True FISP: is it really T2 like contrast? : Comparison with turbo SE images in ovarian pathology.

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Introduction

True fast imaging with steady state precession (True FISP), a gradient-echo technique with fully refocused transverse magnetization, has been often used as a fast T2-weighted MR imaging. Because of the shorter scan time of the sequence when compared with conventional T2-weighted Turbo spin-echo (TSE) imaging, True FISP is expected to be a valuable clinical tool. However, True FISP imaging has an inherent T1/T2 contrast [1] and the signal patterns on True FISP were often different from those on conventional T2-weighted TSE imaging in several conditions.

Purpose of this study was to compare signal pattern of True FISP with that of T2-weighted TSE in several ovarian pathology and to clarify what pathology may be misdiagnosed when True FISP was used as a fast T2-weighted MR imaging technique.

Subjects and methods

55 patients with 57 ovarian lesions were prospectively studied. The histopathological diagnoses were surgically confirmed in all patients. All MR scans were acquires on 1.5 Tesla MR scanner (Siemens, Erlangen, Germany). After the conventional MR examination (T2 weighted sagittal imaging and T1 and T2 transverse imaging), True FISP was performed in sagittal plane with fat-suppression technique. Imaging parameters of 2D true FISP were as follows: TR/TE=5.3/2.6 ms, Flip angle=70 degrees, FOV= 220x140mm, matrix= 256x163, slice thickness/gap=5/2mm, number of average=1, acquisition time=27 sec. Imaging parameters of 2D TSE were as follows: TR/TE=3500/105 ms, Flip angle=180 degrees, matrix= 512x208, FOV and slice thickness were the same as those of 2D true FISP. Three radiologists interpreted all images in three grading score about signal patterns between the two sequences. (1= similar signal patterns in the ovarian lesions between True FISP and TSE, 2= partially different signal patterns ovarian lesions between True FISP and TSE, 3= contrary signal patterns in the ovarian lesions between True FISP and TSE)

Results

The score 1 included 29 patients with 30 ovarian lesions (7 serous cysts, 4 clear cell carcinomas, 4 serous cyst adenocarcinomas, 4 serous cyst adenomas, 4 endometrial cysts, one endometrial adenocarcinoma, one immature telatoma, one mucinous cyst adenocarcinoma, one mucinous cystadenoma, one fibroma and one thecoma); the score 2, 10 patients with 10 lesions (4 endometrial cysts, two mucinous cyst adenocarcinomas, one mucinous cystadenoma, one serous cyst and one fibroma); the score 3, 16 patients with 17 ovarian lesions (10 dermoid cysts, 5 endometrial cysts, one serous cyst adenocarcinoma and one serous cyst adenoma). Figure 1 shows a case of partially different signal pattern between True FISP and TSE and figure 2 shows a case of contrary signal patterns. As shown in the figures, both high and low signal lesions on TSE images may be demonstrated as high signal lesions on True FISP images. Moreover, with hemorrhagic changes or fatty component in the lesions, the ovarian lesions often showed contrary signal patterns between the two sequences.

Conclusion

30% of signal patterns between True FISP and TSE in ovarian pathology were contrary in this study. The results indicate that although True FISP has the advantage of short acquisition times, the sequence is not be able to replace T2 weighted TSE in evaluation of ovarian pathology.

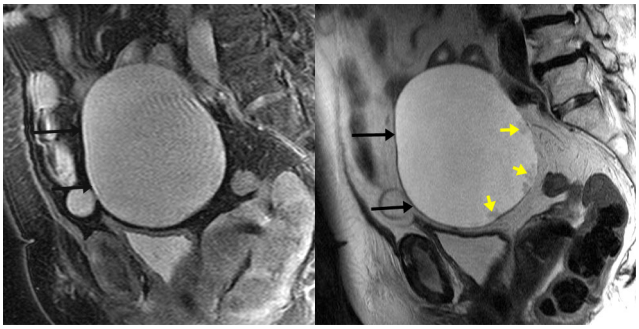

Figure 1A **Figure 1B**

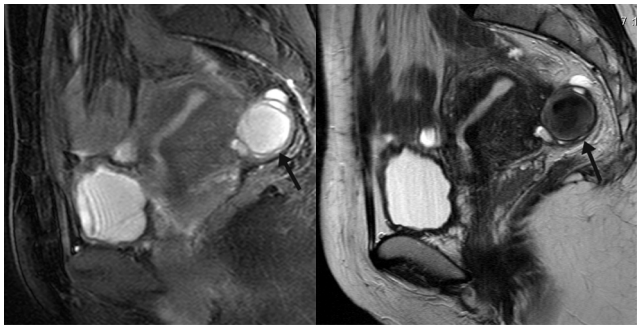

Figure 2A **Figure 2B**

Figure1. Eighty-two-year-old woman with mucinous cystadenoma. Most of the signals of the tumor (black arrow) on True FISP image (Figure 1A) and TSE image (Figure 1B) are high intensity and similar but nodules on the wall (yellow arrow, Fig 1B) were not demonstrated on the True FISP image. **Figure2.** Thirty-seven-year-old woman with endometrial cyst. True FISP image (Figure 2A) shows the increased signal in the cyst (black arrow) but TSE image (Figure 2B) shows the decreased signal in contrast.

Reference

[1] C. J. Müller, et a l. MR Lung Imaging at 0.2 T With T1-Weighted True FISP: Native and Oxygen-Enhanced. JMRI 14:164–168, 2001