ORIGINAL RESEARCH ARTICLE

Diponegoro International Medical Journal 2022 December, Vol 3, No.2: 54 - 60
e-ISSN: 2745-5815

Comparison of Saline Infusion Sonohisterography (SIS) and Histeroscopy Examination in Abnormal Uterine Bleeding

Aphdika Kristian[1*], Hary Tjahjanto[2]

1.Department of Obstetrics and Gynecology, Faculty of Medicine, Diponegoro University / Dr Kariadi General Hospital, Semarang
2.Staff Department of Obstetrics and Gynecology, Faculty of Medicine, Diponegoro University / Dr Kariadi General Hospital, Semarang

Keywords:

Abnormal Uterine Bleeding
Saline Infusion Sonohysterography
Hysteroscopy

*) Correspondence to:
apdhikakristianog@gmail.com

Article history:

Received 06-08-2022
Accepted 19-09-2022
Available online 30-12-2022

ABSTRACT

Background: Abnormal uterine bleeding (AUB) is bleeding from the uterus that is longer than usual or that occurs at an irregular time, affecting 20% of the adolescent age group, and 50% of women aged 40-50 years in Indonesia. The causes of AUB are pregnancy, anovulatory dysfunction, uterine leiomyoma, endometrial polyps, endometrial hyperplasia, or endometrial carcinoma. This study aims to compare the accuracy of Saline Infusion Sonohysterography (SIS), hysteroscopy and endometrial histopathology in determining pathological abnormalities in women with AUB.
Objective:. This cross sectional diagnostic study was conducted at General Hospital dr. Kariadi Semarang and its network hospitals in June 2020. Samples were determined by consecutive sampling, including married women, not pregnant, had no genital infection and did not present with any malignancy. Histopathological examination of the endometrium is the gold standard for AUB diagnosis. Research data were obtained from secondary data from patient's medical records including demographic characteristics, clinical history, pregnancy history, SIS examination data, hysteroscopy and endometrial histopathology.
Methods: There were 51 subjects with a mean age of 31.67 ± 5.21 years. The most common complaints were intermenstrual bleeding (37.3%), followed by irregular menstrual bleeding (21.6%), heavy menstrual bleeding (13.7%), and amenorrhea (5.9%). Sensitivity value of SIS examination ranged from 81.5-100% and specificity ranged from 30.77-100%. Hysteroscopy has a sensitivity value range of 87.5-98% and a specificity value of 62.5-100%.
Results: SIS examination could be an alternative for endometrial structural abnormalities diagnosis in AUB if hysteroscopy is unavailable.
Conclusion: Anxiety that were experienced by the elderly has been shown to be related to medical adherence during the COVID-19 pandemic

DIMJ, 2022, 3(2), 54-60 DOI: https://doi.org/10.15412/dimj.v3i2.15412

1. Introduction

Abnormal uterine bleeding (AUB) is a condition of bleeding from the birth canal that describes any variety of symptom from a normal menstruation (in terms of frequency, regularity, duration or volume) and includes intermenstrual bleeding.1,2 AUB is a common clinical problem, affects up to 14% of women during their reproductive years and impairs their quality of life by creating significant physical, emotional, sexual, social and material burdens.3,4 Patients need to be clinically categorized as premenopausal, perimenopausal, or postmenopausal. The most common cause of AUB other than pregnancy in premenopausal women is due to anovulatory dysfunction.5 The prevalence of abnormal uterine bleeding in Indonesia has not been reported with certainty. AUB is known to occur about 20% in the adolescent age group, and 50% in the age group of 40-50 years.3

The International Federation of Gynecology and Obstetrics (FIGO) classifies AUB based on structural etiology such as polyps, adenomyosis, leiomyoma, malignancy and hyperplasia as well as non-structural disorders consisting of coagulopathy disorders, ovulatory dysfunction, endometrial, iatrogenic and unclassified groups.1

Saline infusion sonohysterography (SIS) is an additional examination to transvaginal ultrasound that is useful for endometrial cavity evaluation. This procedure is also known as hysterosonography, saline contrast sonohysterography, and sonohysterography. This test inserts sterile saline into the endometrial

cavity through a small catheter. The resulting distention of the endometrial cavity helps to outline any irregularities, deformities, or growths that may be present in the endometrium.6

