

# Role of Saline Infusion Sonohysterography and Transvaginal Colour Doppler Ultrasonography in Evaluating Uterine Polyps: A Prospective Study

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## Abstract

**Background:** Management of uterine polyps is primarily based on the hysteroscopy and biopsy.

**Aim of Study:** Is to compare the diagnostic performance of transvaginal color Doppler sonography (TVCD) and sonohysterography (SHG) in the diagnosis of endometrial polyps.

**Material and Methods:** Thirty-four women (mean age, 38.6 years; range, 28-55 years) with clinical or B-mode sonographic suspicion of endometrial polyps were included in this prospective study. Transvaginal color Doppler sonography first and then SHG were performed in all patients. On TVCD, a polyp was suspected when a vascular pedicle penetrating the endometrium from the myometrium was identified. On SHG, a polyp was suspected when a focal polypoid lesion was seen within the endometrial cavity. All patients underwent hysteroscopy and endometrial biopsy, the findings of which were used as the criterion standard. Sensitivity and specificity for TVCD and SHG were calculated and compared by the McNemar test.

**Results:** Hysteroscopy and endometrial biopsy findings were as follows: 33 (97.1%) cases had endometrial polyps, while 4 (11.8%) had endometrial hyperplasia, 6 (17.6%) had endometritis, 2 (5.9%) had fibroids, and 2 (5.9%) had adenomyosis. Accuracy and *p*-value for TVCD and SHG were 58.82% and 0.441 and 91.17% and 0.005, respectively.

**Conclusion:** Findings showed that there was a significant difference between color doppler results and sonohysterography findings. Saline infusion Sonohysterography is significantly more accurate than transvaginal color Doppler ultrasonography in the detection of endometrial polyps.

**Key Words:** Color Doppler sonography – Endometrial polyp – Sonohysterography – Hysteroscopy.

## Introduction

UTERINE polyps are a common cause of vaginal bleeding in pre- and postmenopausal women, mostly benign; however, it carries risk of pre-malignancy, hysteroscopic biopsy is the gold standard in diagnosis [1].

Uterine polyps are abnormal growth, with morphologic subtypes; sessile or elongated pedunculated lesions of different size that project into endometrial cavity. They are the most frequently observed pathological finding in the uterus.

They may be asymptomatic or symptomatic, causing irregular menstrual bleeding, bleeding between menstrual periods, excessively heavy menstrual bleeding (menorrhagia) [2], and vaginal bleeding after menopause [3]. It has been a causative relation between uterine polyps and infertility [4] how polyps engage in subfertility and pregnancy loss is unclear, even it can miscarriage women undergoing IVF it may interfere with sperm transport, embryo implantation, or intrauterine inflammation [5].

The pathogenesis and history of endometrial polyps is unknown, however there are theories believed to be related to estrogen stimulation. The risk factors for endometrial polyp formation includes obesity, increased endogenous estrogen, high blood pressure and exogenous estrogen administration (Tamoxifen, a uterine estrogen agonist used to treat breast cancer) [6].

**Abbreviations:**

- AUB : Abnormal uterine bleeding.
- D&C : Dilatation and curettage.
- IVF : In vitro Fertilization.
- MRI : Magnetic resonance image.
- NSAIDs : Non-steroidal anti-inflammatory drugs.
- SHG : Sono-hysterography.
- SISH : Saline infusion sono-hysterography.
- TVCD : Trans-vaginal color Doppler.
- TVUS : Trans-vaginal ultrasound.

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*Diagnosis of uterine polyps can be done through:* Transvaginal Ultrasonography (TVUS) which consider the primary modality for assessment of endometrial abnormalities [7], Colour flow doppler which demonstrate the feeding vessel of endometrial polyp (Fig. 1), Sonohysterography (saline infusion hysteroqram) which is more accurate than ultrasound alone (Figs. 2,3), MRI because of its good soft tissue contrast resolution in cases of vaginal or cervical stenosis, Hysteroscopy and histological diagnosis is the gold standard [3,6,8,9].

Management of endometrial polyps is done through hysteroscopic polypectomy which is considered the most optimal treatment of endometrial polyps [7], also through Dilatation and curettage (D&C) however there is a potential for polyps to be missed due to their mobility [6].

