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EC GYNAECOLOGY
Research Article

Comparison of Saline Infusion Sonohysterography and Transvaginal Ultrasound in Detection of Endometrial Polyps

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Received: April 17, 2018; **Published:** June 27, 2018

Abstract

Objective: The purpose of this study was to assess the accuracy of transvaginal ultrasound (TVS) to visualize endometrial polyps diagnosed on saline infusion sonohysterography (SIS). Various characteristics were assessed to determine whether they influenced the detection of polyps on TVS.

Methods: This study selected 1000 consecutive patients with polyps on SIS who also had preliminary TVS. Characteristics assessed included: patient age, polyp size and location, the number of polyps, submucosal and intramural fibroids, presence of Doppler flow to the polyp, abnormal bleeding, endometrial thickness and the presence of adenomyosis or ultrasound diagnosis of polycystic ovaries. The Pearson's chi-square test for independence and T-tests for independent samples were used to compare the samples.

Results: 54.1% of patients with polyps diagnosed on SIS had polyps on TVS. The size of the polyp, multiple polyps, absence of submucosal fibroids, polyp location (fundal), and blood flow to the polyp were significantly associated with detection of a polyp on preliminary TVS ($P < 0.05$). Age was found to be a significant factor; the polyps of younger women were missed more often on the TVS study ($t = -2.18$, $df = 998$, $p = 0.03$).

Conclusions: Almost half of endometrial polyps seen on SIS were missed on TVS. Factors associated with missed polyp detection included smaller size, single polyp, submucosal fibroids, non-fundal location, younger age and reduced or absent Doppler flow to the polyp. These results have implications for the management of both abnormal uterine bleeding and infertility.

Keywords: *Abnormal Uterine Bleeding; Endometrial Polyps; Infertility; Sonohysterogram; Ultrasound; Diagnosis*

Abbreviations

AUB: Abnormal Uterine Bleeding; TVS: Transvaginal Ultrasound; SIS: Saline Infusion Sonohysterography; PCO: Polycystic Ovaries; DH: Diagnostic Hysteroscopy

Introduction

Diagnostic imaging studies help to provide important information during the investigation and management of common gynecologic problems including postmenopausal bleeding, premenopausal abnormal uterine bleeding (AUB), pelvic pain and infertility. AUB is often attributed to neoplasms of the uterus, including uterine polpys and leiomyomas, usually diagnosed by medical imaging studies [1,2]. In infertility patients, imaging can be used to detect relevant conditions such as endometrial polyps and leiomyomas, as well as uterine synechiae and fallopian tubal patency [3].

Non-invasive imaging investigations for these gynecological issues include transvaginal ultrasound (TVS) and saline infusion sonohysterography (SIS). However, TVS can be suboptimal in detecting endometrial pathology [4,5]. Traditionally, it has been felt that the gold standard for the investigation of endometrial pathology was diagnostic hysteroscopy (DH) [6]. Yet, DH often occurs in the operating theater under general anesthetic or IV sedation and involves risks including uterine perforation, intraperitoneal injury, fluid and electrolyte issues, infection and anesthetic risks. Also, DH is more time-consuming and costly than imaging studies [7]. In terms of the non-invasive methods, recent studies have suggested that the SIS is more sensitive than the TVS and specific in terms of endometrial pathology [8,9]. The objective of this study was to assess the accuracy of TVS to visualize endometrial polyps diagnosed on SIS. This was achieved using a blinded retrospective case series.

Materials and Methods

Our patient population consisted of 1,000 consecutive patients diagnosed with endometrial polyps on SIS. All of these patients also had preliminary transvaginal US within 48 hours of the SIS for evaluation of AUB, infertility, or possible pathology from another imaging center. The studies were performed from January to July 2009 in the Toronto area at an academically oriented private practice. For the SIS, the patient was placed in the dorsal lithotomy position with stirrups. The cervix was visualized using a plastic bivalve vaginal speculum. The vagina was then cleaned using 0.05% chlorhexidine gluconate and the cervix was cannulated with a 5 French balloon-tipped Batrik H/S catheter (Surgmed, Dorval, Quebec, Canada). The speculum was removed following inflation of the balloon within the cervical canal. Up to 6 mL of sterile saline was used to distend the endometrial cavity and the study was completed.

