length of the thrombus, RBC proportion, and other factors.

Discussion and conclusion: CT and MR successfully differentiate between different artificial thrombi structures. Through our clinical study, we found strong correlations between imaging parameters (CT and NMR) and clinical/treatment parameters. According to these findings, the further optimization of stroke treatment is possible, while our study may serve as a basis for further research in this area, where advances in CT (spectral CT) and MR diagnostics suggest that we can focus more on thrombi properties.

Keywords: CT, MR, thrombi, stroke, stroke clinical parameters, mechanical thrombectomy

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