The purpose of our study is to evaluate the diagnostic performance and the accuracy of Colour Doppler and saline infusion sonohysterography in diagnosis of endometrial polyps and comparing them with hysteroscopy & biopsy.

### Material and Methods

*Study population:* A prospective study was conducted in the Radiology Department in Ain Shams University Hospital. The study was performed in 8-month period from March 2021 till October 2021, including 34 consecutive women patients aged from 28 to 55 years, with gynecological symptoms of menorrhagia, metrorrhagia and infertility. All patients included in the study were subjected to both transvaginal color Doppler sonography, saline infusion sonohysterography in the radiodiagnosis department and then patients is scheduled for hysteroscopic biopsy in early cancer detection & Gyn Endoscopy unit, Maternity Hospital, Ain Shams University.

Exclusion criteria included any patient not diagnosed with uterine polyp on grey scale U/S, patients with genital tract infection, pregnant women, women in late menstrual phase, intrauterine device, women with cervical stenosis or patulous os and women with endometrial cancer.

*Transvaginal color Doppler Ultrasound:* An informed verbal consent was obtained after explaining the procedure to the patient.

Examination was performed with the patient in a lithotomy position. All scans will be performed using the US scanner (LOGIQ P5 MACHINE) in two perpendicular planes with high-frequency trans-vaginal transducers. Grey scale and colour

Doppler will be performed to confirm diagnosis by visualization of pedicle vascularity.

*Saline infusion sonohysterography:* Non-steroidal anti-inflammatory drug (NSAIDs) as ibuprofen (400mg) is administrated half an hour before the examination, the patient lies in lithotomy position and vaginal speculum is introduced then vagina is painted with antiseptic solution, the upper cervical lip is grasped with a vulsellum.

A silicone Foley catheter of gauge 10-16 (according to size of cervical canal) is flushed with saline to get rid of air then introduced through the internal os then bulb is inflated with 3ml of normal saline (or Intra-uterine insemination IUI catheter used to avoid balloon painful sensation), then speculum and vulsellum is removed.

Trans-vaginal probe is introduced, and 50ml of warm sterile saline is infused slowly to distend the endometrium cavity under real time guidance, uterine images and findings are noted by specialized radiologist, at the end of the examination the bulb is emptied, and catheter removed, after evaluating the endometrial cavity for thickness, irregularities, or lesions (polyps).

*Statistical analysis:* Statistical analysis was conducted using SPSS 22nd edition, numeric variables as age was presented in mean  $\pm$  SD. Categorical data were presented in frequency and percentages, paired comparison of diagnostic modalities was conducted using McNemar test. Sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy were calculated using 2X2 contingency tables. Any  $p$ -value  $<0.05$  was considered significant.

### Results

A total of 34 females were include in our final analysis, they had a mean age  $38.6 \pm$  SD 5.7 years old range from 28 to 55 years old. Among the included patients 52.9% complained of menorrhagia, while 50% complained of metrorrhagia and 50% complained of primary or secondary infertility. Colored doppler findings among the included patients showed positive single feeding vessel findings in 55.9% while 44.1 % had negative doppler findings.

Sonohystrography revealed positive results in diagnosis of endometraial polyps among 88.2% of the cases while 11.8% were negative from any abnormal finding.

Histopathology examination of the obtained specimens showed that 33 (97.1%) had endometrial

polyps, while 4 (11.8%) had endometrial hyperplasia, 6 (17.6%) had endometritis, 2 (5.9%) had fibroids, 2 (5.9%) had adenomyosis.

Paired comparison between Histopathology findings of endometrial polyps and color doppler findings showed that there was a statistically significant difference between histopathology results and color doppler findings with *p*-value 0.441.

Color doppler had a sensitivity 57.6% in detection of endometrial polyps, specificity 100.0%, PPV 100.0%, NPV 6.7% and overall diagnostic accuracy 58.82%.

Paired comparison between Histopathology findings of endometrial polyps and sonohysterography findings showed that there was concordance between histopathology results and sonohysterography findings with *p*-value 0.005.

Sonohysterography had a sensitivity 90.9% in detection of endometrial polyps, specificity 100%, PPV 100%, NPV 25% and overall diagnostic accuracy 91.17%.

The figure showed high concordance between histopathology findings and sono-hystrography, as positive results was 88.2% in sono-hysterography versus 55.9% in the color doppler versus 97.1% in histopathology examinations.



