Comparison of the diagnostic accuracy of contrast-enhanced ultrasound (CEUS) within 5 minutes and CT/MRI for diagnosing vital tumor tissue after RFA/TACE in HCC and liver metastasis in a tertiary Swiss GI center

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Background: Contrast-enhanced-ultrasound (CEUS) is accurate for follow-up after radiofrequency ablation (RFA) in HCC or liver metastasis as well as after transarterial chemo-embolization (TACE) in HCC (1,2,3). CEUS is easily available, safe and cost-effective without exposure to radiation, risk of renal insufficiency or thyreotoxicosis. Severe adverse effects are very uncommon (0,06 - 0,4%) (4, 5). Follow-up according the modified RECIST (6) is until now only performed by CT and MRI. Data are missing for CEUS in comparison with CT/MRI in clinical routine. Our aim was to assess the response/relapse of malignant focal liver lesions (FLL) after RFA or TACE by CEUS in comparison to CT/MRI in clinical routine.

Methods: We analyzed CEUS between 1/2011-11/2013 performed by three examinators (at least level II of training according to European Federation Society for Ultrasound) on two ultrasound devices after RFA and/or TACE in comparison to CT/MRI (with intravenous contrast application). All patients were examined according the international guidelines (7) with 1,5 - 2 ml intravenous sulphur hexafluoride microbubbles as contrast agent within 5 minutes. Representative still images and video clips were recorded. Postinterventional intratumoral arterial enhancement was interpreted as tumor vitality/relapse, wash out reinforced this finding. Standard of reference (SOR) were the convergent results of CEUS with CT or MRI with follow-up.

Results: In all 20 patients (17 HCC and one cholangio-carcinoma all with cirrhosis and 2 liver metastasis of colorectal carcinoma) with median age of 43-86 years, no complications occurred after CEUS. CEUS could be compared with CT/MRI in 39 examinations after 30 interventions (RFA n=13/TACE n=17) with a median follow of 6,7 months. Controls were performed one month and then every three months after interventions. In seven different cases CEUS and CT/MRI could not demonstrate tumor vitality after incomplete RFA/TACE. With CT/MRI alone we would have missed 10% (n=4) cases with tumor vitality/relapse (three times by CT after one month and once by MRI after six months...
(table 2)) and with CEUS alone respectively 7-8% of different cases (n=3). This is described as sensitivity with 75-80% and negative predictive value (npV) with 85-88% (table 1). CEUS could avoid one false positive MRI result after one month (specificity and positive predictive value (ppV) 100%), where this reactive hypervascularisation was confirmed by the following MRI.

Conclusions: In our setting CEUS is practicable with no adverse effects and good accuracy of 90% to determine tumor response after RFA/TACE. CEUS is not inferior to CT/MRI. Combination of CEUS with CT/MRI could avoid 20% of false negative results (tumor vitality/relapse). Rapidity, cost-effectiveness and missing nephrotoxic contrast agent could be important advantages of CEUS. We discuss an alternating follow up with CEUS and CT/MRI in the required 3-month-intervall according the modified RECIST (6) which has to be analyzed in larger prospective studies.

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