Hysteroscopy is a powerful tool for diagnosing and treating pathology in the uterine cavity.7 Indications for diagnostic hysteroscopy includes AUB, suspicious lesions or foreign bodies involving the endometrial cavity, or post-treatment follow-up. Diagnostic hysteroscopy should be performed in the proliferative phase of the menstrual cycle for women of reproductive age, and targeted biopsies can be performed whenever necessary. However, known pregnancies as well as genital tract infections, such as pelvic inflammatory disease (PID), pyometra, and active human papillomavirus infection, are contraindications for hysteroscopy.8

Histopathological examination of the endometrium is still the diagnostic standard for clinical diagnosis of endometrial pathology by assessing endometrial biopsy material under a light microscope.9 The aim of this study was to compare the accuracy of Saline Infusion Sonohysterography (SIS), hysteroscopy and endometrial histopathology in establishing pathological abnormalities in women with abnormal uterine bleeding.

2. Methods

This diagnostic cross sectional research design was conducted at the General Hospital at dr. Kariadi Semarang and its network hospitals in June 2020. The study sample was determined by consecutive sampling, namely women who were married, not pregnant, had no genital infection and did present with malignancy. Histopathological examination of the endometrium is the standard for the diagnosis of AUB. The research data was obtained from secondary data from the patient's medical records including demographic characteristics, clinical history, pregnancy history, SIS examination data, hysteroscopy and endometrial histopathology.

Table 1. Subject characteristics

Variable	Frequency/ Mean
Age (years)	31,67 ± 5,21
Height (cm)	156,98 ± 5,49
Weight	61,69 ± 5,49
Normoweight	40
Overweight	6
Obesity	5
Bleeding duration	61,69 ± 10,08
• <6 months	28 (54,9%)
• 6-12 months	14 (27,5%)
• 13-18 months	7 (13,7%)
• 19-24 months	2 (3,9%)
Bleeding complaints	
• Amenorrhea	3 (5,9%)
• *Heavy Menstrual Bleeding*	7 (13,7%)
• *Irregular Menstrual Bleeding*	11 (21,6%)
• *Intermenstrual Bleeding*	30 (58,8%)
Parity	
• Nullipara	32 (62,7%)
• Multipara	19 (37,3%)
Miscarriage history	
• Never	38 (74,5%)
• Once	6 (11,8%)
• More than once	7 (13,7%)
Birthing history	
• Pervaginam	18 (35,3%)
• Sectio Caesarea	12 (23,5%)
• Pervaginam dan Sectio Caesarea	6 (11,8%)
• Infertile	15 (29,4%)

All research data will be obtained with secondary data from medical records of patients who come with abnormal uterine bleeding who come to dr. Kariadi after obtaining a research permit. The data taken included demographic characteristics, clinical history, pregnancy history, SIS examination data, hysteroscopy and endometrial histopathology. SIS and hysteroscopy were performed by one obstetrician and gynecologist, specializing in fertility and endocrine who has performed SIS for 10 years and hysteroscopy for 5 years.

The data collected from the field is first entered into the Microsoft Office Excel file. Further data were processed using a statistical analysis computer program. Descriptive analysis in the form of patient characteristics is presented in the form of tables and diagrams. Categorical data is presented in the form of numbers and percentages. Diagnostic data will be analyzed with sensitivity, specificity, positive predictive value and negative predictive value in percentage

Table 2. Comparison of SIS and histopathological examination results with f endometrial polyp findings

		Histopathology		Total
		Polyp	Not Polyp	
SIS	**Polyp**	26	9	35
	Not Polip	4	12	16
	Total	30	21	51

Table 3. Comparison of SIS and histopathological examination results with uterine myoma findings

		Histopathology		Total
		Uterine Myoma	Not Uterine Myoma	
SIS	**Uterine Myoma**	4	1	5
	Not Uterine Myoma	3	43	46
	Total	7	44	51