The transvaginal US studies were completed by experienced sonographers using the GE Voluson 730 Experts, the Voluson E6 and the Logic P5 machines. All SIS were performed by a radiologist (A.H.) with extensive experience with the procedure. The radiologist was blinded to the results of the preliminary TVS. Important factors that were included in the analysis were: patient age, the size of polyp, the number of polyps, the presence of submucosal or intramural fibroids, adenomyosis, polyp location (i.e. fundus vs. non-fundus), Doppler flow to the polyp, AUB, endometrial thickness, ultrasound diagnosis of polycystic ovaries (PCO) and fertility status (i.e. infertility case vs. non-infertility case). The statistical analysis included the Pearson's chi-square test for independence and independent sample T-tests. Significance was defined using an alpha level of $p < 0.05$. This study was approved by the True North Imaging Internal Research Ethics Board (IRB). Each participant consented to the procedures mentioned.

Results

Of the 1000 patients with confirmed polyps on SIS, 651 women were being investigated for AUB or postmenopausal bleeding, 170 women for infertility and the remaining 179 for workup of a potential intracavitary abnormality noted at another ultrasound center. Only 54.1% of the 1,000 patients (n = 541) had a polyp seen on the preliminary TVS study. An example of a case where the polyp was missed on TVS is shown in figure 1. Chi-square tests of independence were performed to determine which factors where associated with detection of a polyp on the preliminary TVS. There were several factors that appeared to significantly influence whether or not the polyp was detected on the US study.

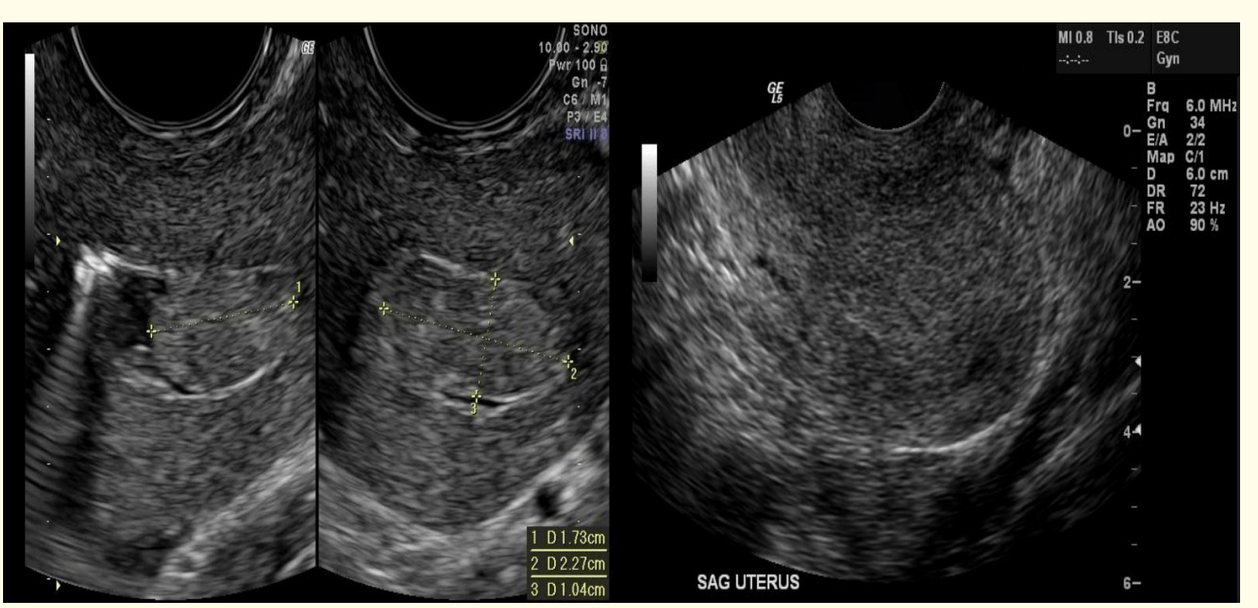

Figure 1: *Endometrial poly detected on SIS (left) that was missed on TVS (right).*

Of the 170 patients experiencing infertility and found to have a polyp on SIS, 52.9% (N = 90) were missed by TVS. Of the polyps seen on SIS, 429 were less than 1cm in size; 56.1% (n = 241) of polyps in this size category were not detected by US. Of the polyps that were 1 - 2 cm in size (n = 511), 40.7% of them were not seen on the US study. Most of the polyps that were > 2cm were detected by the transvaginal US (83.3%).

The location of the polyp was also a significant factor. When the polyp was located at the uterine fundus (N = 717), it was more likely to have been detected (63.7%) on TVS, as compared to non-fundal location (29.7% detected). Other factors found to be significantly related to detection of polyps on preliminary TVS included: multiple polyps, the absence of submucosal leiomyomas, and the presence of Doppler flow to the polyp ($p < 0.05$). However, the presence of intramural leiomyomas, abnormal uterine bleeding, adenomyosis or PCO on ultrasound were not found to significantly affect polyp detection rates on the TVS.

