3D CE whole body MRA with 16–channel array coil system for Japanese population

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SYNOPSIS:

The purpose of this study is to clearly demonstrate that the 16-channel array coil system can be applied to 3D CE whole body MRA. 26 patients underwent whole body MRA in a four step automatic table feed technique. Upper part of MRA was obtained using 3D time-resolved MRA. Abdominal, femoral and popliteal MRA were obtained using 3D high resolution MRA. The excellent image quality enables detailed assessment of the displayed vascular territories. 3D whole body MRA with 16–channel array coil system is a promising technique in the diagnosis of the arterial vascular system from aortic arch and major branches to the distal trifurcation arteries.

PURPOSE:

The purpose of this study is to clearly demonstrate that the 16-channel array coil system can be applied to 3D CE whole body MRA in Japanese population whose stature is shorter than that of western people.

MATERIALS and METHODS:

Twenty-six consecutive patients (22 men and 4 women; Age range 43 – 85 years) with peripheral artery occlusive disease underwent CE whole body MRA in a four step automatic table feed technique. The MRI unit used was MAGNETOM SONATA 1.5T Maestro class (SIEMENS, Erlangen, Germany) with integrated panoramic array (IPA) coil system (CP Body Flex Array, CP Flex Extender, CP Peripheral Angio Array, CP Spine Array). Whole body MRA was obtained by turbo MRA using parallel acquisition technique; Upper part of MRA was obtained using 3D time resolved MRA. Imaging parameter were TR 3.0 msec, TE 1.2 msec, matrix 205 x 256, partition 20, FOV 350 mm, PAT factor 2, acquisition time 3.6 sec and voxel size 1.7 x 1.4 x 4 = 10 mm³. Sequential view ordering was used. Oblique sagittal, 4 independent data sets were obtained consecutively. Abdominal, femoral and popliteal MRA were obtained using 3D high resolution MRA. Imaging parameter (abdomen / femoral / popliteal) were TR (4.0/ 3.4/ 3.5) msec, TE (1.5/ 1.8/ 1.6) msec, matrix 256 x 512, partition (32/ 56/ 72), FOV 350 mm, PAT factor 2, acquisition time (12/14/18) sec and voxel size (1.4 x 0.7 x 3 = 2.8 / 1.4 x 0.7 x 1.6 = 1.5 / 1.4 x 0.7 x 1.2 = 1.2) mm³. View ordering was (sequential/ elliptic centric/ elliptic centric). The 3D data sets were overlapped by 5cm, which resulted in craniocaudal coverage of 125cm. The total acquisition time amounted to 73 seconds. Three-dimensional MRA were reconstructed from the images obtained by subtracting the pre-contrast images from the post contrast images using the maximum intensity projection algorithm. The waiting time of the first 3D data set was calculated on the basis of the travel time of a test bolus used 1 mL of Gd-DTPA from the injection site to the proximal end of the descending aorta. 19 mL of Gd –DTPA was automatically injected (MR Spectoris; Medrad) by using the following biphasic protocol. The first 10 mL of Gd-DTPA was injected at a rate of 1 mL/sec, and the remained 9 mL was administered at a rate of 0.5 mL/sec. 20 ml of physiologic saline was infused at 0.5 mL/sec after Gd-DTPA infusion. Image analysis was conducted on the three items. 1) Whether arterial system was visualized or not, according to a 3-grade scale on each station (excellent: clearly visualized, good: visualized, poor: not visualized or partially visualized). 2) Whether venous system was visualized or not, according to a 4-grade scale (none, slightly, moderately, markedly). 3) Whether 3D MRA was obtained the angiogram from aortic arch and major branches to the distal trifurcation arteries or not.

RESULTS:

1) On thoracic station, 21 of 26 (81%) was excellent and remained 5 (19%) was good. On the abdominal station, 25 of 26 (96%) was excellent and remained one was good. On both femoral and popliteal station, all images were clearly visualized arterial systems. 2) On femoral station, moderately overlap is 7 of 52 legs (13%). On popliteal station, moderately overlap is 6 of 52 legs (12%) and markedly overlap is 13 of 52 legs (25%). 3) On all 26 patients, whole body 3D MRA was obtained the angiogram from aortic arch and major branches to the distal trifurcation arteries or not.

CONCLUSION:

3D CE whole body MRA with 16–channel array coil system is a promising technique in the diagnosis of the arterial vascular system from aortic arch and major branches to the distal trifurcation arteries in Japanese population.