

Non-contrast MR Angiography of the Subclavian Arterial Branch using 3D half-Fourier FSE with time-SLIP

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Purpose

The purpose of our study is to selectively visualize the subclavian arterial branches without contrast media and compare an ECG-gated 3D half-Fourier FSE imaging combined with time-spatial labeling inversion pulses (time-SLIP) with other nonenhanced MR angiography (MRA) techniques.

Materials and Methods

All the studies were performed on 20 healthy volunteers on a 1.5T MRI system (EXCELART Vantage XGV Toshiba), using a QD head SPEEDER coil. The on-and-off alternate time-SLIP acquisitions followed by subtraction were applied in the experiment. The following studies were performed for the assessment of the subclavian arterial branches; 1) varying tag positions and width, where a selective pulse was applied independently of the imaging field, 2) varying phase-encode directions, and 3) various nonenhanced MRA techniques including time-of-flight (TOF), half-Fourier FSE MRA, and balanced steady-state free precession (bSSFP) with and without time-SLIP. In addition, time-SLIP MRA combined with a swap phase encode extended data (SPEED) acquisition (time-SLIP SPEED) was also compared. Typical scan parameters were as follows: TR/TE=3RR/30ms, BBTI=1000-1200ms, matrix=256x256, FOV=300x300 mm, slice thickness =2.5 mm, and scan times=6-7min.

Results

The detailed anatomy of the subclavian arterial trees was obtained by using half-Fourier FSE and time-SLIP with the SPEED acquisition, as shown in Fig.1. The thyrocervical trunk and the costocervical trunk were visualized in addition to the vertebral artery and the internal thoracic artery. On 17 of the volunteers, the Half-Fourier FSE MRA with time-SLIP provided excellent anatomical look at the subclavian arterial tree when the tag was applied obliquely to the proximal subclavian artery, as shown in Fig. 2. Half-Fourier FSE MRA was rather effective than time-SLIP MRA and other non-contrast techniques in 3 volunteers.

Conclusion

Nonenhanced half-Fourier FSE MRA with time-SLIP using SPEED acquisition (time-SLIP SPEED) provided good visualization of the subclavian arterial branches especially when the tag position was optimized.

References

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- 2) Kanazawa H and Miyazaki M, ISMRM 2002, p140.

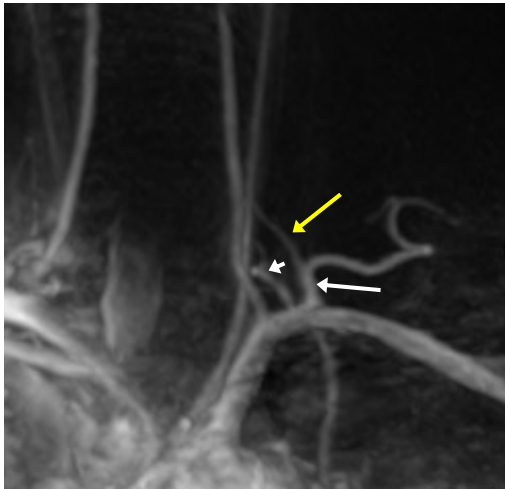


Fig.1) Nonenhanced MRA of the subclavian arterial trees in a 35-year-old male volunteer by using time-SLIP and half-Fourier FSE with the SPEED acquisition. Note that thyrocervical trunk (white arrow), inferior thyroid artery (yellow arrow), and costocervical trunk (arrowhead) are clearly depicted.



Fig.2) Nonenhanced MRA in a 43-year-old male volunteer by using time-SLIP in a head-foot phase-encode direction. Partial MIP image shows tortuous arteries of proximal subclavian arterial branches. The yellow rectangular area shows a tag pulse.