Purpose: Only a few studies on diffusion weighted (DW) imaging of ovarian lesions have been reported (1-4). In previous studies, the role of DW imaging in distinguishing between benign and malignant tumors may be limited by using mean apparent diffusion coefficient (ADC\text{mean}) values. However, to our knowledge, the utility of DW imaging with using minimum apparent diffusion coefficient (ADC\text{min}) for the female pelvis has not previously been investigated. The purpose of our study is to determine the accuracy of DW imaging in the characterization of ovarian masses with solid components and to clarify the relationship between ADC\text{mean} and ADC\text{min} with solid components of the ovarian tumors in patients undergoing pelvic 3T MR imaging.

Materials and Methods: Eighty-nine women (mean age: 53.8 years old) with 95 ovarian masses with solid components (13 benign-, 18 border line-, and 64 malignant tumors) referred for the characterization of ovarian masses underwent conventional MR imaging on a 3T MR system (Philips Achieva, Best, The Netherlands) using a 32-element SENSE torso coil. T2-weighted imaging, DW imaging (Single shot SE-EPI, b-values of 0 and 1000 s/mm$^2$), pre- and postcontrast T1-weighted imaging were acquired. MR images were retrospectively evaluated in consensus by two experienced radiologists. A circular region-of-interest (ROI) was placed to be as large as possible within the confines of the solid part of the tumors on DW imaging. The ADC\text{mean} and ADC\text{min} of the solid lesion were also measured in the same ROI from the ADC map. For comparison of the results, differences among those tumors with respect to the ADC\text{mean} and ADC\text{min} were assessed by Tukey’s multiple comparison test. Differences with $p < 0.05$ were considered statistically significant.

Results: The mean and standard deviation of the ADC\text{mean} ($\times 10^{-3}$ mm$^2$/s) for benign-, border line-, and malignant ovarian tumors with solid components were $1.45 \pm 0.30, 1.65 \pm 0.37, 0.98 \pm 0.22$ (Fig. 1); the ADC\text{min} for these tumors were $1.13 \pm 0.25, 1.25 \pm 0.26, 0.63 \pm 0.19$, respectively (Fig. 2). Both of the ADC\text{mean} and ADC\text{min} of malignant tumors were significantly lower ($p < 0.01$) than those of other benign or border line tumors. There was overlapped 9 masses in the ADC\text{mean} (cut off of 1.35; sensitivity 93.8%, specificity 61.5%), and 7 masses in the ADC\text{min} (cut off of 0.95; sensitivity 93.8%, specificity 76.9%) for distinguishing between benign and malignant tumors.

Conclusion: In our study, the ADC\text{mean} and ADC\text{min} of malignant ovarian masses with solid components were significantly lower than those of other benign- and border line masses. ADC\text{min} was better than ADC\text{mean} for characterization of ovarian masses with solid components. However, it may be occasionally difficult to differentiate benign and malignant masses only on the basis of DW imaging.