Table 4. Comparison of SIS and histopathological examination results with malignancy and hyperplasia findings

		Histopathology		Total
		Hyperplasia	Not Hyplerplasia	
SIS	**Hyperplasia**	4	2	6
	Not Hyperplasia	4	41	45
	Total	8	43	51

Table 5. Comparison of hysteroscopy and histopathological examinations results with endometrial polyp findings

		Histopathology		Total
		Polyp	Not Polyp	
Histeroskopi	**Polyp**	30	2	32
	Not Polyp	0	19	19
	Total	30	21	51

Table 6. Comparison of hysteroscopy and histopathological examinations results with uterine myoma findings

		Histopathology		Total
		Uterine Myoma	Not Uterine Myoma	
Hysteroscopy	**Uterine Myoma**	7	1	8
	Not Uterine Myoma	0	43	43
	Total	7	44	51

Table 7. Comparison of hysteroscopy and histopathological examinations results with hyperplasia findings

		Histopathology		
		Hyperplasia	Not Hyperplasia	Total
Hysteroscopy	**Hyperplasia**	7	0	7
	Not Hyperplasia	1	43	44
	Total	8	43	51

Table 8. Comparison of SIS and hysteroscopy examination results with endometrial polyp findings

		Hysteroscopy		Total
		Polyp	Not Polyp	
Hysteroscopy	**Polyp**	32	4	36
	Not Polyp	0	15	15
	Total	32	19	51

Table 9. Comparison of SIS and hysteroscopy results with uterine myoma findings

		Hysteroscopy		Total
		Uterine Myoma	Not Uterine Myoma	
SIS	**Uterine Myoma**	4	1	5
	Not Uterine Myoma	4	42	46
	Total	8	43	51

Table 10. Comparison of SIS and hysteroscopy examinations results with hyperplasia findings

		Hysteroscopy		
		Hyperplasia	Not Hyperplasia	Total
SIS	**Hyperplasia**	6	0	6
	Not Hyperplasia	1	44	45
	Total	7	44	51

Table 11. Diagnostic test results of saline infusion sonohysterography and hysteroscopy compared with histopathology

Examination	Sensitivity	Specificity	PPV	NPV
Saline Infusion Sonohysterography				
• Polyp	86,67%	57,14%	74,29%	75%
• Leiomyoma	57,14%	97,92%	80%	93,48%
• Hyperplasia	50%	95,35%	66,67%	91,11%
Hysteroscopy				
• Polyp	100%	90,48%	93,75%	100%
• Leiomyoma	100%	97,73%	87,5%	100%
• Hyperplasia	87,5%	100%	100%	97,73%

Note: PPV=positive predictive value, NPV = negative predictive value

Table 12. Diagnostic test results of saline infusion sonohysterography compared with hysteroscopy.

Examination	Sensitivity	Specificity	PPV	NPV
• Polyp	100%	78,95%	88,89%	100%
• Leiomyoma	50%	97,67%	80%	91,30%
• Hyperplasia	85,71%	100%	100%	97,78%

3. Results

Our study included 51 subjects with AUB who had undergone SIS examination, hysteroscopic examination and standard examination with histopathology of endometrial tissue. Subject characteristics can be seen in Table 1. Comparison of the results of SIS examination and hysteroscopy and histopathology with the findings of endometrial polyps, uterine myomas, malignancy and hyperplasia, can be seen in Table 2-10. The value of sensitivity, specificity, positive predictive value and negative predictive value of each examination modality compared to tissue histopathology can be seen in Table 11-12.