Fig. (1): TVCD showing feeding vessel for endometrial polyp.



Fig. (2): Saline infusion sono-hysterography showing broad based polyp with a wide attachment to the endometrium.

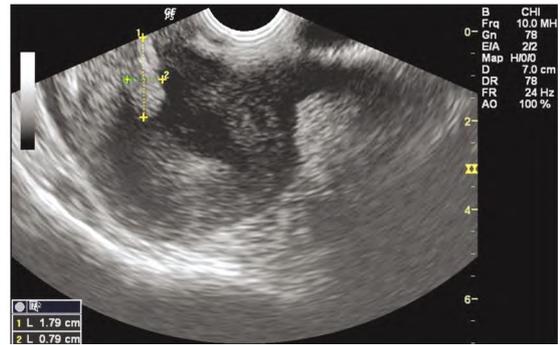


Fig. (3): SHG shows hyperechoic overgrowth attached to the inner wall of uterus that extent to the uterine cavity.

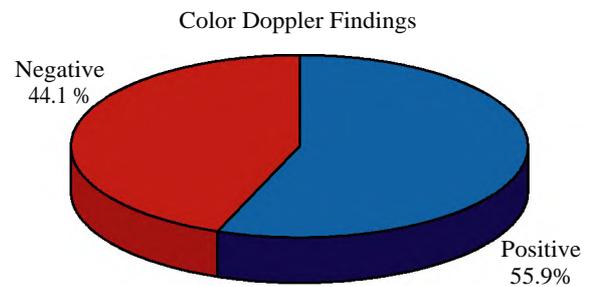


Fig. (4): Pie chart showing findings of color doppler among the included patients.

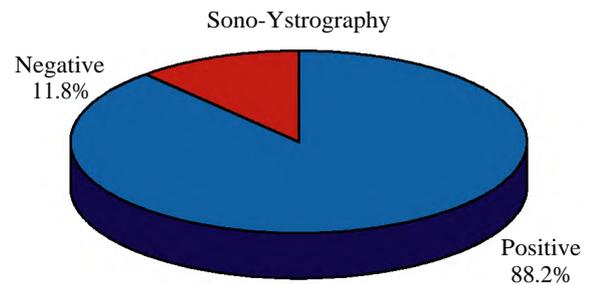


Fig. (5): Pie chart showing findings of sono-hystrography among the included patients.

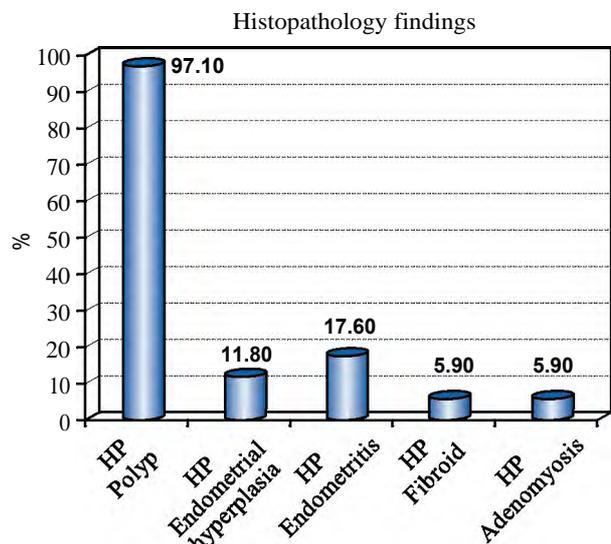


Fig. (6): Bar chart showing Histopathology findings among the included patients.

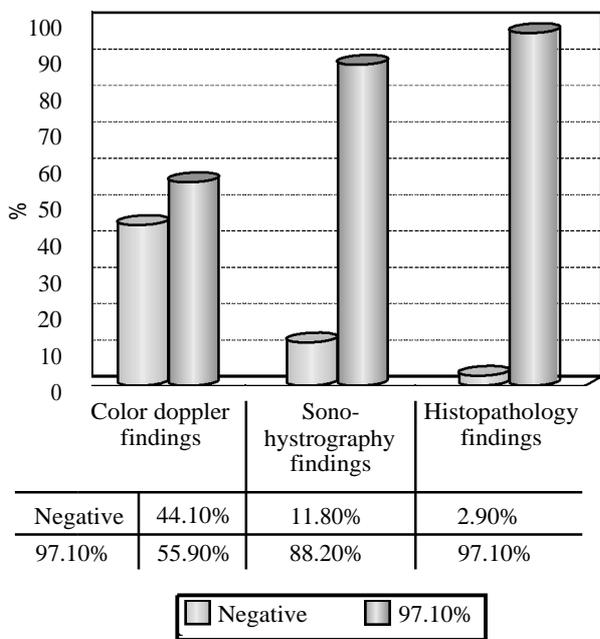


Fig. (7): Bar chart showing findings of imaging modalities and histopathology findings.

