

## ***Correlation between Vaginal ultrasound , hysterosonography and hysteroscopy in the exploration of abnormal uterine bleeding***

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### **Abstract**

**Objectives** To determine the contribution of hysterosonography in uterine cavity pathologies in case of bleeding, and appraise the performance of this examination in the evaluation of the uterine cavity by comparing it to vaginal ultrasound and diagnostic hysteroscopy. **Methods** A retrospective study of 31 hysterosonography examinations was performed in the Gynecology and Obstetrics Department of Farhat Hached University Hospital Center Sousse, Tunisia. Included in the study were patients suffering from abnormal bleeding. First, we assessed the feasibility and tolerance of hysterosonography. Secondly, our evaluation consisted of two parts: On the first hand, the study of the diagnostic value of hysterosonography by calculating its sensitivity, specificity, positive predictive value and negative predictive value. On the other hand, we studied the concordance between the results of hysterosonography and those of hysteroscopy. **Results** During the period of clinical trial, the failure rate of performing hysterosonography was 3.2%. Tolerance has always been good. Hysterosonography enabled etiologic diagnosis of bleeding with a 75% SEN, 88.89% SP, 81.8% VPP, and 84.2% VPN. Hysterosonography / hysteroscopy concordance for abnormal uterine bleeding was 83.3%. The diagnostic value of hysterosonography was superior to vaginal ultrasound in detecting various endo-cavitary abnormalities. **Conclusion** We have been able to demonstrate that hysterosonography is a feasible test, and useful in the exploration of abnormal uterine bleeding. In clinical practice, combining hysterosonography with transvaginal ultrasound may increase the sensitivity of the latter, thus avoiding unnecessary diagnostic hysteroscopies. It is likely to significantly reduce the indications for diagnostic hysteroscopy, a test that is not devoid of morbidity.

**Key words:** Vaginal Ultrasound, Hysterosonography, Hysteroscopy, Abnormal uterine bleeding

### **Introduction**

Management of abnormal uterine bleeding deserves a sufficiently reliable and producible diagnostic strategy to achieve accurate diagnosis and appropriate treatment. The objective, in the face of such a clinical situation, is to identify the cause of the bleeding, which is classified according to the FIGO 2011 International Federation of Gynecology and Obstetrics Classification for Structural Causes (PALM) Non-Structural Causes (COEIN) [1, 2]. Uterine ultrasound, especially vaginal ultrasound, is the first-line examination. If this ultrasound allows, in the majority of the cases, a satisfactory study of the uterine cavity and the neighboring myometrium thanks to the natural contrast of the endometrium,

the interpretation of the uterine lining can sometimes be difficult, which necessitates the use of other investigations. In addition, remember that this ultrasound is operator-dependent, and the quality of images and their interpretation are subject to the experience and expertise of the operator. Known since 1981 [3], hysterosonography has now taken off.

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In our context, as well as countries with limited resources, hysterosonography seems to us to be a practical and interesting test in view of the diagnostic difficulties of endometrial lesions, given its technical and financial accessibility. To study its contribution to the etiological prediction in case of abnormal uterine bleeding, we analyzed the medical observations of patients who were treated in this context, and we set ourselves the objective of evaluating the diagnostic performance of hysterosonography in the prediction of the histological nature of the endo-cavitary abnormality observed, comparing it to vaginal ultrasound and diagnostic hysteroscopy considered as the reference examination in the exploration of this uterine cavity. This allowed us to consider the implementation of a correlation between the results of the different examinations used in the exploration of pathologies of the uterine cavity in this context of abnormal uterine bleeding by evaluating their feasibility as well as their diagnostic performance in order to adopt adequate and economical care.

## Methods

We conducted a retrospective study during a five-month period from February 1, 2017 to July 31, 2017 to evaluate the feasibility of performing hysterosonography in case of abnormal uterine bleeding in our gynecology-obstetric department. CHU Farhat Hached of Sousse, Tunisia. The ethics committee of our institution approved the study. The informed consent of the patients was requested by explaining to them that the study does not interfere in any case with the modalities of the management and does not modify the therapy. Consent was oral, undocumented. We included all patients consulting for abnormal uterine bleeding whether in the genital or postmenopausal activity and in which the bleeding was objectified on clinical examination.