4. Discussions

The results of our study on 51 productive age female subjects (18-60 years) with complaints of AUB showed that the mean age was 31.67 ± 5.21 years. The duration of complaints of abnormal bleeding was less than 6 months, followed by 6-12 months, 13-18 months and 19-24 months. Moradan et al showed the characteristics of uterine bleeding duration in 100 women which showed that most patients had self-examination especially in the period <6 months of complaints, some others came with complaints of 6-24 months or more.[10] Most cases of AUB are associated with anovulatory menstrual cycles, while adolescents and perimenopausal women is very susceptible to this condition. Approximately 20% of affected individuals were in the adolescent age group, and 50% of affected individuals were aged 40-50 years.[11,12]

Intermenstrual bleeding was the most common complaint of bleeding pattern from the birth canal in our study, followed by irregular menstrual bleeding, heavy menstrual bleeding and amenorrhea. Moradan et al showed that intermenstrual bleeding was the most common complaint by patients with abnormal uterine bleeding, followed by complaints of heavy menstrual bleeding and postmenopausal bleeding.[10] Intermenstrual bleeding is a complaint of irregular and frequent bleeding between menstrual cycles. Endometrial polyps respond variably to estrogen also progesterone and do not have the cyclical changes seen in the adjacent endometrium. Endometrial polyps may have bleeding symptoms in an irregular and intermenstrual pattern.[13]

Most of the subjects of this study had a history of giving birth with most women by normal vaginal delivery. A total of 29.4% of the research subjects were unmarried women or had infertility conditions. Sanam et al showed that the mean onset of abnormal bleeding was 44.27 ± 11.99 months at vaginal delivery compared to 38.62 ± 12.74 months at history of cesarean delivery. Anatomical causes and incidence of fibroids were also higher in the cesarean group. The second most common anatomic cause in the cesarean group is isthmocele. The incidence of hypomenorrhea in vaginal delivery is also higher and the duration of abnormal uterine bleeding is shorter after caesarean section.[14]

The results of saline infusion sonohysterography for diagnosing endometrial polyps were compared with tissue pathology in our study, with a sensitivity value of 86.67%, specificity of 57.14%, positive predictive value of 74.29% and negative predictive value of 75%. Moradan et al showed that SIS examination could detect endometrial polyps with a sensitivity of 75%, specificity of 87.5%, positive predictive value of 82.5% and negative predictive value of 81.7%. Moradan et al also showed that SIS examination could distinguish uterine polyps or myomas with a sensitivity value of 79.6%, specificity 89.1%, a positive predictive value of 89.6% and a negative predictive value of 78.8%.[10] Soguktas et al showed that SIS can distinguish polypoid lesions with a sensitivity of 64.7% and a sensitivity of 82.3%.[15]

Hysteroscopy compared with histopathological examination results in diagnosing polyp findings showed a sensitivity value of 100%, a specificity value of 90.48%, a positive predictive value of 93.75% and a negative predictive value of 100%. Moradan et al showed that hysteroscopy can diagnose endometrial polyps with 100% sensitivity, 94.6% specificity, 93.6% positive predictive value and 100% negative predictive value. Moradan et al also showed that hysteroscopy could differentiate the findings of endometrial polyps or uterine myomas with a sensitivity value of 100%, specificity of 95.7%, positive predictive value of 96.4% and negative predictive value of 100%. Soguktas et al showed that hysteroscopy could differentiate polypoid lesions with a sensitivity of 91.1%% and a sensitivity of 98.2%.[15]

SIS examination for diagnosing uterine myomas compared with histopathological examination in our study had a sensitivity value of 57.14%, specificity of 97.92%, positive predictive value of 80% and negative predictive value of 93.48%. Moradan et al showed that the diagnosis of uterine fibroids with SIS examination had a sensitivity value of 60%, specificity 97.8%, a positive predictive value of 75% and a negative predictive value of 95.6%.[10] Soguktas et al stated that the SIS examination can differentiate uterine myomas from submucosal types with a sensitivity and specificity value of 100%.[15]

Hysteroscopy showed a sensitivity value of 100%, a specificity value of 97.73%, a positive predictive value of 87.5% and a negative predictive value of 100% for diagnosing structural abnormalities of abnormal uterine bleeding in the form of uterine myomas compared with histopathological examination. Moradan et al showed that the diagnosis of uterine fibroids by hysteroscopy examination had a sensitivity value of 90%, specificity 100%, a positive predictive value of 100% and a negative predictive value of 98.9%. Soguktas et al stated that hysteroscopy examination can differentiate uterine myomas with submucosal

Published by Universitas Diponegoro.

