Introduction

Abnormal uterine bleeding (AUB) is overall the most common symptom for gynecological visits in the peri- and postmenopausal age, involving about 15% of women. Besides systemic, iatrogenic or hormonal age-related causes, an endometrial pathology (polyps, submucous myomas, endometrial hyperplasia, and endometrial carcinoma) should always be suspected, and evaluation appears to be mandatory ***(Verrotti et al., 2008).***

Abnormal uterine bleeding is a common presenting symptom in the family practice setting. In women of childbearing age, a methodical history, physical examination, and laboratory evaluation may enable the physician to rule out causes such as pregnancy and pregnancy-related disorders, medications, iatrogenic causes, systemic conditions, and obvious genital tract pathology. Dysfunctional uterine bleeding is diagnosed by exclusion of these causes. Women of childbearing age who are at low risk for endometrial cancer may be assessed initially by transvaginal ultrasonography. Postmenopausal women with abnormal uterine bleeding should be offered dilatation and curettage; if they are poor candidates for general anesthesia or decline dilatation and curettage, they may be offered transvaginal ultrasonography or saline-infusion sonohysterography with directed endometrial biopsy *(**Albers et al**., **2004**).*

The causes may vary from simple dysfunctional uterine bleeding without any organic cause to the endometrial cancer. The cases of AUB usually need thorough investigation to rule out organic causes especially at perimenopausal and postmenopausal age when the risk of endometrial carcinoma is 10% to 15%. Hysteroscopy with directed biopsy, over the years, has assumed the role of reference standard investigation for AUB because it is an accurate method for diagnosing and treating endometrial abnormalities, however, its invasive nature and high cost preclude its use as a primary diagnostic procedure in patients with AUB ***(Aslam et al., 2007).***

Up to 33% of women referred to gynecological outpatient clinics have AUB, and this proportion rises to 69% in a perimenopausal or postmenopausal group. Local causes include fibroids, endometrial polyps, cervical polyps, endometrial hyperplasia and endometrial carcinoma ***(Karimzadeh et al., 2011).***

Endometrial assessment has traditionally been achieved by blind dilatation of the cervix and curettage of the endometrium (D&C) under general anesthesia ***(Clarks, 2006).*** Saline infusion sonohysterography (SIS) is a diagnostic technique in which the uterine cavity is distended thereby enabling the visualization of endometrial surface *(**Kelekci et al**., **2005**).*

Preoperative imaging of the uterine cavity is very important and the results can be necessary for the surgical management. A useful imaging technique for accurate diagnosis should be highly sensitive and specific, non-invasive and cost-effective. It seems that SIS is a non-invasive, cheap and feasible technique with lower pain. In order to compare SIS and hysteroscopy, the majority of women found that SIS was not painful, whereas only 25% said the same for hysteroscopy ***(Karimzadeh et al., 2011).***

Several studies reported nearly equal diagnostic accuracy of SIS compared with diagnostic hysteroscopy; therefore, it is well established now that one may refrain from further diagnostic procedures if SIS shows a normal uterine cavity. A recent systematic review and meta-analysis supported this view. Moreover, SIS is less painful compared with diagnostic hysteroscopy, which is advantageous especially for women with a normal uterine cavity because a diagnosis can be achieved with the least possible patient discomfort. Finally, SIS proved to be less expensive compared with diagnostic hysteroscopy. Unfortunately, the positive predictive value of SIS is between 0.75 and 0.95; therefore, a considerable number of women will be scheduled for diagnostic hysteroscopy despite having a normal uterine cavity ***(de Kroon et al., 2004).***

Nowadays, three-dimensional (3D) sonography became available. The presentation of volume data instead of slices of data has proved to be clarifying and of additional value, especially in obstetrics. After that, evidence has become available showing the advantages of

3D sonography in gynecology. In these studies, 3D sonography allowed improved classification of ovarian tumors as well as improved evaluation of the postmenopausal endometrium. Finally, 3D sonography was highly accurate in the diagnosis of müllerian anomalies ***(de Kroon et al., 2003).***

Three-dimensional U/S is a multiplaner simultaneous 3 axes sectional image displayed on the same screen. These 3 planes (frontal, sagittal, and coronal) can be displayed anatomically and topographically layer by layer. 3D allows volume examination on the monitor simultaneously in three perpendicular planes. All three planes are located in a separate window and each of them can be rotated at 90 degrees to each other in all three axes. After acquiring the required volume, the presence of the patient is no longer needed, so the examination last no more than 3 minutes. It has the ability to register all three imaging planes simultaneously as well as to visualize surfaces 3 dimensionally. 3DU/S enables visualization of the uterus in the coronal plane which is rarely seen on conventional B-mode scans. Transvaginal 3DU/S thus provides a unique diagnostic tool for non-invasive studies of the uterine morphology and diagnosis of congenital uterine anomalies ***(Ebrashy et al., 2004).***

Increasing experience with 3D U/S in combination with many favorable reports on SIS resulted in the introduction of 3DSIS.Although some studies concluded that more research is necessary for a final decision about the clinical relevance of 3DSIS, others reported excellent specificity and positive predictive values for 3DSIS. Therefore, 3DSIS may be of clinical relevance because its use may increase the positive predictive value of SIS and may prevent women with a normal uterine cavity from undergoing diagnostic hysteroscopy ***(de Kroon et al., 2004).***

Hysteroscopy was one of the very earliest approaches to the direct study of the uterine cavity. The direct or magnified observation of the uterine cavity by hysteroscopy may offer a more precise diagnosis, a better ground for therapy or verification of results as compared to other methods such as hysterography. Although still hysteroscopy could be considered an invasive diagnostic procedure yet in all studies it is considered as the gold standard for evaluation of the uterine cavity ***(Abo Hemila et al., 2005).***

Diagnostic hysteroscopy (DHS) for diagnosis and management of abnormal uterine bleeding has developed as an easy performed procedure with minimal discomfort and significantly reduced risks and expenses. The procedure is a fast, effective and much more precise way to detect intra uterine abnormalities, as well as to better define the correct plan for any proposed operative management ***(Brooks, 2007).***

In the last decade, many centers replaced hysteroscopy with saline infusion sonography (SIS) as the standard diagnostic procedure for AUB. SIS was found to have comparable sensitivity to diagnostic hysteroscopy while being less invasive, less painful, and less expensive. With the introduction of 3-dimensional sonographic into routine practice, many sonographic units shifted from 2-dimensional hysterosonography (2DSIS) to 3-dimensional hysterosonography (3DSIS). However, the data to support this shift are limited and inconsistent. The 3DSIS has several potential advantages over 2DSIS; first, saving a uterine volume instead of a few 2D images allows a thorough review of the entire uterine cavity after the patient has left the office; second, 3DSIS is likely to be a shorter and therefore less inconvenient exam than 2DSIS. A single-volume acquisition that is sufficient for 3DSIS takes up to 10 seconds compared with the multiple views and measurements needed in 2DSIS; finally, the addition of a coronal view, not available in 2-dimensional imaging, and the construction of rendered image may allow better understanding of the intrauterine pathology by the surgeon. This may lead to a more precise surgery plan and performance ***(Terry et al., 2009)***.