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Original Research Article

Correlation between Hysteroscopic Evaluation, Saline Infusion Sonography (SIS), and Histopathology of the Endometrium in the Diagnosis of Menorrhagia.

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Abstract

Background: Menorrhagia is excessive menstrual bleeding evaluated using SIS, an ultrasound using saline injection to visualize endometrial thickness and diagnose uterine conditions. Results of SIS are used with other tests to understand causes and inform treatment.

Aims and Objectives: To evaluate the correlation between hysteroscopic evaluation, saline infusion sonography (SIS), and histopathology of the endometrium in the diagnosis of menorrhagia.

Materials and Methods: A study was conducted in Ujjain, India to compare the diagnostic value of hysteroscopy and saline infusion sonography in evaluating AUB in 97 women with prolonged menstrual bleeding. The study was conducted from 2011 to 2013 and involved clinical exams, blood tests, sonography, hysteroscopy, and histopathological examination.

Results: Menorrhagia is more common in reproductive-age women (mean age 36.4 years) with 2 or more children. Clinically, most menorrhagia patients had a uterus size of 6-8 weeks, while polymenorrhoea and metrorrhagia patients had normal uteruses. SIS found abnormalities in 57.7% and hysteroscopy in 55.6%, hysteroscopy detected normal and abnormal pathology with 96% sensitivity, 87.23% specificity, 88.88% positive predictive value, 95.34% negative predictive value, and 91.75% accuracy, SIS detected normal and abnormal pathology with 96% sensitivity, 82.97% specificity, 85.71% positive predictive value, 95.12% negative predictive value, and 89.69% accuracy.

Conclusion: Hysteroscopy and SIS both can detect structural abnormalities but for greater accuracy and management, hysteroscopy with a guided biopsy should be used if SIS does not detect a lesion. Age, number of pregnancies, and uterine preservation will determine the treatment method.

Keywords: Hysteroscopic Evaluation, Saline Infusion Sonography, Endometrium.

Introduction

There has been a growing number of women seeking gynecological consultations due to menorrhagia, with some undergoing hysterectomy within 5 years of presentation, even if there is no uterine pathology found. Approximately 5% of women seek advice from their family physician and 12% of all gynecological referrals are related to menorrhagia [1]. Approximately 6% of girls in puberty and the same proportion of women in their reproductive year's experience heavy

menstrual bleeding, with the percentage potentially reaching as high as 15% in perimenopausal women. [2].

According to the FIGO classification system from 2006, the nine main categories that cause abnormal uterine bleeding (AUB) are arranged using the acronym "PALM-COEIN. These categories are: Polyp, Adenomyosis, Leiomyoma, Malignancy and Hyperplasia, Coagulopathy, Ovulatory dysfunction, Endometrial, Iatrogenic, and Not yet classified. [3]

Non-invasive methods such as Ultrasonography (USG), Saline infusion sonography (SIS), and MRI evaluate endometrial thickness, defects, and blood flow. Minimally invasive methods like hysteroscopy and endometrium sampling are less intrusive. Invasive methods, including biopsy, dilatation and curettage, and fractional curettage, provide a more thorough examination. Newer methods include biochemical, histochemical, immunohistochemical, and electronmicroscopic approaches. [4].

USG is a useful tool for imaging uterine and endometrial abnormalities. Transvaginal ultrasound (TVS) offers better visualization of the endometrium and ovaries compared to trans abdominal imaging. However, it has limitations in evaluating the uterine cavity and may miss small structural abnormalities. SIS overcomes these limitations by infusing saline into the uterine cavity for better visualization. SIS is a cost-effective, widely available, and simple diagnostic procedure for evaluating intracavitary uterine conditions. [5].