Available online at: https://ejournal2.undip.ac.id/index.php/dimj

locations with a sensitivity and specificity value of 100%.[15]

The saline infusion sonohysterography examination in our study had a sensitivity value of 50%, specificity of 93.35%, a positive predictive value of 66.67% and a negative predictive value of 91.11% in diagnosing structural malignancies and hyperplasia in abnormal uterine bleeding compared to by histopathological examination. Soguktas et al showed that the diagnosis of endometrial hyperplasia with SIS examination had a sensitivity value of 85.7% and a sensitivity value of 96.3%. The diagnosis of endometrial carcinoma by SIS examination showed a sensitivity of 100% and a specificity of 96.6%.[15]

Hysteroscopy showed a sensitivity value of 87.5%, a specificity value of 100%, a positive predictive value of 100% and a negative predictive value of 97.73% for diagnosing structural abnormalities of abnormal uterine bleeding in the form of malignancy and hyperplasia compared with histopathological examination. Soguktas et al showed that the diagnosis of endometrial hyperplasia by hysteroscopy examination had a sensitivity value of 85.7% and a sensitivity value of 97.6%. The diagnosis of endometrial carcinoma by hysteroscopy examination showed a sensitivity of 100% and a specificity of 96.6%.[15]

The results of SIS examination compared with hysteroscopy findings showed a sensitivity value of 100% for polyps, 50% for uterine myomas and 85.71% for hyperplasia and malignancy in women. The SIS specificity value for hysteroscopy was found to be 78.95% for endometrial polyps, 97.67% for uterine myomas and 100% for hyperplasia or malignancy. Positive predictive values were found to be 88.89% for polyps, 80% for uterine myomas and 100% for hyperplasia or malignancy. Negative predictive values were found to be 100% for polyps, 91.30% for uterine myomas and 97.78% for hyperplasia or malignancy. El-Naser et al showed a diagnostic comparison between SIS examination and hysteroscopy showed that SIS had a sensitivity of 63.6%, specificity of 98.70%, positive predictive value of 87.5% and negative predictive value of 95% and an overall accuracy of 94.30% in the detection of endometrial polyps. SIS has advantages in diagnosing submucosal fibroid disorders with a sensitivity, specificity, positive predictive value and negative predictive value of 100%.[16]

Based on our findings and comparison with previous studies, the sensitivity value of SIS examination ranged from 81.5-100% and specificity ranged from 30.77-100%. Hysteroscopy examination has a sensitivity value range of 87.5-98% and a specificity value of 62.5-100%. Low sensitivity and specificity of SIS have been previously reported. Sonohysteroscopy failed to detect endometrial polyps in 30 of 105 patients. SIS can also detect blood clots and misdiagnosed it as endometrial polyps. Some investigators do not consider sonohysterography results to be sufficient evidence to confirm or rule out endometrial abnormalities.[17]

One of our limitations is that there were no cases with adenomyosis, either detected by SIS examination, hysteroscopy or tissue histopathology, so the results of this study did not fully explain the accuracy or diagnostic profile of SIS and hysteroscopy examinations in diagnosing abnormal uterine bleeding with structural abnormalities of adenomyosis. Our research also did not conduct a kappa test because the results of the examination were only carried out by one person, so it has the potential to cause examination bias.

5. Conclusion

Saline Infusion Sonohysterography (SIS) examination can be used as an alternative diagnostic test for endometrial structural abnormalities in abnormal uterine bleeding if hysteroscopy is not available. Further research needs to be carried out with at least two examinations to avoid bias in result interpretation.

Ethical Approval

All procedures have been approved by the issuance of ethical clearance

Conflicts of Interest

The authors declare that there was no conflict of interest.

Funding

No specific funding was provided for this article

Author Contributions

Conceptualization, AK, HT; methodology, AK, HT; writing—original draft preparation, AK, HT; writing—review and editing, AK, HT; visualization, AK, HT; supervision, AK, HT; project administration, HT

Acknowledgments

This research was supported by Dr. Kariadi General Hospital Center and Faculty of Medicine, Diponegoro University, Semarang.

