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"Gain Fading" A new reliable 3D transvaginal ultrasonographic(TVUS) feature helps in diagnosing histological proven Adenomyosis using BCL6 biomarker in cases of reproductive failure

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Introduction

Adenomyosis has been found to be contributing cause of infertility, repeated implantation failure and recurrent miscarriage. Meanwhile, adenomyosis has moved from a histological diagnosis to an imaging technique diagnosis. TVUS has now become the most cost effective first-line imaging diagnostic tool compared to MRI which is expensive and provides only a complementary role. There are 2D/3D specific features that have been suggested according to Morphological Uterus Sonographic Assessment (MUSA), that prove to be reliable in diagnosing adenomyosis. We are suggesting a new sign "Gain Fading" that were tested with MUSA features in cases of reproductive failure proven to have endometriosis at the level of uterus using BCL6 protein biomarker.

Patients and methods

We used GE Voluson E8 3D 5-9 TVUS for this technique and after doing a complete assessment using 2D we applied 3D using Gyn HDlive ™ Silhouette. In suspected adenomyotic area, hyperechogenic islands and striations of the same color and gain, similar to that of endometrium might appear within the uterine muscle wall. On reducing the gain, these areas/ striations fade away only when the endometrium start fading as well. If both fade at the same time the case is considered positive, while if both fade completely while the endometrium is still apparent, the case is considered negative. We looked retrospectively for cases that were referred to our fertility center for reproductive failure during the period of March-September 2021. 137 Subjects received 2D/3D TVUS and received endometrial biopsies for BCL6 analysis at the secretory phase of menstrual cycle during their diagnostic workup. The authors looked at the images retrospectively and recorded both 2D/3D ultrasonographic features. This was followed prospectively in view of the BCL6 results (above a cut-off HSCORE=1.4 is positive). Statistical analysis was carried out using SPSS version 23 software.

Results

Using BCL6 positive cases, the number of positive cases using "Gain Fading" sign were 97/ 135 (71.5%) There was a statistical difference between cases with BCL6 positive versus cases with BCL6 negative results. The cases that had no 2D adenomyosis (MUSA) features were 25/137 (18.2%) of BCL6 positive cases. While if 3D features were added: only 9/137 (6.5%).

Specifically:

- Asymmetry myometrial wall: sensitivity 33.1%, specificity 68.2%,positive predictive value (PPV) 62.5, and negative predictive value (NPV) 38.9.
    - Of note: MUSA criteria figures with 2D; sensitivity 57.2%, specificity 71.9% and 3D was 59.2% and 53.4% respectively.
- Globular uterus: sensitivity 34.6%, specificity 74.4%, PPV 68.1 and NPV 41.8.
    - Of note MUSA 2D: sensitivity 55%, specificity 80.2%.
- Hypoechoic linear striations: sensitivity 21.2%, specificity 77.9%, PPV 60.4%, NPV 38.3%.
    - Of note MUSA 2D: sensitivity 71.3%, specificity 79.7%,while 3D figures 52.8%, 61.1% respectively.
- Heterogenous myometrium: sensitivity 75.7%, specificity 31.4%, PPV 63.6 and NPV 45.
    - Of note MUSA 2D; sensitivity 86%, specificity 61.3% while 3D were 82.7% and 41.4% respectively.
- Myometrial cysts: sensitivity 49.3, specificity 59.5, PPV 66.3, and NPV 42.
    - Of note MUSA 2D: sensitivity 72%, specificity 62.7% and 3D were 58.2%, 54.3% respectively.

Conclusion

In our hands the sensitivity and specificity of the new Gain Fading sign is better than that found with other MUSA features in detecting adenomyosis using a novel biomarker BCL6 for identification of potential cases.There are many advantages for adding this new feature to MUSA criteria; inexpensive, simple to perform, easy to learn and does not add duration to the assessment. Yet it adds a more sensitive and specific feature to the diagnosis. We believe it will improve the accuracy in diagnosing adenomyosis by TVUS.