European Society of Human Reproduction and Embryology

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Three-dimensional vaginal ultrasound: a tool to get better definition of uterine anomalies

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The uterine malformations include a miscellaneous group of anomalies that have been linked to an increased incidence of adverse reproductive outcomes (spontaneous abortion, preterm labor, placental abruption, and fetal death)

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THE REAL IMPACT OF MULLERIAN MALFORMATIONS ON REPRODUCTIVE PERFORMANCE IS STILL CONTROVERSIAL …

The hysteroscopic metroplasty has been proposed as the basis of treatment of correctable malformations

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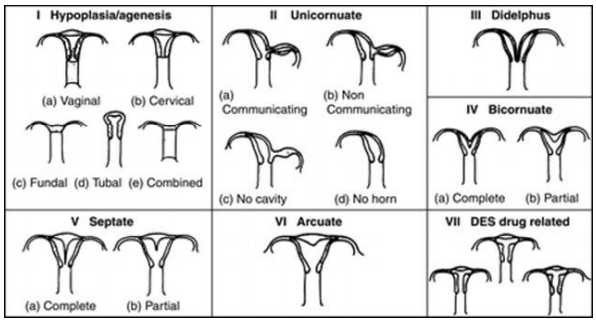
Dissection of the fibrotic portion of the septum is carried on from the uterine isthmus toward the fundus until the muscular component of the uterine wall and the venous myometrial vessels are evident, preserving adequate fundus thickness (1.5 cm) to avert intraoperative uterine perforation or uterine rupture during pregnancy or labor.

The necessity to establish whether and how to provide surgical correction of the anatomical defect has led to development of a large number of classifications of uterine anomalies

CLASSIFICATION UTERINE MALFORMATIONS (AFS, 1988)



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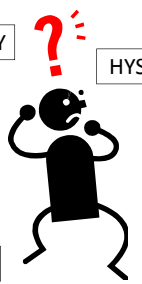
"A limitation of the AFS classification is that it does not specify diagnostic methods to detect anomalies suspected only on the subjective impression of the clinician performing the test"

HYSTEROSCOPY

HYSTEROSALPINGOGRAPHY

TRANSVAGINAL ULTRASOUND



3D TRANSVAGINAL ULTRASOUND

LAPAROSCOPY

2

In addition, malformations with features included in more than one category cannot be classified individually and precisely

In particular, an important issue concerns the differentiation between class V (septate) and class VI (arcuate) anomalies

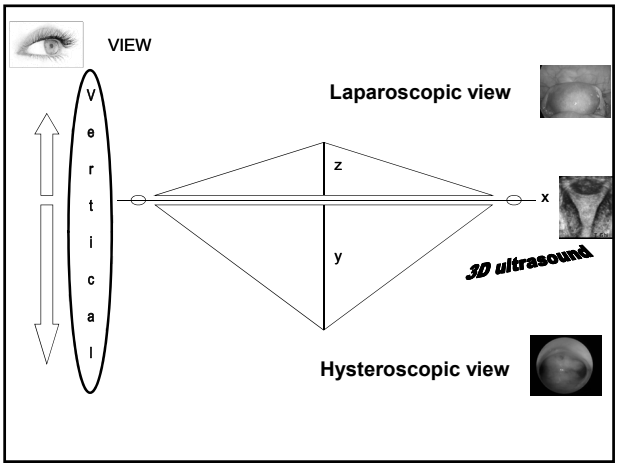
… THERE ARE NO OBJECTIVE CRITERIA TO DISTINGUISH PRECISELY SEPTATE AND ARCUATE UTERUS …

The external uterine contour is typically convex but may be flat or slightly concave (with a fundal cleft <1 cm)

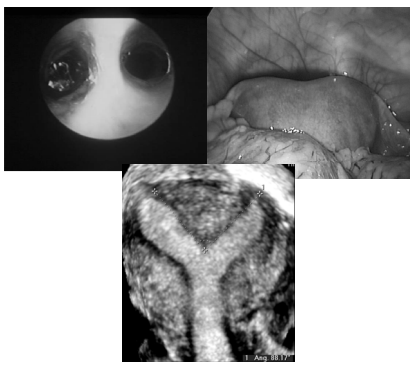
This is clinically important because these subtypes exhibit different reproductive complications, and require different clinical management

The AFS classification system categorizes uterine anomalies as class V or VI without specifying the uterine fundus features (thickness and external contour) and the endocavitary development of the septum, all of which are important in determining whether office operative hysteroscopy or the resectoscopic/miniresectoscopic approach is preferable