**Discussion**

Histological examination is still the gold standard for uterine cavity pathologies such as endometrial polyps. The evaluation of abnormal uterine bleeding is traditionally based on histological diagnosis, established either with dilatation and curettage or endometrial biopsy. However, these diagnostic procedures are invasive, and they may not detect all of the endometrial abnormalities if performed alone [2].

Transvaginal sonographic measurement of endometrial thickness has been shown to be useful method for detecting endometrial disease. However, increased endometrial thickness is not a specific finding and may be caused by several conditions, such as endometrial polyps, hyperplasia, and cancer.

Transvaginal color Doppler sonography allows assessment of endometrial vascularization. Recent reports have shown that endometrial polyps exhibit specific vascular patterns on color flow mapping [10].

This study was conducted on total of 34 females were include in our final analysis, they had a mean age  $38.6 \pm SD 5.7$  years old range from 28 to 55 years old.

There were 18 patients (52.9%) presented with menorrhagia as one of the symptoms, 17 patients (50%) presented with metrorrhagia as one of the symptoms and 17 patients (50.0%) presented with infertility as one of the symptoms.

According to our study, menorrhagia should be considered the most common symptom among clinical presentation of endometrial polyp's patients with incidence of 52.9% which comes against a study by Alcázar et al., [10] who stated that 47% of the patients were asymptomatic.

SHG is a relatively inexpensive procedure that can be easily performed with no need for special skill. It provides a reliable diagnosis in the detection of endometrial polyps over TVS. However, hysteroscopy and endoscopic biopsies remain the decisive diagnostic tests.

SHG was described to be a simple, safe, accurate and cost-effective technique for detecting endometrial abnormalities [8].

Sono-hystrography in our study revealed positive results for endometrial polyps in 88.2% of the cases with accuracy 91.17% which comes in line with a study by Alcázar et al., [10] which reported SHG accuracy 96% while a study by Kamel et al., [8] reported diagnostic accuracy for SHG 93.3%.

Our study in Sonohystrography had a sensitivity 90.9% in detection of endometrial polys, specificity 100%, PPV 100%, NPV 25% in line with Romano et al., [13] in which their study reported a sensitivity, specificity, positive and negative predictive value of 95%, 100%, 100% and 94% respectively, for SHG in detecting endometrial abnormalities including polyps.

In study for Kaveh et al., [2] found that saline infusion sono-hysterography (SISH) has a sensitivity of 87.9% and a specificity of 92.2% in the detection of endometrial polyps, results were consistent with the previous systematic review conducted in Vroom et al., [11] which reported a sensitivity of 86.5% and specificity of 91.1% for SISH in diagnosis of endometrial polyps.

In our study trans-vaginal color Doppler (TVCD) revealed positive findings for single feeding vessel in 19 cases out of 34 with 55.9% with sensitivity 57.6% in detection of endometrial polys, specificity 100.0%, PPV 100.0%, NPV 6.7% and overall diagnostic accuracy 58.82%.

A study by Talaat et al., [12] by concluded that the pedicle artery sign has 94% sensitivity 100% specificity.

Cogendez et al., [13] have studied the sensitivity, specificity, and positive and negative predictive values of the single vessel pattern in diagnosing endometrial polyps were 80, 100, 100, and 69.2%, respectively.

However, provided that the only way to rule out the risk of malignancy is through hysteroscopy and biopsy, SISH can be used as a method to stratify patients with abnormal uterine bleeding (AUB) to go for more diagnostic work up and treatment with hysteroscopy. Nevertheless, hysteroscopy is an exceptionally sensitive method, allowing the exclusion of intracavitary pathology as well as treatment in the same sitting with proper tissue biopsy from the abnormal area, which can be of help in proper treatment planning.