Patients who had cervico-vaginal infection, pregnancy, insurable cervical stenosis and / or suspected endometrial cancer were excluded from this study. The study protocol that we defined consisted of an abdominal and endovaginal ultrasound performed always in first intention. All patients received a second hysterosonography. Whether the hysterosonography was normal or not, the patient had a diagnostic and / or operative hysteroscopy with or without histological evidence. Simple to perform, hysterosonography is an endovaginal ultrasound with contrast enhancement (EVAC). The examination is performed using an ultrasound system (Medison 128 BW) equipped with a vaginal probe and an injection catheter corresponding to an intrauterine insemination catheter PM IU PS 1260600 (PM IU - Catheter d intrauterine insemination PS 1260600 2 / CH6 1.6 mm / 0.40 ml 45 mm PRINCE MEDICAL SAS ZA) is a flexible, sterile and disposable catheter specifically designed for use in insemination settings. Artificial intrauterine thanks to its rigid inserter and its two lateral holes. The material we had included a mobile lamp to visualize the cervix, a tray with a Collin speculum of suitable size, a longuette forceps, a cup, a condom to cover the endo-vaginal ultrasound probe, an antiseptic, sterile compresses and a 20cc syringe or an infusion of saline (at 9 ‰) (Figure 1).

The technique of performing the examination is standardized: insertion of the speculum in a patient installed in a gynecological position, disinfection of the cervix with an antiseptic, insertion of the catheter under visual control. In the majority of cases, no cervical grasping is necessary, nor any cervical dilation. Once the catheter is installed, the speculum is removed and a trans-vaginal ultrasound is performed. This unprepared examination allows a first morphological and biometric analysis of the uterus and appendages. In a second step, some saline CC (10 to 50 ml) are injected through the catheter. The injection can be done using a pre-filled syringe or by using a perfusor attached to an infusion of saline. The arrival of physiological saline in the uterine cavity takes off both sides and creates a contrast that allows visualization of the endometrial relief and any anomalies (Figure 2).

The uterine cavity is analyzed by sagittal and coronal sections.

At the end of the examination, the catheter is removed and the endocervix is better examined. All hysterosonography were performed without any premedication or anesthesia, and no therapy was prescribed for prophylaxis, especially no antibiotic therapy.

There are no special precautions to take after the examination and patients are advised to resume normal daily activity.

Hysteroscopy was performed in all recruited patients (Figure 3).

Our evaluation consisted of two parts: the study of the diagnostic value of hysterosonography by calculating sensitivity (SEN), specificity (SP), positive predictive value (PPV) and negative predictive value (VPN). Sensitivity has been favored in our study since hysterosonography is considered to be an orientation test. A sensitivity greater than or equal to 80% is considered excellent. On the other hand, we studied concordance; that is, the agreement between the results of hysterosonography and the results of hysteroscopy and histology.

## Results

The total number of patients included was 31. The average age was 41.5 years, with extremes ranging from 27 to 56 years old. Among our candidates, four were menopausal. Regarding hysterosonography, no infectious or haemorrhagic complication was observed in our study population during the examination. However, in one patient, a non-passable obstacle was noted in the cervix, a finding that prevented further examination, and the failure rate was 3.2%.

The tolerance of hysterosonography has always been good and the examination was considered painless by the majority of our patients.

However, minimal pelvic pain was noted in 3 patients (10%).

