

Original Research Article


A comparative diagnostic evaluation of hysteroscopy, transvaginal ultrasonography and histopathological examination in 50 cases of abnormal uterine bleeding

Sujatha Audimulapu^{1*}, M. Sudeepti²

¹Assistant Professor, ²Senior Resident

Department of Obstetrics and Gynecology, Modern Government Maternity Hospital, Petlaburzu, Osmania Medical College, Hyderabad, Telangana, India

*Corresponding author email: audisujatha888@gmail.com

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Abstract

Background: AUB is a common gynecological complaint and it may involve females at any age group. 33% of women referred to gynaecology clinics have AUB and the figure rises to 69% in premenopausal and postmenopausal women.

Aim: To compare the diagnostic efficacy of transvaginal ultrasonography and hysteroscopy in detecting uterine abnormalities in abnormal uterine bleeding by correlating the results with histopathological examination.

Materials and methods: This was a prospective and comparative study which was conducted in Modern Government Maternity Hospital, Petlaburzu, Osmania Medical College, and Hyderabad and it was conducted from November 2013 to July 2015. This study had 50 patients with AUB. Inclusion criteria: Women with abnormal uterine bleeding such as Heavy menstrual bleeding, intermenstrual bleeding, irregular and heavy bleeding, Regular, frequent and Heavy bleeding, postmenopausal bleeding, continuous bleeding, related to uterine causes. Exclusion criteria: Pelvic infection, Pregnancy, drug intake that can lead to vaginal bleeding (anticoagulants, hormonal replacement therapy, hormonal contraceptives), vaginal, vulval or cervical causes of bleeding. Informed consent was taken for all the patients, subjected to the study.

Results: In the study, diagnostic hysteroscopy, transvaginal ultrasonography and hysteroscopy were done in 50 cases of abnormal uterine bleeding. Mean age of the patients enrolled in the study was

44.5±5.36 years. Most common bleeding pattern observed was Heavy flow with regular cycles (Menorrhagia) which was observed in 42% of the patients followed by Heavy flow with irregular cycles (Menometrorrhagia) which was observed in 26% of the patients in the study. With respect to parity of subjects, maximum incidence of abnormal uterine bleeding was seen in the parity of 2 (36%) followed by parity 3 (32%). Majority of patients came with 1-6 months duration of bleeding of AUB. Most common histopathology finding is Proliferative endometrium. Out of 50 cases, 38 cases (76%) of Hysteroscopy findings correlated with Histopathology and discrepancy in findings was noted in 12 cases (24%). In 26 cases (52%), TVS findings correlated with histopathology findings, and the results differed in 24 patients (48%). Sensitivity and specificity for Transvaginal ultrasonography is 62.8% and 86.6% in comparison with Sensitivity and Specificity of Hysteroscopy which is 74.3 % and 93.3 % respectively. Positive predictive value is 96.3 % and Negative Predictive value is 60.8% for hysteroscopy. Whereas, for Transvaginal ultrasonography, Positive predictive value is 91.6% and Negative Predictive Value is 50%. According to these findings, Hysteroscopy is superior to transvaginal ultrasonography in evaluating abnormal uterine bleeding because of higher sensitivity, specificity, positive predictive value, negative predictive value. Transvaginal ultrasonography is non-invasive, relatively cheap, causes minimal discomfort to the patient and can be used as the initial modality in patients with abnormal uterine bleeding. However, it has inferior diagnostic value when compared to hysteroscopy.

Conclusion: In conclusion, although Transvaginal ultrasonography represents a practical approach for the initial evaluation of uterine pathologies, a hysteroscopy examination would be necessary in most of the suspicious cases. Hysteroscopy remains the best option for the assessment of AUB owing to its diagnostic performance when compared to Transvaginal ultrasonography. It allows direct visualization of the cavity and also sampling for histopathological examination.

Key words

Hysteroscopy, Transvaginal ultrasonography, Histopathological examination, Abnormal uterine bleeding.

Introduction

AUB is a common gynecological complaint and it may involve females at any age group. 33% of women referred to gynaecology clinics have AUB and the figure rises to 69% in premenopausal and postmenopausal women [1]. Abnormal uterine bleeding accounts for two thirds of all hysterectomies [2]. During the last decades, several methods including transvaginal ultrasonography, saline infusion sonography, and hysteroscopy, have been developed to assess uterine cavity, with their own advantages and disadvantages. Although TVS is a simple examination allowing clear visualization of most uterine conditions, several concerns have been raised regarding its accuracy [3]. Hysteroscopy on the other hand, allows direct visualization and sampling of the uterine cavity and has an established diagnostic value for many uterine

conditions. However, the latter modality is not as cost-effective and convenient as ultrasonographic imaging modalities, which are associated with relatively less patient discomfort and do not necessitate anesthesia. Invasive nature of Hysteroscopy and high cost preclude its use as a primary diagnostic procedure in patients with AUB. Thus, currently available modalities are far from being perfect [4]. Ability of TVS for screening the lesions within the endometrial cavity is limited. The finding of a thickened central endometrial complex seen on TVS is often non-specific and may be caused by an endometrial polyp, submucosal fibroids, endometrial hyperplasia, carcinoma, or cystic atrophy. Focal lesions are underdiagnosed at TVS because of limitations of the double-layer thickness evaluation [5]. Hysteroscopy has emerged as a useful diagnostic procedure that is