Three-dimensional (3D) SIS is a newer, less invasive method to diagnose menorrhagia compared to hysteroscopy and is more cost-effective, doesn't require general anesthesia, and can be done as an outpatient procedure. It provides reliable evaluation of the uterus, including its contour, adhesions, and focal pathologies, and is easily accepted by patients. Thus, 3D SIS can be considered a first line diagnostic approach for patients with AUB. [6]

Materials and Methods

A prospective observational study was conducted at R.D Medical College & associated Hospitals in Ujjain, India. The study population was women attending the hospital with a complaint of menorrhagia (prolonged menstrual bleeding). A cohort of 97 women between the ages of 18-50 who met the inclusion criteria and did not meet any of the exclusion criteria were enrolled in the study. The study was conducted from September 2011 to March 2013. The patients underwent clinical examination, routine blood investigations, abdominal and TVS, and saline infusion sonography. All women underwent hysteroscopy and a histopathological examination of the endometrium. The study aimed to compare the diagnostic value of hysteroscopy and saline infusion sonography in evaluating AUB and determine the best method to evaluate AUB based on sensitivity, specificity, positive predictive value, and negative predictive value. Ethical clearance was obtained and informed consent was obtained from all participants.

Observations & Result

In present study majority of the patients were in reproductive years followed by perimenopause age group (Figure 1). The majority of patients (72.16%) had more than 2 children, 25.77% had less than 2, and only 2.06% were nulliparous.

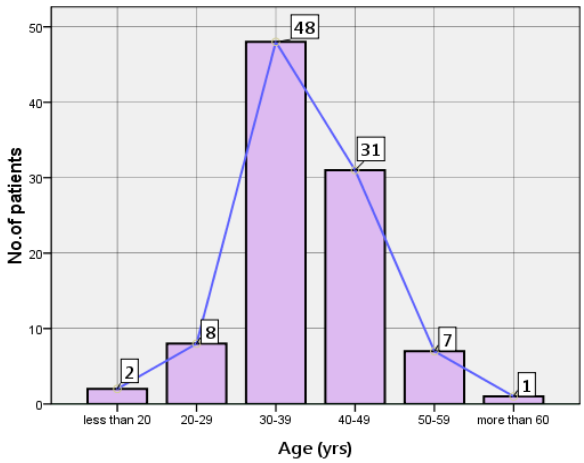

Figure 1: Age Distribution of Patients.

The majority of the patients were farmers, making up 55.67% of the cases. The majority of the patients, 85.57%, were from rural areas, while only 14.43% were from urban areas. Majority of patients having complaints of menorrhagia (n = 56), had clinically size of uterus is 6 to 8 weeks gravid uterus (n = 45). Patients having complaints of polymenorrhagia (n = 27), majority of patients had normal size uterus (n = 18) (Figure 2).

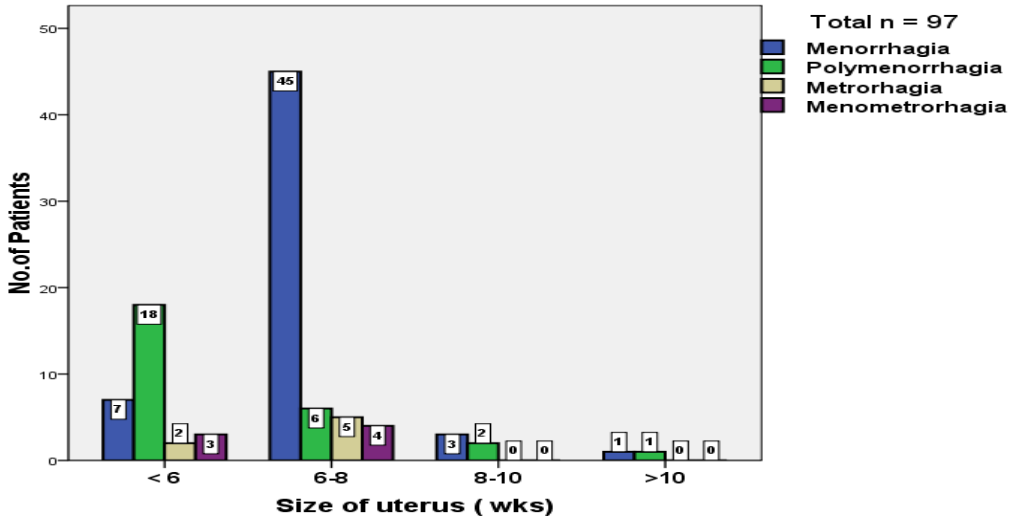

Figure 2: Patients distribution according to Type of complaints and size of uterus