Hysteroscopy was superior to both trans-vaginal color Doppler and sono-hystero-graphy regarding discriminating between polyps and other endometrial lesions. We calculated 97.1% positive results among the cases for hysteroscopy for diagnosis of endometrial polyps nearly like Kaveh et al., [2] study which calculated a 0.92 (95% CI: 0.89-0.94) sensitivity and a specificity of 0.85 (95% CI: 0.81-0.88) for hysteroscopy.

This study used histological diagnosis as the gold standard and assessed the accuracy of trans-vaginal color Doppler and saline infusion sono-hystero-graphy in predicting endometrial polyps.

Histopathology examination of the obtained hysteroscopic specimens showed that 33 (97.1%) of cases had endometrial polyps, while 4 (11.8%) had endometrial hyperplasia, 6 (17.6%) had endometritis, 2 (5.9%) had fibroids and 2 (5.9%) had adenomyosis.

Our study showed that there was concordance between histopathology results and sonohystero-graphy findings with  $p$ -value 0.005.

A study performed by Cepni et al., [14] showed a sensitivity of 94% and a specificity of 58% for hysteroscopic diagnosis of endometrial polyps.

Our study showed high concordance between histopathology findings and sono-hystero-graphy, as positive results was 88.2% in sono-hystero-graphy versus 55.9% in the color doppler versus 97.1% in histopathology examinations.

#### Conclusion:

As per our results, color doppler findings of endometrial polyps and sono-hystero-graphy findings showed that there was a significant difference between color doppler results and sono-hystero-graphy findings while there was high concordance between histopathology results and sono-hystero-graphy findings.

Which prove the superiority of sonohystero-graphy over color Doppler sonography in diagnosis of uterine polyps.

Sono-hystero-graphy results closely correspond to those obtained in a hysteroscopic examination combined with histopathological analysis.

*Competing interests:* Not applicable, the authors have no conflicts of interest to declare.

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#### References

- 1- ÇİL A.S., BOZKURT M., KARA D. and GULER B.: Giant endometrial polyp protruding from the external cervical os in a postmenopausal woman: Magnetic resonance imaging and hysteroscopic findings. *Proceedings in Obstetrics and Gynecology*, 3 (3): 1-9, 2013.
- 2- KAVEH M., SADEGI K., SALARZAEI M. and PAROOEI F.: Comparison of diagnostic accuracy of saline infusion sonohystero-graphy, transvaginal sonography, and hysteroscopy in evaluating the endometrial polyps in women with abnormal uterine bleeding: A systematic review and meta-analysis. *Wideochirurgia I Inne Tech. Maloinwazyjne*, 15: 403-415, 2020.
- 3- HASE S., MITSUMORI A. and INAI R.: Endometrial polyps: MR imaging features. *Acta. Med. Okayama.*, 66 (6): 475-485, 2012.
- 4- HINCKLEY M.D. and MILKI A.A.: 1000 Office-Based Hysteroscopies Prior To In vitro Fertilization: Feasibility and Findings. *JSLs*, 8: 103-107, 2004.
- 5- AL CHAMI A. and SARIDOGAN E.: Endometrial Polyps and Subfertility. *J. Obstet. Gynecol. India*, 67: 9-14, 2017.
- 6- NIJKANG N.P., ANDERSON L., MARKHAM R. and MANCONI F.: Endometrial polyps: Pathogenesis, sequelae and treatment. *SAGE Open Med.*, 7: 205031211984824, 2019.
- 7- AMREEN S., SINGH M., CHOH N.A., SALDANHA C. and GOJWARI T.A.: Doppler evaluation of endometrial polyps. *Egypt. J. Radiol. Nucl. Med.*, 49: 850-853, 2018.
- 8- KAMEL H.S., DARWISH A.M. and MOHAMED S.A.: Comparison of transvaginal ultrasonography and vaginal sonohystero-graphy in the detection of endometrial polyps. *Acta obstetricia et gynecologica Scandinavica*, 79 (1): 60-4, 2000.
- 9- AHMED S.A., EL TAIEB H.A. and ABOTALEB H.: Diagnostic performance of sonohystero-graphy and MRI diffusion in benign endometrial lesion characterization. *The Egyptian Journal of Radiology and Nuclear Medicine*, 49 (2): 579-89, 2018.
- 10- ALCÁZAR J.L., CASTILLO G., MÍNGUEZ J.A. and GALÁN M.J.: Endometrial blood flow mapping using transvaginal power Doppler sonography in women with post- menopausal bleeding and thickened endometrium. *Ultrasound Obstet. Gynecol.*, 21: 583-588, 2003.
- 11- VROOM A.J., TIMMERMANS A. and BONGERS M.Y.: Diagnostic accuracy of saline contrast sonohystero-graphy

