

'Is three-dimensional ultrasound or magnetic resonance imaging more effective in the diagnosis of congenital uterine anomalies?'

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Introduction

Congenital uterine anomalies (CUAs) are anatomical abnormalities caused by embryological müllerian duct maldevelopment⁴. Most patients with CUA present with infertility, recurrent miscarriage and foetal intrauterine growth restriction¹. An accurate diagnosis of the type of CUA is a vital stage of patient management in order to identify operable cases⁴. Although the use of three-dimensional transvaginal ultrasound (3D TVS) has increased the detection of CUAs, multiple alternative diagnostic techniques are still being utilised². The Royal College of Obstetricians and Gynaecologists (RCOG) consider 3D TVS to be the gold standard for the assessment of CUAs, as it has been found to be more reproducible and less invasive than other commonly used radiological and surgical diagnostic modalities².

Trust A currently only indicate MRI in the diagnosis and classification of CUAs, whilst the gynaecology ultrasound service at Trust A has the potential to provide 3D TVS. A literature review will therefore be conducted to identify the most recent evidence base in order to critically reflect upon the effectiveness of US in CUA diagnosis compared to MRI, the implications on patient management and to propose alternatives for service improvement.

Method

A systematic literature search was conducted utilising seven health-care databases including Cinahl Plus, Medline, Scopus and EBSCO Medical. Boolean search operators were also employed to ensure all relevant sources were found.

Search results were then assessed against inclusion and exclusion criteria, including limiting the research articles to those conducted in the past six years (2016-2022) to increase relevance to practice and generalisability. This resulted in three highly relevant studies for critical appraisal.