Note that our evaluation of pelvic pain was subjective without resorting to a scale or assessment score. No cases of discomfort were noted during the examination. As part of this exploration of abnormal uterine bleeding, hysterosonography was: - Normal in 4 cases, - Abnormal in 26 cases (ie a rate of  $26/30 = 86.7\%$ ) visualizing: - atrophy of the endometrium in 2 cases, - hypertrophy of the endometrium in 5 cases, - and / or intra-cavitary pathology: endometrial polyp in 9 cases and intracavitary myoma in 10 cases. In this group of patients, we have studied the results of hysterosonography compared to hysteroscopy for all pathologies combined, then with respect to histology pathology by pathology and we present our results (Table 1). Thus, in this type of pathology we found for hysterosonography: - a sensitivity of 75% - a specificity of 88.89% - a positive predictive value of 81.8% - a negative predictive value of 84.2% The Hysterosonography / Hysteroscopy concordance for abnormal uterine bleeding was 83.3% (25/30).

### 1- Case of hypertrophy of the endometrium

In the case of hypertrophy of the endometrium evoked by hysterosonography, we analyzed the results of the histological study, mainly looking for endometrial hyperplasia, and compared them to the hysterosonography data. This confrontation made it possible to find the following statistical values for hysterosonography:

Sensitivity = 60%

Specificity = 60%

The concordance Hysterosonography / Histology, in case of hypertrophy of the endometrium, was then 60%.

The sample size could not calculate VPP and VPN.

### 2- Case of endometrial polyp

For this pathological entity, the confrontation Hysterosonography / Histology allowed to find the following statistical values:

Sensitivity = 65%

Specificity = 33.3%

VPP = 56.5%

VPN = 41.6%

The concordance Hysterosonography / Histology was then 51.4%.

### 3- Case of intracavitary myoma:

Our study has shown that hysterosonography is interesting in the diagnosis of this type of endocavitary pathologies with:

Sensitivity = 76.9%

Specificity = 78.9%

VPP = 71.4%

VPN = 83.3%

The concordance Hysterosonography / Histology, in case of bleeding intracavitary myoma was then 78.1%.

### Discussion

Hysterosonography allowed the etiological diagnosis of bleeding with: a sensitivity of 75%, - a specificity of 88.89%, - a VPP 81.8%, - and a VPN of 84.2%. Recall that the management of abnormal uterine bleeding deserves a sufficiently reliable and productive diagnostic strategy to achieve an accurate diagnosis and allow appropriate treatment. The objective in this clinical situation is to identify the cause of the bleeding, which is classified according to the classification of FIGO 2011 International Federation of Gynecology and Obstetrics in PALM-COEIN [1]. This classification recognizes that any patient may have one or more pathological entities causing her symptomatology, and defines two types of causes for abnormal uterine bleeding: - structural causes (PALM): polyp, adenomyosis, leiomyoma, malignant lesions and hyperplasia, - and non-structural causes (COEIN): coagulopathies, ovulatory dysfunctions, particularly infectious and inflammatory endometrial abnormalities, iatrogenic causes and finally unclassified causes [1, 2]. In recent years, there has been renewed interest in hysterosonography because of its accessibility and low cost. The great interest of this technique is recognized today in the distinction between normal uterine cavity and pathological uterine cavity with a sensitivity of 85 to 100% according to the studies [4, 5]. Indeed, while hysteroscopy

was the first "gold standard" in the exploration of endometrial and endocavitary pathology, since the appearance of hysterosonography, the number of publications continues to increase. According to the meta-analysis of Kroon et al. [6], which included 24 studies, hysterosonography has an excellent sensitivity of 97%, and a specificity of 92% in the diagnosis of endometrial and endocavitary pathologies making it the "New Gold standard". This is observed in our study where hysterosonography has a sensitivity of 75% and a specificity of 89%. A literature review comparing endovaginal ultrasound, hysterosonography and hysteroscopy has resumed 19 studies [7]; this meta-analysis shows that these explorations have variable performances. For the identification of an endocavity pathology, the sensitivity of transvaginal ultrasound (10 studies) varies between 48 and 100%, while the sensitivity of hysterosonography (11 studies) varies between 85 and 100%. This literature review concludes that different diagnostic tests can predict a pathology with a good likelihood ratio. However, the data concerning ultrasound and hysterosonography are very heterogeneous. Ultrasonography has a higher false-negative rate than hysterosonography and hysteroscopy for the diagnosis of endo-uterine diseases [7]. We report a review of different studies comparing the performance of transvaginal ultrasound and hysterosonography in the screening and characterization of endo-cavitary lesions (Table 2). Hysterosonography then makes it possible to better characterize the focal abnormalities of the uterine cavity. Endometrial polyps and submucous myomas are easily recognized. The examination retains the same relevance before and after menopause. Another interest of hysterosonography is to be effective for the distinction between focal endometrial abnormalities and diffuse anomalies. In this situation, hysterosonography has a specificity equivalent to that of hysteroscopy and definitively surpasses transvaginal ultrasound [10]. Hysterosonography may reveal asymmetry in mucosal thickness, whereas standard ultrasound showed only an overall increase in endometrial thickness. The biopsy performed after hysterosonography is thus guided to the most pathological zone [10].

