Preoperative prediction of uterine sarcoma using T2 weighted imaging and apparent diffusion coefficient (ADC) on MRI and its clinical application

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Objectives
Uterine sarcoma is a rare disease with a poor prognosis, and its preoperative diagnosis is difficult. We previously presented the finding that a tumor with high tumor-to-subcutaneous fat signal intensity ratio on MRI T2 weighted imaging (TFSIR) and low ADC is highly suspected of sarcoma. But we have not reported our experience of clinical use as a preoperative prediction method yet. This time we reexamined the cutoff value of these parameters through additional cases to make it more reliable. The purpose of this study is to testify that these parameters are worthy of clinical use.

Methods
1. Sarcoma group: 5 cases of uterine sarcoma performed MRI from 2014 for three years
2. Myoma group: 64 cases of uterine benign tumor performed MRI in 2015 and 2016
1. Calculation of both TFSIR and ADC (Fig.1) and their comparison between two groups.
2. Calculation of the cutoff values of these parameters to predict sarcoma
3. Consideration of preoperative prediction method by combination of these two parameters
4. Matching preoperative predictions to pathological results for 38 uterine tumors in 2017

Results
The sarcoma group had significantly higher TFSIR than the myoma. The minimum cutoff value of TFSIR to diagnose sarcoma was 0.515. The sarcoma group had significantly lower ADC values than the leiomyoma group. The maximum cutoff value of ADC to diagnose sarcoma was 1.280 (Fig.2). All tumors with both positive TFSIR and ADC were sarcoma. The others were benign tumor (Table1). We considered that tumor with both positive TFSIR and ADC is predicted as sarcoma. Among 38 uterine tumors in 2017, three tumors were predicted as sarcoma and two of those tumors were indeed sarcoma. All tumors predicted as benign tumor were indeed benign (Fig.3).

Conclusion
Preoperative prediction of uterine sarcoma is possible using both TFSIR and ADC on MRI, whereas we have to be careful for false positive case.

Table1) Pattern of TFSIR and ADC, and pathological findings

<table>
<thead>
<tr>
<th>TFSIR</th>
<th>ADC</th>
<th>No. of cases</th>
<th>Patho.</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>+</td>
<td>5</td>
<td>Sarcoma</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
<td>6</td>
<td>Myoma</td>
</tr>
<tr>
<td>-</td>
<td>+</td>
<td>6</td>
<td>Myoma</td>
</tr>
<tr>
<td>-</td>
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<td>21</td>
<td></td>
</tr>
</tbody>
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Fig1) Images of TFRSIR calculation and ADC measurement

Fig2) Comparison of TFSIR
Cut off value >0.515
sensitivity100%, specificity88%

Fig3) Comparison of ADC
Cut off value <1.280
sensitivity100%, specificity84%

Fig3) Preoperative Diagnosis method using 2 parameters and matching to pathological results