safe, with a low incidence of clinically significant complications. The accuracy of diagnosis based on hysteroscopic visualization is high for endometrial cancer, but only moderate for other endometrial diseases [6]. Hysteroscopy is an operator-dependent technique and its sensitivity is therefore not as optimal as that of a histological examination [7]. Office hysteroscopy has the advantage of directly visualizing the uterine cavity and endometrium, but it cannot comment on myometrial pathology [8]. This study aimed to compare the diagnostic efficacy of transvaginal ultrasonography and hysteroscopy in detecting uterine abnormalities in abnormal uterine bleeding by correlating the results with histopathological examination.

Materials and methods

This was a prospective and comparative study which was conducted in Modern Government Maternity Hospital, Petlaburz, Osmania Medical College, and Hyderabad and it was conducted from November 2013 to July 2015. This study had 50 patients with AUB.

Inclusion criteria

Women with abnormal uterine bleeding such as Heavy menstrual bleeding, intermenstrual bleeding, irregular and heavy bleeding, Regular, frequent and Heavy bleeding, postmenopausal bleeding, continuous bleeding, related to uterine causes.

Exclusion criteria

Pelvic infection, Pregnancy, drug intake that can lead to vaginal bleeding (anticoagulants, hormonal replacement therapy, hormonal contraceptives), vaginal, vulval or cervical causes of bleeding.

Informed consent was taken for all the patients, subjected to the study. Systemic and pelvic examinations were done on all the patients. Relevant laboratory tests were done accordingly and non-gynecological cases were excluded. All patients were subjected to Transvaginal scan before Hysteroscopy. Dilatation and curettage

was done for all patients after the hysteroscopy session. All the specimens were placed in formalin 10% and sent for histopathological correlation. Final diagnosis was the diagnosis applied after the histopathological result was received. Histopathological reports of endometrial pattern as well as that of the hysterectomy specimens were correlated with ultra-sonographic and hysteroscopy findings, and the sensitivity and specificity of each test were calculated.

Transvaginal ultrasonography

Transvaginal ultrasound examination was done using 7.5MHZ vaginal transducer. Each patient was advised to empty the bladder before examination. The procedure was carried with the patient in supine with thighs abducted, knees flexed and buttocks elevated on a pillow. A transvaginal probe is covered with a condom. A small amount of jelly is applied to the tip of probe, condom interface and outside sheath. The probe is gently inserted into vagina and the bladder, ovaries, uterus, ovaries cervix, fallopian tubes and cul-de-sac are evaluated. Examination techniques include 3 basic maneuvers – 1. Advancement and withdrawal of transducer along long axis of vagina. 2. Angling the transducer tip from side to side and from anterior to posterior. 3. Rotating the transducer along its axis. If endometrial thickness (double layer) measured less than 15 mm in premenopausal women and less than 4mm in postmenopausal women and seemed regular by TVS, it was considered a normal finding. A centrally placed echodense line within the uterus and a homogeneous endometrial lining with distinct margins to the myometrium were also considered normal. Deformations of the endometrial lining, absence of central hyperechoic line, and the appearance of any structure with or without well-defined margins or variable echogenicity, were considered abnormal.

Hysteroscopy

Hysteroscopy was performed with a rigid 30° hysteroscope and diagnostic sheath of 5 mm diameter (Storz Endoscopy). Hysteroscopy was

usually done in postmenstrual period, as the vision is clear, but this was not possible for all AUB patients. After taking informed consent for the procedure, the patient was kept on empty stomach for 8 hours before the procedure. All the procedures were done on an elective basis. Patient was asked to void urine immediately prior to hysteroscopy. Under anesthesia, patient is placed in dorsal lithotomy position, perineum and vagina are painted and draped. The instrument is assembled and checked. A bimanual examination is done. A Sims speculum is introduced into the vagina and the cervix is exposed. The cervix is grasped with vulsellum on outer surface of upper lip. The uterus is then gently sounded and dilated up to No.12. Hysteroscopy with the inner sheath for inflow of distention medium is used. It is connected to the tube going to a ringer lactate bottle. Infusion pump is used to raise the pressure. Telescope is connected to light source. Under vision hysteroscope is inserted into cervical canal and the scope tip is kept at the level of internal os. Endometrial cavity is visualized systematically. Cornua are located by following along the fundus. Ostia are seen in the cornua and by the flow of medium or air bubbles through the ostia. While inserting the scope or while taking out the scope endocervical canal is visualized and also ectocervix is visualized. Fluid input and output is monitored. At the completion of the procedure, the instruments are removed. Curettage of the endometrium is done. The sample is placed in formalin 10% until histological staining with hematoxylin and eosin for histopathological examinations by the pathologist. Hysteroscopic findings were defined as the diagnostic impression based on the appearance of the surface of the uterine cavity, before biopsy. Post Procedure: Patients general condition and vitals were checked. Any bleeding per vagina is watched for (**Photo – 1 to 11**).

