Section: **Ultraschall und Intervention**

ID: 152

Abstract-Title:
3D ULTRASOUND NAVIGATED RFA OF LIVER TUMOUR 3D ULTRASCHALL BASIERTE NAVIGATION VON HFTT IN DER LEBER

Authors:
S. Arnold[1], A. Schmitgen[1], G. Grunst[2], R. Kubitz[3], M. Wettstein[4]
[1] LOCALITE GmbH
[2] Fraunhofer Institut FIT
[3] Klinik für Gastroenterologie, Hepatologie und Infektiologie, Universitätsklinikum Düsseldorf
[4] I. Medizinische Klinik, Klinikum Passau

Abstract-Text:
Purpose
Primary liver tumours and liver metastases are of high clinical relevance. They are the fifth most common kind of malignant tumours and the third most common cause of death in the group of malignant tumours. Radio Frequency Ablation (RFA) is accepted as a gentle and inexpensive treatment but suffers from higher recurrence of tumours compared to resection. Thus, RFA usually is chosen in cases where resection is not possible. As a part of the BMBF sponsored project FUSION our aim is to develop an integrated method utilizing 3D ultrasound to achieve better outcome for patients with liver tumours, who are treated with RFA. Method
We developed a 3D ultrasound based navigation system (LOCALITE SonoNavigator). The system is built on top of and combineable with a convential 2D Ultrasound device. Optical tracking (NDI Polaris) is used for pointing devices, RFA applicator and ultrasound probe. Preoperative 3D images (e.g. CT) can be registered roughly to the patient using a rigid transformation based on anatomical landmarks. The navigation system enables the surgeon to collect 3D ultrasound datasets at any time. Planning data for the applicator\'s path and target can be incorporated and updated during intervention. An integrated environment provides intrainterventional comparison of 2D and 3D data from different sources (ultrasound, CT) and supports the surgeon in transferring information from one modality to the other (Fig. 1). Notable effort was made to support the initial adjustment of the applicator and to decouple the ultrasound probe from the applicator (Fig. 2). Until now the method was evaluated in 8 interventions and is improved continuously based on the analysis. Important anlayzed aspects are the quality of intrainterventional data (3D and 2D) both in respect to visibility of relevant structures and accuracy of their positioning, the quality of registration of preinterventional data and the overall value of the presented information for the surgeon\'s orientation. Results
In cases where the applicator\'s access path differs from the optimal acoustic window decoupling of ultrasound probe and RFA applicator exhibits a great improvement for the surgeon and even enables him to treat tumours that are inaccessible using the conventional puncture device (where ultrasound probe and applicator are bound together). The same applies in cases where the laesion is hard to identify in ultrasound images: According to our expectations the implemented registration of preinterventional data still

needs improvement. Specific problems are different positioning of the patient during CT imaging and intervention and large intrainterventional shifts of the liver caused by respiration. However, the presentation of corresponding information in CT and ultrasound helps to interpret the ultrasound images and improves orientation.The possibility to determine the applicator\'s access path based on intrainterventional 3D ultrasound allows for an initial positioning and advancing of the applicator that is near to optimum.
Conclusion
Our study has shown that 3D ultrasound based navigation combined with a sensible integration of preoperative CT greatly improves the surgeon\'s orientation and the positioning of the RFA applicator. Prior untreatable tumours could succesfully be treated and the overall difficulty of interventions could be diminished significantly. However long time results are not available yet, therefore no reliable statement regarding the recurrence of ablated tumours can be made. Further efforts will be made to enhance preinterventional simulation of ablation, registration of preinterventional CT and the amount of documented data to provide the basis for a more comprehensive study.

Bild 1/JPG

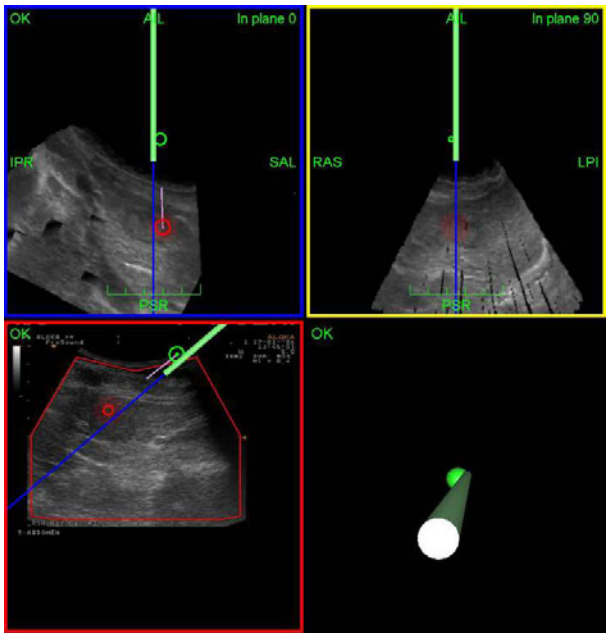

Bild 2/JPG