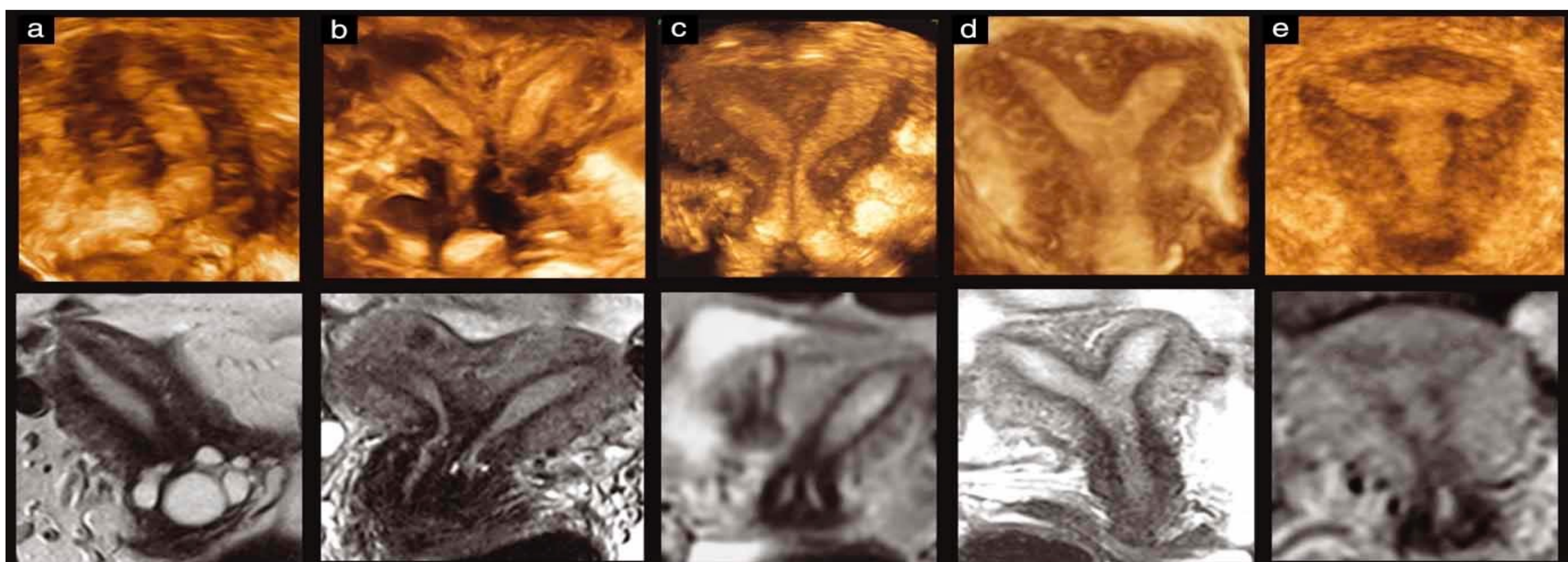


Figure 1: Comparison of three-dimensional ultrasound and magnetic resonance imaging in cases of uterine malformation³; according to ARSM classification, show: (a) unicornuate uterus (Type IIc); (b) bicornuate uterus (Type IVb); (c) septate uterus with two cervixes (Type Va); (d) partial septate uterus (Type Vb); (e) uterus with diethylstilbestrol (DES) drug-related malformations (Type VII).

Results

Abd Elsalam et al's¹ study was a cross-sectional study design involving thirty females suspected of CUA on 2D US, all patients underwent subsequent 3D TVS and MRI exams. This study found diagnosis by 3D TVS had a strong agreement ($P < 0.01$) with MRI and was a viable alternative. US was also found to cost less than an MRI and was better tolerated by patients.

The data was examined using the European Society of Human Reproduction and Embryology–European Society for Gynaecological Endoscopy (ESHRE–ESGE) consensus classification, which provided objective criteria and a statistical analysis programme which strengthened the validity of the results. However, as well as a small number of cases (30), multiple operators were included in the study and it is not stated whether they were blinded to the results. This can result in inter-observer variation as well as bias in the data gathered, reducing the study's reproducibility.

Cekdemir et al⁴ conducted a retrospective investigation on 27 women with suspected müllerian duct anomalies (MDA) who underwent 2DUS, 3DUS and MRI. This study found 3D-US to show good agreement with MRI for the identification of CUA's based on the ESHRE-ESGE consensus (96.3%) and American Society for Reproductive Medicine (ASRM) classification (88.9%).

The MRI and US imaging teams were blinded to each other, which reduced bias and improved reliability of results. However, there were no complex cases included in the study, reducing generalisability of data. This suggests that a similar study focusing on complicated CUAs is needed to assess the reliability of this data.

Ergenoglu et al⁵ found 3DUS to be a more superior diagnostic tool than MRI. Comparing the diagnostic concordance of: MRI, 3DUS and surgical diagnosis; 3D US and surgical diagnosis of CUA demonstrated a good level of agreement, with a kappa index of 0.896 (95 percent CI, 0.695–1). Compared to a kappa index of 0.592 (95% CI, 0.300–0.882) between MRI and the surgical diagnosis. The retrospective cohort study design increases bias since the research procedures, data collecting, and data quality assurance were not planned in advance. This is highly likely to have skewed the results.

Relevance to practice

From the literature review, 3D TVS was found to be as effective as MRI^{1,4} with one article finding 3D TVS to be more effective in diagnosing and classifying CUAs⁴. Three Dimensional-US is a good substitute for MRI since patients find it more tolerable¹ and it is less expensive^{1,4}. The literature review provided evidence that the RCOG's recommended practice² is supported by current research evidence^{1,4,5}. Therefore, Trust A should utilise 3DUS as part of the CUA pathway as it has been found to improve patient management, it would also promote Sonographer development. Implications of the gradual implementation of 3D TVS include workflow disruptions, cost of further training and staff resistance.

However, the evidence identified in the literature review has certain limitations. All three studies were based outside of the United Kingdom (UK), whether these findings could be extrapolated to the UK would have to be investigated. In addition, there were no large-scale investigations; A small sample size of 30 people might lead to an overestimation of a link's strength and an increase in false-positive data. Whilst the RCOG recommends the use of 3DUS in the diagnosis and classification of CUAs², this literature review suggests more studies are required on larger cohorts with more complex CUA cases.

Conclusion

The literature review found that 3D TVS is more effective than MRI in the diagnosis of CUAs. Trust A should therefore implement 3DUS within the CUA patient pathway to improve patient management. This finding supports the RCOG's recommended practice, however, further studies are still required on larger cohorts with more complex CUAs.

References

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