- in detecting endometrial polyps in women with postmenopausal bleeding: Systematic review and meta-analysis. *Ultrasound Obstet. Gynecol.*, 54: 28-34, 2019.
- 12- TALAAT S., MOSTAFA N. and ALRAUOF M.A.B.D.: Diagnostic value of ultrasound and colour doppler in endometrial and cervical polyps. *Med. J. Cairo Univ.*, 77: 397-403, 2009.
- 13- COGENDEZ E., EKEN M.K. and BAKAL N.: The role of transvaginal power Doppler ultrasound in the differential diagnosis of benign intrauterine focal lesions. *J. Med. Ultrason*, 42: 533-40, 2015.
- 14- CEPNI I., OCAL P., ERKAN S., SARICALI F.S., AKBAS H. and DEMIRKIRAN F.: Comparison of transvaginal sonography, saline infusion sonography and hysteroscopy in the evaluation of uterine cavity pathologies. *Aust. N. Z. J. Obstet. Gynaecol.*, 45 (1): 30-5, 2005.

## دور الموجات الصوتية والدوبلر المهبلية باستخدام محلول فى تقييم مرض الزوائد اللحمية فى الرحم

الزوائد اللحمية فى الرحم هى النمو الغير طبيعى لبطانة الرحم. وهى تعد من أكثر الاكتشافات المرضية التى تم ملاحظاتها فى الرحم. قد يأتى بعض المرضى بدون أعراض والبعض الآخر قد يعانون من نزيفاً غزيراً فى الدورة الشهرية، أو نزيفاً مهبلياً بعد انقطاع الطمث. يمكن تشخيص الزوائد اللحمية فى الرحم من خلال عدة فحوصات منها: فحص الموجات فوق الصوتية عن طريق المهبل وهى تعد من الفحوصات المبدئية لتشخيص أمراض بطانة الرحم، استخدام الدوبلر لتوضيح الشريان المغذى للزائدة اللحمية، فحص تدفق محلول الملح عن طريق الموجات الصوتية وهو يعد أكثر دقة من استخدام الموجات الصوتية فقط، فحص الرنين المغناطيسى فهو أكثر جودة وخاصة فى حالات ضيق عنق الرحم أو المهبل، ويعتبر استخدام المنظار الرحمى وأخذ عينة من الزائدة اللحمية الفحص الأساسى فى التشخيص. تم إجراء دراسة على نحو ٣٥ مريضة تتراوح أعمارهم من ٢٨ إلى ٥٥ عاماً تم تحويلهم من قسم النساء والعيادات الخارجية إلى قسم الاشعة التشخيصية بمستشفى عين شمس لإجراء فحص الموجات الصوتية والدوبلر المهبلية باستخدام محلول الملح تم توجيههم لوحده الكشف المبكر عن الأورام لحمل منظار وعينه رحمية. أظهرت الدراسة أن من بين المرضى المشمولين، اشتكى ٥٢.٩% من غزارة الطمث، بينما اشتكى ٥٠% من الزيف الرحمى فى الفترات بين الدورات الشهرية واشتكى ٥٠% من العقم. أيضاً أن نسبة تشخيص الزوائد اللحمية الرحمية بالدوبلر المهبلية هى ٥٥.٩% من نسبة الحالات، بينما أظهر التشخيص بالموجات الوصية المهبلية عن طريق تدفق محلول الملح نسبة ٨٨.٢%، فى حين أن نتائج عينات المنظار الرحمى ظهرت بنسبة ٩٧.١%. ومن هنا، تشير الدراسة أن النتائج التى تم الحصول عليها من خلال فحص الموجات الصوتية المهبلية باستخدام محلول الملح يمكن الاعتماد عليها فى تقييم مرض الزوائد اللحمية الرحمية. كما يمكن استخدام هذا الفتح لمتابعة المرضى وتقييم تطور المرض ودرجا استجابهم للعلاج.