

## **S13: Microcirculation of Inner Organs**

### **S13-1 Critical analysis of CEUS examinations of the liver in an interdisciplinary ultrasound department**

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**OBJECTIVE:** The examination of unclear liver lesions with CEUS has already found widespread use in daily practice. The aim of this study was to assess the diagnostic certainty of CEUS in comparison to other modalities (CT / MRI) in an interdisciplinary ultrasound department.

**METHODS:** Between January 2013 and August 2018 in total 138 CEUS examinations of the liver were analysed. CEUS was performed by one experienced sonographer after bolus injection of 1.0 up to 2.4ml sulphur hexafluoride microbubbles having used a high-end ultrasound device (LOGIQ E9, GE, USA) and multifrequency probes with Contrast Harmonic imaging. The data collection took place retrospectively on the basis of the patient files with the permission of the Ethical Committee of the University of Regensburg. In 79% of cases findings of CT or MRI were available for the comparison with CEUS. A histological examination as gold standard was available at 39% and was included in the evaluation. The final diagnosis was determined by the synopsis of all examinations, the conducted therapy according to the medical letters and follow-up examinations.

**RESULTS:** The median age of all patients was 62 years, with a known malignant disease in 78% of cases and a known liver cirrhosis in 29%. CEUS described solid lesions in 112 cases (97 malignant lesions, 15 benign lesions), in 26 cases no tumor was detectable. The existence of a tumour was diagnosed by CEUS correctly in 95% of cases (Sensitivity 97,9%, Specificity 87,8%, PPV 95%, NPV 94,7%). Restricted ultrasound conditions (e.g. obesity, meteorism) were present in 38% of cases with a slight decrease of the diagnostic accuracy from 95,6% to 92,0%. The combination with one or two modalities raises the diagnostic accuracy (94,8% vs. 92,4% vs. 100%).

**CONCLUSIONS:** CEUS is a safe and indispensable diagnostic in tumour evaluation of the liver. Due to its favourable side-effects, CEUS should be used early in diagnostic process.

### **S13-2 VTIQ and VTQ in combination with B-mode and color Doppler ultrasound improve classification of salivary gland tumors, especially for inexperienced physician**

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While ultrasound is the method of choice for preoperative evaluation of masses of the parotid glands, existing methods do not allow for definite differentiation between the most common benign and malignant tumors. The aim of our study was to evaluate if acoustic radiation force elastography, Virtual touch quantification (VTQ) and imaging quantification (VTIQ) are

beneficial in preoperative evaluation of parotid tumors.

We investigated the parenchyma of 82 parotid glands, eight lymph nodes of healthy volunteers and 41 tumors of the parotid gland via ultrasound, color Doppler ultrasound, VTIQ and VTQ elastography. Each examination was documented with pictures and videos, which were viewed by twelve independent examiners with various levels of experience. After viewing the B-mode and Doppler images, each examiner predicted whether the mass was benign or malignant. For benign tumors, each examiner also made a forecast for the tumor type. Subsequently, each examiner also viewed the VTIQ and VTQ elastography images and reevaluated the initial predictions of malignancy and tumor type.

In benign tumors, the sensitivity was 76% with only B-mode and color Doppler sonography and increased to 83% with the addition of VTIQ and VTQ, where the specificity also increased from 34% to 40%. Similarly, in malignant tumors elastography improved sensitivity from 34% to 40% and specificity from 76% to 83%.

VTQ and VTIQ in combination with classical ultrasound examination provides additional data that improves the capability to distinguish between benign and malignant tumors by increasing both the sensitivity and specificity of the ultrasound examination.

### **S13-3 CEUS perfusion imaging after ablation treatment in patients with prostate cancer: First results**

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With the rising number of percutaneous ablation therapies in prostate cancer there is a need of reliable diagnostics after the intervention to differentiate between reactive changes and tumor. To assess the success of percutaneous ablation therapies for prostate cancer using transabdominal CEUS with parametric imaging.

Retrospective reading of perfusion analysis for 50 patients who were treated with IRE for prostate cancer. CEUS was performed after bolus injection of 1.5-2.4 ml of sulfur-hexafluoride microbubbles. DICOM loops were continuously acquired for 1 minute and were stored digitally in PACS. 8 mm regions of interest were placed clockwise at the margins of the ablation defect and in the center. Additionally parametric images were calculated. For the evaluation of the success after percutaneous treatment the perfusion results were compared to the follow-up control after 6 months with CT and MRI and CEUS.

37 patients were successfully treated, meaning there was no local recurrence after 6 months. 13 patients still showed remaining tumor. In cases of remaining tumor there was a dynamic early nodular hypervascularisation with a fast and high wash in. The corresponding parametric images showed nodular red and yellow pseudo-color shades.

Using transabdominal CEUS, parametric imaging and TIC analysis, a critical analysis of post-ablation defects in prostate cancer is possible. With the help of pseudo-colors, remaining tumor-vascularization can be detected.

**S13-4 Contrast-enhanced ultrasound (CEUS) and gallbladder diseases - a retrospective monocenter analysis of imaging findings with histopathological correlation.**

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**S13-5 Contrast-enhanced ultrasound (CEUS) for the evaluation of gallbladder diseases in comparison to cross-sectional imaging modalities and histopathological results.**

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**S13-6 New Horizons for Kidney Imaging: Dynamic Microvascularization in Contrast-enhanced Ultrasound (CEUS)**

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**Objective:** In nephrology, ultrasound diagnostics plays an important role as the method of further investigation following an initial examination. The aim of this study was to identify the indications for CEUS in renal imaging in an interdisciplinary ultrasound department.

**Methods:** Between September 2014 and July 2016, 102 CEUS examinations of the kidney in 82 patients were analysed regarding the indication for ultrasound. CEUS was performed by one experienced sonographer and a nephrologist after bolus injection of 1.0 up to 2.4ml sulphur hexafluoride microbubbles having used multifrequency probes with Contrast Harmonic imaging. **Results:** CEUS of the kidney was performed in patients between 20 and 87 years. 44% of the patients had a stage 3 of chronic kidney disease and higher, 38% of the patients had undergone a renal transplantation. No adverse events were observed. 54% of the examinations were requested by nephrologists, the remaining by surgeons, oncologists or gastroenterologists. In 47% of the cases the objectives were the evaluation of complex renal cysts, in 31% the analysis of kidney perfusion, in 19% the assessment of solid renal masses. The remaining were perirenal tumours (2%) and infection (1%). **Conclusions:** CEUS is a good diagnostic alternative for patients with impaired renal function, complicated cysts, infections, solid renal lesions and after renal transplantation. The visualization of the microcirculation on a capillary level is crucial in the assessment of kidney diseases.