References

1. Chodankar R, Critchley HOD. Abnormal

Available online at: https://ejournal2.undip.ac.id/index.php/dimj

uterine bleeding (including PALM COEIN classification). Obstet Gynaecol Reprod Med [Internet]. 2019;29(4):98–104. Available from: https://doi.org/10.1016/j.ogrm.2019.01.009
2. Bacon JL. Abnormal Uterine Bleeding: Current Classification and Clinical Management. Obstet Gynecol Clin North Am [Internet]. 2017;44(2):179–93. Available from: http://dx.doi.org/10.1016/j.ogc.2017.02.012
3. Fraser I, Langham S. Health-related quality of life and economic burden of abnormal uterine bleeding. Expert Rev Obs Gynecol. 2009;4:179–89.
4. Frick KD, Clark MA, Steinwachs DM, Langenberg P, Stovall D, Munro MG, et al. Financial and Quality-of-Life Burden of Dysfunctional Uterine Bleeding Among Women Agreeing To Obtain Surgical Treatment. Women's Heal Issues [Internet]. 2009;19(1):70–8. Available from: http://dx.doi.org/10.1016/j.whi.2008.07.002
5. Brasic N, Feldstein VA. Dysfunctional uterine bleeding: Diagnostic approach and therapeutic options. Ultrasound Clin [Internet]. 2010;5(2):245–56. Available from: http://dx.doi.org/10.1016/j.cult.2010.03.007
6. Ong CL. Saline Infusion Sonohysterography. Ultrasound Clin. 2007;2(1):121–32.
7. Armstrong S, Showell M, Stewart E, Rebar R, Vanderpoel S, Farquhar C. Baseline anatomical assessment of the uterus and ovaries in infertile women: a systematic review of the evidence on which assessment methods are the safest and most effective in terms of improving fertility outcomes. Hum Reprod Updat. 2017;23:533–47.
8. Deffieux X, Gauthier T, Menager N, Legendre G AA, Pierre F et al. Hysteroscopy: guidelines for clinical practice from the French college of gynaecologists and obstetricians. Eur J Obs Gynecol Reprod Biol. 2014;178(114–122).
9. Dangal G. A study of endometrium of patients with abnormal uterine bleeding at Chitwan valley. KUMJ. 2003;1:110–2.
10. Moradan S, Darzi SN, Ghorbani R. Diagnostic value of saline infusion sonohysterography for detecting endometrial focal lesion. Pan Afr Med J. 2019;33:1–8.
11. Rezk M, Masood A, Dawood R. Perimenopausal bleeding: Patterns, pathology, response to progestins and clinical outcome. J Obstet Gynaecol J Inst Obstet Gynaecol. 2015;35(5):517–21.
12. Bennett AR, Gray SH. What to do when she's bleeding through: the recognition, evaluation, and management of abnormal uterine bleeding in adolescents. Curr Opin Pediatr. 2014 Aug;26(4):413–9.
13. Hapangama DK, Bulmer JN. Pathophysiology of Heavy Menstrual Bleeding. Women's Heal [Internet]. 2016 Jan 1;12(1):3–13. Available from: https://doi.org/10.2217/whe.15.81
14. Moradan S. Causes and incidence of abnormal uterine bleeding patterns in women with the history of cesarean section and vaginal delivery. 2018 Jul 25;20.
15. Soguktas S, Cogendez E, Eser Kayatas S, Asoglu MR, Selcuk S, Ertekin A. Comparison of saline infusion sonohysterography and hysteroscopy in diagnosis of premenopausal women with abnormal uterine bleeding. Eur J Obstet Gynecol Reprod Biol. 2012;161(1):66–70.
16. El-Gaber Ali AE-NA, HH A, MM K, KM A, AM A. 3D/Saline infusion Sono-hysterography versus conventional office hysteroscopy in uterine cavity evaluation prior to ICSI procedure. J Pregnancy Reprod. 2018;2(5):1–4.
17. Anioł M, Dec G, Wojda K, Sieroszewski P. Usefulness of saline infusion sonohysterography and feeding artery imaging in endometrial polyp diagnosis. Ginekol Pol. 2017 Jun 30;88:285–8.