Extended Abstract

Journal of Pediatric Dental Care

2020

Vol.2 Iss.3

Comparison between Dynamic Contrast-Enhanced Magnetic Resonance (DCE-MR) and Dynamic Contrast-Enhanced Ultrasound (DCE-US) in the Imaging of Pediatric Extra-Cranial Tumor

*Corresponding author: Wendy WM Lam, Department of Radiology, Queen Mary Hospital, 102 Pokfulam Road, Hong Kong SAR, PR China, Tel: +85222555488; E- mail: lamwendy60@yahoo.com.hk

Abstract

Post injection data analysis was conducted using Functool software. A region of interest (ROI) was placed in the lumen of the nearest large artery to evaluate the arterial input function. Consecutively, perfusion and tissue-blood ratio were calculated and colour mapping was generated. ROIs were drawn around its highest vascularized area and different parts of the tumor or mass according to the different distribution pattern on the colour map.

Signal intensity (SI) values were measured in operator-defined ROIs. The SI values derived from the ROIs were plotted against time as time intensity curve (TIC). TIC was plotted and the enhancement patterns were divided into type 1, 2 and 3 curves. Type 1 curve showed a gradual continual persistent rise after the arrival of the arterial bolus (progressive). Type 2 curve showed relatively rapid increase after the arrival of the arterial bolus and then became plateau or static. Under Type 3 curve, TIC demonstrated a sharp rise of contrast enhancement in the tumor after the arrival of the arterial bolus and then followed by a steeper wash-out (Figure 1).

For follow-up cases of tumors after neoadjuvant chemo or radiotherapy, their latest DCE-MR performed shortly before the operation or PET-CT were analyzed. Tumor inactive area was defined by the area of lack of signal changes on the color map and showing type 1 curve. The post-treatment tumor activities were compared with findings on histologic sections of the resected specimens or PET-CT findings.

histopathological evidence it had been suggested that DCE-MR might be able to provide additional independent indices of angiogenic activity and could therefore act as a prognostic indicator in a broad range of tumor types. DCE-MR time intensity curve (TIC) patterns are categorized into three types: type 1, persistently enhancing (progressive), which suggests less angiogenic; type 2, plateau type, which has an intermediate probability for malignancy; and type 3, washout type, which is indicative of malignancy with a lot of angiogenesis [7,8].

Our previous study [9] on the application of DCE-MR in a broad range of pediatric extra-cranial tumors showed similar results as in adults. Type 1 curve with maximal enhancement intensity (SImax) less than 350 may be an additional indicator for benign or inactive tumors. The extent of tumor necrosis was correlated closely with pathology findings in follow-up cases. The lack of irradiation has an advantage over CT or PET in pediatric applications.

Use of ultrasound contrast in children is a new development. Off- label use is generally widespread especially in pediatric, as many drugs have not been tested separately in children. The use of dynamic contrast-enhanced US (DCE-US) is a new functional technique enabling a quantitative assessment of solid tumor perfusion using raw linear data in adults [10]. Comparison between DCE-US with dynamic contrast-enhanced computed tomography (DCE-CT) had been performed in the evaluation of hepatocellular carcinoma in adult [11]. Egger et al. showed no statistical difference between DCE-US and DCE-CT in the quantitative assessment of contrast enhancement. In a study comparing DCE-US with DCE-MR and DCE-CT for the assessment of vascular response to Sunitinib in renal cell carcinoma in adult [12], Bjarnason et al. found that DCE-US might help select optimal scheduling for novel anti-angiogenic drugs.

DCE-US is a useful instrument for early prediction of tumor therapy responses. Hoyt et al. [13] evaluated whether DCR-US could predict the response of breast tumors to bevacizumab therapy using a murine model. The breast cancer response to a single dose of bevacizumab in the murine model was immediate and transient, and revealed that the tumor perfusion data within 3 days of bevacizumab dosing were sufficient to minimize the prediction error to 10%; whereas measurements of physical tumor size alone did not appear adequate to assess the therapeutic response. Merz et al. [14] found that DCE-US could predict antiangiogenic treatment responses using Sunitinib within 2 days in 20 rats with experimental breast cancer bone metastases. So far there was no literature comparing DCE-US with DCE-MR in children. The usefulness of DCE-US in pediatric patients had not been determined.

This work is partly presented at 4th Annual Meeting on Pediatric Dentistry & Dental Treatments, June 14-15, 2019 at Canada