

Parallel Imaging for Diffusion-Weighted MR Imaging in Gastric Cancer: A Comparative Study

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Purpose: To evaluate whether parallel imaging can help to improve image quality of diffusion-weighted MR imaging (DWI) in gastric cancer.

Materials and methods: Twenty patients with gastric cancer underwent single-shot echo-planar DWI with parallel imaging technique (TR/TE=2750/65, reduction factor=2) and without (TR/TE=3000/65). The parameters were the same: matrix, 128×128; section thickness/ intersection gap, 5mm/1mm; slice number, 12; NEX, 4; FOV, 38cm×38cm. The *b* values were 0, 1000s/mm², and the MPG pulses were placed in 3 directions. The two sequences were compared for image quality (including image distortion and artifacts) and contrast-to-noise ratio (CNR). The artifacts were classified into 3 grades: grade 1, no obvious artifact; grade 2, obvious artifacts without influencing cancer identification and apparent diffusion coefficient (ADC) measurement; grade 3, obvious artifacts influencing cancer identification or/and ADC measurement.

Results: At DWI with parallel imaging, significantly ($P<0.05$) higher image quality scores were achieved through a substantial reduction of distortions and artifacts, especially the susceptibility artifacts. In three patients, ADCs couldn't be measured because of severe artifacts and image distortion, which were improved with parallel imaging. DWI with parallel imaging had lower background signal intensity ($P<0.05$), and higher CNR ($P<0.05$) than those without (Table 1).

Conclusion: Parallel imaging can eliminate magnetic susceptibility artifacts of DWI in gastric cancer, decrease background signal intensity, and improve imaging contrast.

Table 1 Comparison of image quality between DWI with and without parallel imaging

Sequence*	Susceptibility Artifacts	Imaging Distortion	Grade of artifacts			CNR
			1	2	3	
1	15	12	5	12	3	21.86±12.75
2	3	2	13	7	0	25.34±12.96
<i>P</i> value	<0.05	<0.05	<0.05			<0.05

*: 1, DWI without parallel imaging; 2, DWI with parallel imaging.

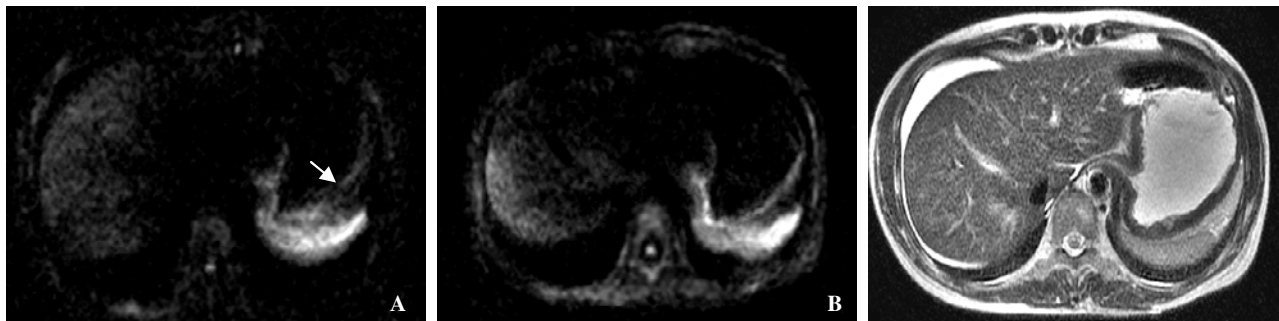


Fig.1 Cardia-fundus cancer. A, DWI without parallel imaging, high signal of cancer was distorted and discontinuity; B, DWI with parallel imaging, the background noise was reduced, the distortion was eliminated and the cancer signal was uniformity; C, SSFSE showed the cancer shape was consistent with figure B.

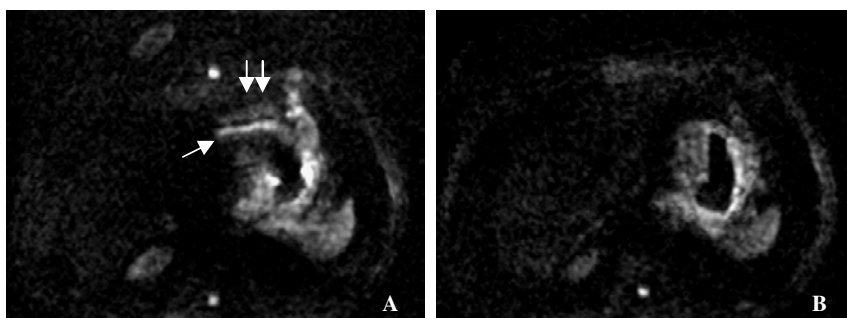


Fig.2 Gastric body cancer. A, DWI without parallel imaging, the signal of cancer was obviously distorted, severe susceptibility artifact can be seen at the gas-liquid level (white arrow), and ghost artifact was demonstrated (double white arrow); B, DWI with parallel imaging, the distortion and artifacts remarkably reduced or disappeared.