### Conclusion

We have been able to prove the superiority of hysterosonography over vaginal ultrasound for the diagnosis of intrauterine abnormalities and their descriptions. Our conclusions highlight the essential role of hysterosonography in the exploration of endo-uterine anomalies, since it reliably assesses the size, location, and number of intracavitary lesions, as well as their types and indications. The most appropriate treatment. In clinical practice, coupling hysterosonography to endovaginal ultrasonography may increase sensitivity, while avoiding unnecessary diagnostic hysteroscopies. It is likely to significantly reduce the indications for diagnostic hysteroscopy, a test that is not devoid of morbidity.

**Figure 1:** Material of hysterosonography



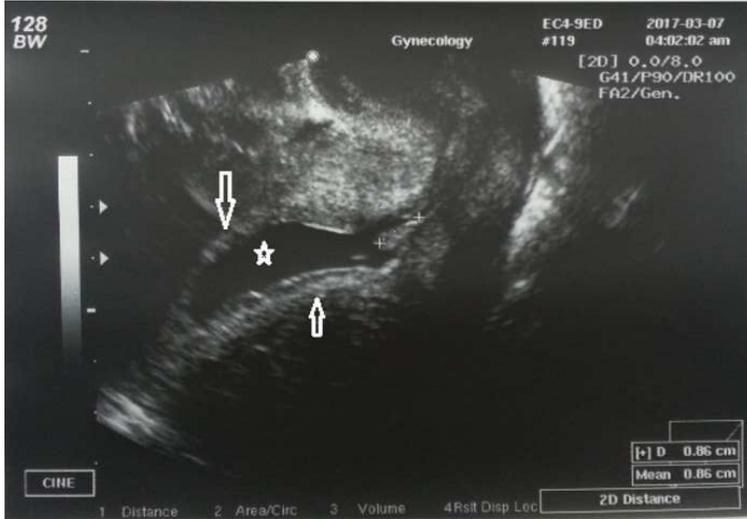
**Table 1:** Hysterosono / Hysteroscopy Confrontation in case of haemorrhagic disorder of the menstrual cycle.

		Hysteroscopy		
		Normal	Abnormal	Total
Hysterosono	Normal	9	2	11
	Abnormal	3	16	19
	Total	12	18	30

**Table 2:** Efficacy of trans-vaginal ultrasound and hysterosonography in screening and characterization of endocavitary lesions.

Authors	Trans-vaginal sonography		Hysterosonography	
	Sensibility	Specificity	Sensibility	Specificity
De Vries [8]	60 %	93 %	88 %	95 %
Dueholm [9]	92 %	62 %	99 %	72 %
Notre série	60.7 %	66.67 %	81.8 %	91.9 %

**Figure 2:** *Hysterosonography image: intracavitary serum injection (star) and detachment of both sides of the endometrium (arrows).*



**Figure 3:** *Vaginal sonography (3 A), hysterosonography (3 B 1 and 3 B 2) and hysteroscopy (3 C) in Ms. Z, 32 years, ménometrorragie (star: serum distended by the serum, arrow: fibroma type 2 of FIGO).*



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