Independent samples T-tests were performed to compare the mean age and the mean endometrial thickness of patients whose polyp was detected on preliminary TVS to those whose polyp was missed. The mean age was significantly different between the two groups, with older age being associated with a higher detection rate on TVS ($T = -2.18$, $df = 998$, $p = 0.03$). There was no significant difference in mean endometrial thickness ($T = 1.70$, $df = 998$, $p = 0.09$).

Discussion

TVS is used widely for evaluation of uterine and endometrial pathology and is often utilized in deciding how to manage important gynaecological issues such as AUB and infertility. Our results show that almost half of the endometrial polyps seen on SIS were missed on TVS. Larger polyps, fundal location, not having a history of infertility and older age were more predictive of detection on prior TVS.

Since the prevalence rates of AUB in North America range from 10 - 30% [10], optimal management will benefit a large proportion of women. It has been suggested that 30 - 34% of AUB is attributable to the presence of endometrial polyps [11,12], which makes accurate diagnosis important. In women with AUB in this study (n = 651), the TVS failed to detect the presence of a polyp in 46.5%. By underdiagnosing endometrial polyps without SIS, patients may be exposed to greater morbidity from unnecessary procedures to manage AUB or may continue to suffer from untreated AUB since the cause has been missed. A meta-analysis of studies evaluating the uterine cavity in AUB patients reported that the pooled sensitivity and specificity of SIS were 95% and 88%, respectively [13]. Since all subjects in the current study were found to have polyps on SIS, we cannot discuss the specificity of the SIS or TVS at this time. However, we can suggest that the SIS was more sensitive in the detection of polyps. It has been demonstrated by other studies that the TVS is less sensitive and specific compared to the SIS in evaluating the endometrial cavity [5,14,15]. It has been suggested that the SIS should be used in conjunction with the TVS to complete the diagnostic work-up when intracavitary masses are suspected [9], which is supported by the current study.

The presence of endometrial polyps has a demonstrated role in infertility [16,17]. The prevalence of polyps in women experiencing infertility ranges from 5-13% and may affect implantation of the embryo [12,18]. In the current study, 53% of polyps confirmed by SIS in infertile women were missed by the TVS. When intrauterine insemination is utilized, the removal of polyps may lead to a doubling in pregnancy rates [19]. A recent cost-benefit analyses demonstrated that the removal of uterine polyps was beneficial if performed prior to intrauterine insemination or *in vitro* fertilization [20]. A molecular mechanism has been identified as a putative mechanism to explain why polyps negatively influence uterine receptivity, thereby supporting the need for removal when fertility is desired [17]. The accurate identification of uterine pathology which may impair fertility in women of reproductive age is imperative for achieving pregnancy. Since infertility treatments can be quite demanding, financially, physically and emotionally, the optimization of reproductive conditions prior to fertility procedures is of paramount importance.

Another important consideration in the diagnosis of endometrial polyps is the potential for malignant and premalignant conditions. Accurate detection is essential in this case to allow for earlier diagnosis and treatment, and perhaps could have prognostic implications. A large meta-analysis illustrated that 5.42% of polyps in postmenopausal women had endometrial neoplasia, as did 1.70% of polyps in

premenopausal women. This review also showed that AUB was a significant risk factor for neoplasia in a polyp, with 4.15% of women with AUB having neoplastic polyps, compared to 2.16% in those without AUB [17]. Earlier intervention following thorough investigations involving SIS would help decrease the associated morbidity and mortality.

We have identified multiple factors that may influence whether the polyp is detected on TVS, which may help to guide the clinician when deciding which test to order. Important characteristics associated with failed detection on the TVS included polyp size ≤ 2 cm, the presence of a submucosal fibroid, non-fundal location and reduced Doppler flow to the polyp. The TVS detected most polyps larger than 2.0 cm in the current study. However, an increased risk for malignant transformation has been identified in polyps greater than 1.0cm and diagnostic opportunity may be missed in those polyps measuring in the 1.0 - 2.0 cm range [21]. Furthermore, knowing the location of the polyp (i.e. non-fundal) is helpful when further intervention such as hysteroscopy is needed. In the management of polyps and fibroids, it has been observed that the location and degree of projection into the cavity is consistent 98% of the time between SIS and hysteroscopy [22,23].

Conclusion

In conclusion, a large proportion of endometrial polyps seen on SIS were missed on TVS. To our knowledge, this is the largest investigation comparing radiologic diagnostic testing methods of endometrial polyps. These results have implications for the management of both abnormal uterine bleeding and infertility. Although pathological diagnosis using tissue obtained from hysteroscopy remains imperative, the information obtained from a SIS can help to determine when the hysteroscopy is required.

Financial Support

None.

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Volume 7 Issue 7 July 2018