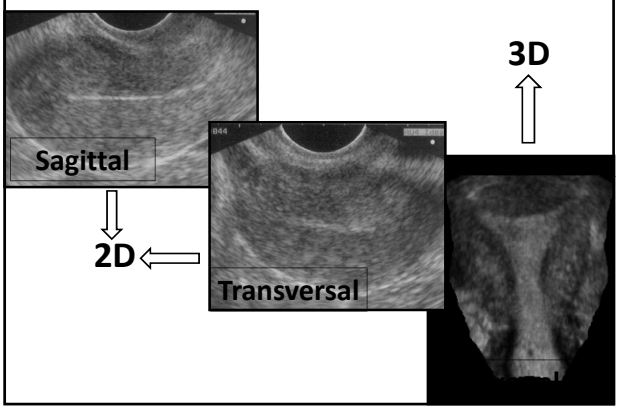
Although the gold standard for diagnosis and treatment of uterine anomalies is represented by combined hysteroscopy and laparoscopy, in the last years it is possible to select patients for the intervention by the integration of the hysteroscopy with the three-dimensional transvaginal ultrasound (3D) for the study of uterine fundus. From the combined hysteroscopy and 3D ultrasound it is possible to obtain adequate information regarding the thickness, the external contour and the morphology of the uterine fundus, using the inter-ostial line as reference line on coronal scan of the uterus. Thus, the laparoscopy can be reserved for cases in which you want to study tubal patency or to treat any concomitant adnexal diseases.



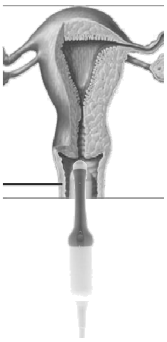
Methods integration



TRANSVAGINAL ULTRASOUND: SECTION PLANS OF THE UTERUS



3D transvaginal ultrasound



The integration of hysteroscopy and 3D ultrasound allows us to produce a geometrical model, reproducible and, therefore, more objective than subjective laparoscopic assessment, based on the evaluation of the two parameters cited (endocavitary development of the septum and fundus thickness in reference to the inter-ostial line).

Through this model we elaborated a new subclassification of the uterine anomalies, commonly categorized as AFS V- VI classes, which defines precisely each uterine anomaly on the basis of the combination of the two variables.

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New Outpatient Subclassification System for American Fertility Society Classes V and VI Uterine Anomalies

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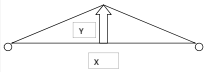
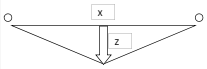
Uterine fundus (Y)



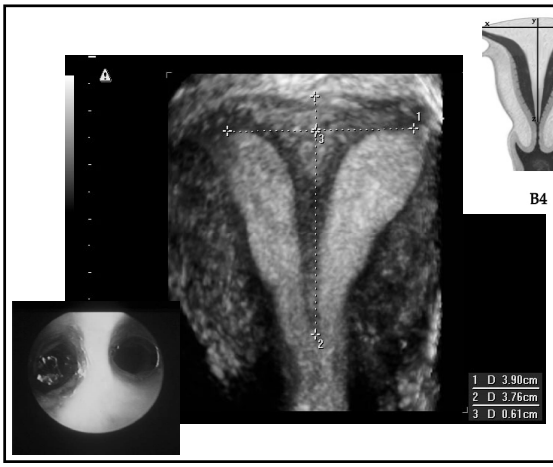
SUBGROUPS	UTERINE FUNDAL THICKNESS (Y)
A: uterine fundus	Y > 1.5 cm
B: Straight uterine fundus	1.5 > Y > 0 cm
C: Concave uterine fundus	0 > Y > -1 cm

Interostial line (X)



Uterine septum (Z)

SUBGROUPS	SEPTUM DEVELOPMENT (Z)
1	≤ 0.5 cm
2	Septum interests 1/3 of the uterine cavity
3	Septum interests 2/3 of the uterine cavity
4	septum interests 3/3 of the uterine cavity



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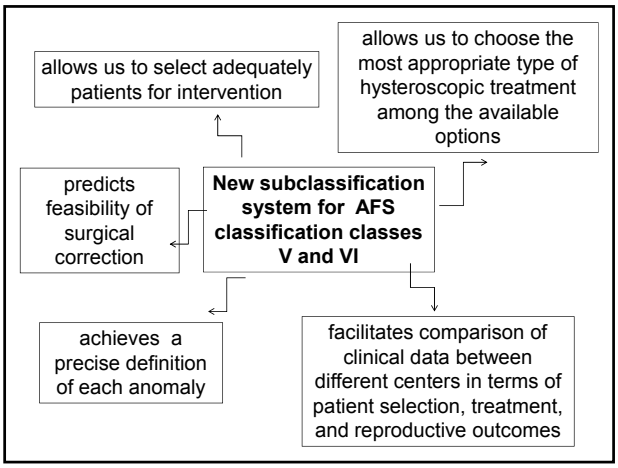
Our subclassification system directly focuses on the architecture of the uterine cavity, describing the uterine fundus thickness and the endocavitary development of the septum. The geometric model, through which the subclassification was elaborated, was produced by data derived from both hysteroscopy and the three-dimensional transvaginal ultrasound (3D US).



Possible limits of 3D-US

There are several factors, uterine (transverse diameter, size, rotation of the uterus, myomas and fibromatosis) and extrauterine (intestinal bloating, fat, low echogenicity of the pelvic tissues), which may affect the 3D US diagnostic accuracy

CONCLUSIONS

Adequate training in 3D US, high-quality well-maintained ultrasound equipment, knowledge of the possible limits of the 3D US, adequate hysteroscopic culture, and the integration of the methods are the basic requirements to characterize the uterine dismorphisms.