The results of SIS, hysteroscopy, and histopathology showed the following distribution of findings in patients with menorrhagia: SIS: 42% normal, 28.86% polyp, 24.74% submucous fibroid, 4% endometrial hyperplasia. Hysteroscopy: 44% normal, 28% polyp, 22% submucous fibroid, 5% endometrial hyperplasia, 1% placental polyp (diagnosed as submucous fibroid on SIS). Histopathology: 49% normal endometrium, 13% endometrial hyperplasia, 20% polyp, 18% submucous fibroid.

On comparing SIS and hysteroscopy; SIS and hysteroscopy with respect to histopathologically proved morphological lesion in uterus SIS has high sensitivity (96%) and specificity (82.97%) for detecting lesions in the uterus compared to Histopathology. For normal findings, SIS has a sensitivity of 96.29% and specificity of 82.97% compared to hysteroscopy. SIS

has a sensitivity of 100% for detecting polyps and 95.23% for submucus fibroids compared to hysteroscopy. For endometrial hyperplasia, SIS has a sensitivity of 80% and specificity of 100% compared to hysteroscopy. Hysteroscopy has a high sensitivity of 96% and specificity of 87.23% compared to Histopathology. Overall, SIS has a high positive predictive value (85.71%) and negative predictive value (95.12%) compared to Histopathology. The accuracy (concordance) of SIS and hysteroscopy in detecting lesions is 89.69% (Table 1).

Table 1: Comparison of SIS and Hysteroscopy; SIS and Hysteroscopy with respect to histopathologically proved morphological lesion in uterus. (False Positive Rate (FPR), False Negative rate(FNR), Likelyhood ratio(LR), high positive predictive value (PPV), negative predictive (NPV), False Negative rate(FNR)

Characteristic tested	SIS and Histopathology					SIS and Hysteroscopy					Hysteroscopy and Histopathology				
	Overall	Normal	Polyp	S. Myoma	E. Hyperplasia	Overall	Normal	Polyp	S. Myoma	E. Hyperplasia	Overall	Normal	Polyp	S. Myoma	E. Hyperplasia
Sensitivity	96	82.97	100	88.23	30.76	100	96.29	96.29	95.23	80	96	87.23	89.47	82.35	30.76
Specificity	82.97	96	88.46	88.75	100	95.34	97.14	97.14	94.73	100	87.23	96	87.17	91.25	98.8
PPV	85.71	95.12	67.85	62.5	100	96.42	92.85	92.85	83.33	100	88.88	95.34	62.96	66.66	80
NPV	95.12	85.71	100	97.26	90.32	100	98.55	98.55	98.63	98.92	95.34	88.88	77.14	96.05	90.21
FPR	17.02	4	11.53	11.25	0	4.65	2.85	2.85	5.26	0	12.76	4	12.82	8.75	1.19
FNR	4	17.02	0	11.76	69.23	0	3.7	3.7	4.7	20	4	12.76	10.52	17.64	69.23
Concordance	89.69	89.69	90.72	88.65	90.72	97.93	96.9	96.9	94.84	98.96	91.75	91.75	67.62	89.69	89.69
LR	140.4	72.46	60.79	39.95	17.29	194.964	89.86	89.86	69.15	28.33	137.2	80.52	42.2	38.03	12.49
Fisher's ExactTest				0	0					0				0	0.001
P Value	<0.001	<0.01	<0.01			<0.001	<0.01	<0.01	<0.01		<0.001	<0.01	<0.01		

