Catheter Tracking Using Transmit Array System

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INTRODUCTION:
Although, soft tissue contrast of MRI is effectively high, visualization of the internal devices, such as guidewires and catheters, is not straightforward. In order to achieve better identification of these devices, various tracking techniques have been developed. Passive tracking methods (1) are easy to implement, but they are not sufficiently reliable. The main problem of active tracking techniques (2-4) is uneasy device handlings. They need to be connected to imager with cables. In addition, these cables create safety problems. There are also hybrid methods, using inductively coupled RF (ICRF) (4) and receive coupled RF (RCRF) (5) coils.

In our study, we propose a new method using ICRF coils and transmit array system. Presented method enables simultaneous acquisition of anatomy and catheter images.

METHOD:
In our work we used a Siemens TimTrio transmit array system and head matrix coil. A small inductively coupled RF loop was placed on a naso-gastric tube inserted into saline solution. Flash sequence is modified in order to get different polarizations with following parameters: TR 20 ms, TE 4 ms, slice thickness 10 mm, flip angle 30°, FOV 225x225, imaging matrix 256x256.

RESULTS: A reference image is acquired in order to show the original data without using oscillated RF field (Figure 3a). In the result of the steering RF catheter tracking method, anatomy was shifted up, on the other hand, ICRF coil was shifted both up and down. Note that, two ghosts of the ICRF coil and some residual components phantom are observed because of imperfections of the body coil. Images show the effectiveness of the method. Shifted ICRF coil image can be color-coded for better tracking of the device.

CONCLUSION: A new method for simultaneous acquisition of both an ICRF coil and background body images. This method can be used very effectively for accurate catheter tracking. In addition, wires instead of ICRF coil can also be used with modifications.

REFERENCES: