Evaluations of the female pelvis: Comparison of 3D T2-weighted FSE images using ASSET and 2D T2-weighted FSE images in three planes

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Introduction: For the evaluation of the female pelvis, 2D T2-weighted fast FSE imaging in the axial and sagittal is important. Since parallel imaging technique reduces imaging time, 3D T2-weighted imaging can be one of the options for the replacement of all 2D T2-weighted images. In 3D T2-weighted images, one of the advantages is high spatial resolution especially in z axis without interslice gap, which may help lesions detections of the uterus and ovarian lesions. Image contrast may be reduced since long echo train length (ETL) is used for 3D T2-weighted FSE images for the reduction of the imaging time with combined use of parallel imaging technique such as array spatial sensitivity technique (ASSET). The purpose was to compare abilities of one set of 2D T2-weighted images in axial, sagittal and perpendicular to the axis of the uterus planes with that of 3D T2-weighted images for the evaluation of the female pelvis.

Material and Methods: 196 female patients underwent pelvic MR imaging for the suspicious of diseases in the pelvis. Among them, 48 patients (median 37 years old, ranged from 15 to 78 years old) were included, who underwent pelvic MR imaging followed by surgery. Final diagnoses were as follows; leiomyoma 13 patients, adenomyosis 2 patients, endometrial polyp 2, mature teratoma 5, metastatic ovarian lesions 2, solid ovarian lesion 2, cystic ovarian lesions 5, cervical cancer after chemotherapy 14, and malignant lymphoma 1. Some cases were overlapped. *MR imaging*; 2D T2-weighted FSE imaging in three planes (total imaging time, 4.5 min; ETL 16; slice thickness 5-7mm, TR 3000-7000(2 respiratory cycle), eTE 89ms, slice thickness/interslice gap; 7mm/2mm for axial, 5mm/1mm for sagittal; FOV 15cm, ASSET factor 2, 2 NEX, chemical fat saturation; oblique coronal : TR 2000ms, eTE 80ms, 4mm/1mm, 256x160, FOV 30cm, 1 NEX, breath hold). 3D T2-weighted FSE imaging (2.5-5min; TR 1 respiratory cycle, eTE 102ms slab thickness/slice 72-90mm/2mm, 256x224, ASSET factor 2, chemical fat saturation) was performed, respectively. *Evaluations:* All the data were transferred to a workstation. Blurring artifacts, intestinal motions, and overall image quality were ranked using 10 point-scale, respectively. Region of interest was placed and SI of uterine myometrium, junctional zone, endometrium, ovary, urine in the urinary bladder, obuturator muscle and lesions were measured. Contrast ratio (CR) was calculated using equation SI of region a /SI of region b. Recognition of the regions were evaluated subjectively using 10 point-scale (1 not recognized to10 well recognized). Subjective rates were statistically compared with Student t test and objectives were evaluated by Wilcoxon signed rank sum test. Pathological lesions were valuated. On axial 2D images alone, combined axial and sagittal 2D images, and all the 2D images in the three planes, whether lesions existed or not was evaluated.

Results: All images were diagnostic. Image quality was competitive ($P>0.05$, Fig 1,2). 3D T2-weighted FSE images can be obtained with image quality and region recognition ($0.05>p$) competitive to 2D T2-weighted FSE images. CRs of uterine muscle, junctional zone, endometrium, urine against obturator muscle were 3.9, 2.5, 5.8, 8.7 for 3D imaging, 3.7, 2.2, 5.0, 8.8 for 2D, respectively ($P<0.05$). Recognitions of the lesions were listed in Table and there were no significant differences between two sequences ($P<0.05$) (Fig 1,2).

Conclusion: 3D T2-weighted FSE images give useful information and can be substitute for 2D T2-weighted FSE images in axial, sagittal and perpendicular to the axis of the uterus.

Table		**3D FSE**		**2D FSE**	
	Total No		**Ax**	**+Sag**	**+Obl**
leiomyoma	**13**	**13/0**	**13/0**	**13/0**	**13/0**
Adenomyosis	**2**	**1/1**	**1/1**	**1/1**	**1/1**
Endometrial lsions	**6**	**5/1**	**5/1**	**5/1**	**5/1**
Mature teratoma	**5**	**3/2**	**4/1**	**4/1**	**4/1**
Solid ovarian tumor	**6**	**6/0**	**6/0**	**6/0**	**6/0**
Csytic ovarian tumor	**5**	**5/0**	**5/0**	**5/0**	**5/0**
p/s chemo cervical ca	**14**	**5/9**	**3/11**	**4/10**	**5/9**

Fig1a 2DFSE ax

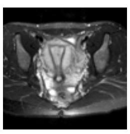


Fig1b 3DFSE

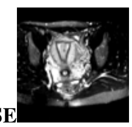


Fig2a 2DFSE sagi

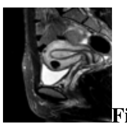
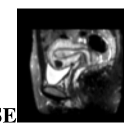


Fig 2b 3DFSE



Endometrial polyp and leiomyoma.