Discussion

Current study observed age as a major risk factor in the subject which is comparable to the findings of the study of Jansen FW et al. (2006) [7], who concluded that only age could be indicated as a risk marker for menorrhagia. In present study the age group of patients varied from 19 to 60 years and mean age was 39.61yrs. Similar findings were reported by Giannninoto A et al. (2003) [8]

In present study, 25.77% of subjects had parity less than two, and 72.16% of subjects had parity more than two (significant $p < 0.01$), 38.14% of subjects were housewives and 61.86% of subjects were involved in heavy physical work. ($p < 0.01$). This observations are comparable to the findings of Panda et al. (1999) [9] and Valle et al. (1977) [10].

In present study analysis of SIS findings shows 42% subjects had normal findings, while 28.8% had polyp, 24.7% had submucous fibroid, and 4.1% had endometrial hyperplasia which is comparable to the study by Steven. R. Goldstein MD et al (19197) [11].

The incidence of endometrial polyps by hysteroscopicaly was 23.7% in the present study while it was 40% as reported by Valle et al.(1997) [10] and 45.9% in Pasqualotto EB et al (2000) [12].

The incidence of submucous fibroid by hysteroscopy is 21.6% in our study while it was reported as 3.3% in Roessel JV et al. (1987) [13] and 28% in Schwarzler P et al.(1998) [14].

Overall Sensitivity, Specificity, PPV, NPV and Concordance was 96%, 87.23%, 88.88%, 95.34% and 91.75 respectively with respect to histopathology which was comparable to Garuti et al (2001) [15] and Panda et al. (1999) [9]

In present study by hysteroscopicaly there was 27 cases of polyp out of which only 19

was confirmed as polyp by histopathology. In similar study of Loffer et al (1989) [16] among 91 patients the hysteroscopic view was negative, in our study 43 had negative hysteroscopic view which is comparable to our results.

On comparision with the studies by Widrich et al 148 total number of lesions on SIS was 61, by hysteroscopy it was 56, sensitivity was 96%, specificity 88%, PPV 89%, and NPV was 96%. In study of Krampl E, et al (2001) [17] total number of lesions on SIS was 56, by hysteroscopy it was 53, while sensitivity was 93.1%, specificity 93.9%, PPV 94.6%, and NPV was 92%. In present study total number of lesions on SIS was 56, by hysteroscopy it was 53, sensitivity was 100%, specificity 95.34%, PPV 96.42%, and NPV was 100% with significant p value.

On comparison of SIS with histopathology Sensitivity was 96%, Specificity 82.97%, PPV 85.71%, NPV 95.12% and concordance 89.69 with p value < 0.01. Sensitivity and specificity of SIS in present study was comparable to William S CD et al (1998) [18].

S. Alborzi et al (2007) [19] compared the accuracy of SIS with TVS for the screening of the causes of AUB in outpatients. They concluded that SIS has sensitivity of 94.1%, specificity of 95%, high PPV of 96% and NPV of 90% than TVS which has sensitivity of 72%, specificity of 92%, PPV of 94% and NPV of 64%. In present study SIS has sensitivity of 96%, specificity of 82.97%, PPV of 85.7% and NPV of 95.12%. [20]

Result shows that both hysteroscopy and SIS are effective in detecting structural lesions. If a lesion is not detected by SIS, then a hysteroscopy with a guided biopsy is recommended for improved accuracy and better management.

Conclusion

Menorrhagia is common in reproductive-aged women with a parity of 2 or more and most women seek treatment within a year. Hysteroscopy was found to have a higher accuracy of 91.75% compared to SIS (89.69%) to detect normal and abnormal pathology. Hysteroscopy is the gold standard for AUB evaluation and offers definitive management, while SIS is a simple diagnostic tool widely available in countries like India.

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