Statistical methods

Descriptive statistics were reported using Mean and standard deviation for continuous variables or numbers and percentages for categorical variables. Sensitivity, specificity, positive

predictive value and negative predictive value were estimated for TVS and hysteroscopy against histopathology. Chi-square test was used to find association between factors. 'P' value < 0.05 was considered as statistically significant.

Photo – 1, 2: Endometrial Polyp.



Photo – 3, 4: Endometrial hyperplasia and submucous fibrioid.



Photo – 5, 6: Atrophic endometrium and endometrial carcinoma.

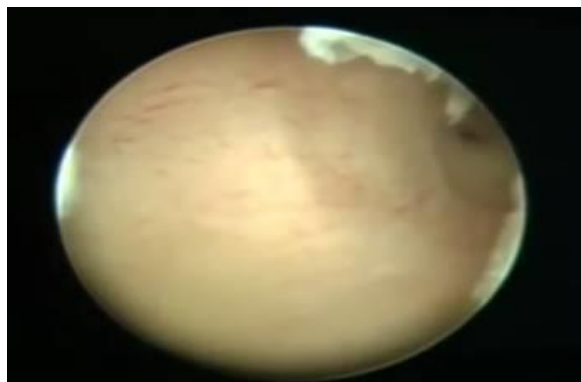


Photo – 10, 11: TVS atrophic endometrium, endometrial polyp.



Photo – 7, 8, 9: TVS adenomyosis, TVS endometrial hyperplasia.



Results

Table - 1 shows mean age of 44.5 ± 5.36 years, type of bleeding and parity. Hysteroscopy findings, histopathology findings, transvaginal ultrasonography findings in 50 cases of abnormal uterine bleeding was as per **Table – 2**. Endometrial thickness as measured by transvaginal ultrasonography (TVS) in correlation to histopathology was as per **Table – 3**. Statistical analysis of findings in hysteroscopy versus histopathology, transvaginal ultrasonography versus histopathology was as per **Table – 4**.

Table – 1: Age distribution, type of bleeding, parity.

Range in years	No. of cases	Percentage
<35	4	8%
36-40	6	12%
41-45	20	40%
46-50	15	30%
>51	5	10%
Type of bleeding	No. of cases	Percentage
Regular, Heavy (Menorrhagia)	21	42%
Irregular , normal flow : Intermenstrual bleeding (Metrorrhagia)	7	14%
Postmenopausal bleeding	5	10%
Continuous bleeding	1	2%
Regular , Frequent and Heavy (Polymenorrhagia)	3	6%
Irregular, Heavy (Menometrorrhagia)	13	26%
Parity	No. of cases	Percentage
Nullipara	3	6%
Para 1	5	10%
Para 2	18	36%
Para 3	16	32%
Para 4	6	12%
Grand Multipara	2	4%

Out of 7 Polyps in Histopathology findings, Hysteroscopy picked up all 7 cases and TVS picked up 3 cases. TVS falsely diagnosed 2 endometrial polyps as hyperplasia and 2 polyps as normal study. Out of 10 cases of Hyperplasia, Hysteroscopy correctly diagnosed 7 cases and failed to detect 3 cases. TVS picked up 6 cases and missed 4 cases. 4 cases of Hyperplasia and polyp in Hysteroscopy correlated with findings of Histopathology. However TVS diagnosed them to be only Hyperplasia. 1 case of Atrophic endometrium and polyp was missed by TVS, but detected in Hysteroscopy. Out of 2 cases of endometrial adenocarcinoma, 1 was correctly diagnosed by both TVS and Hysteroscopy and 1 case was diagnosed as Hyperplasia. 1 case of chronic endometritis in histopathology was diagnosed by Hysteroscopy but TVS showed normal study. Out of 4 cases of submucous fibroid, Hysteroscopy identified 3 cases and falsely diagnosed 1 as polyp. TVS picked up 1

case as submucous fibroid, falsely diagnosed 2 as endometrial hyperplasia and 1 cases as normal study. Out of 5 cases of Adenomyosis, Hysteroscopy failed to detect all the cases, and TVS correctly diagnosed 3 cases and missed 2 cases. Out of 50 cases, 38 cases of Hysteroscopy findings correlated with Histopathology and discrepancy in findings was noted in 12 cases. In 26 cases, TVS findings correlated with histopathology findings, and the results differed in 24 patients.

Discussion

Accurate diagnosis of the cause of AUB is critical. An ideal diagnostic test should be non or minimally invasive, easy to perform, easily acceptable to the patients, low cost and of high sensitivity and specificity. In this prospective study we had compared TVS and hysteroscopy with histopathology reports in 50 cases of abnormal uterine bleeding.

Table – 2: Hysteroscopy findings, histopathology findings, transvaginal ultrasonography findings in 50 cases of abnormal uterine bleeding.

Hysteroscopy Pathology	No. of cases	Percentage
Normal	23	46%
Endometrial Polyp	8	16%
Endometrial Hyperplasia	9	18%
Endometrial Polyp and Hyperplasia	4	8%
Atrophic endometrium and Polyp	1	2%
Endometrial Carcinoma	1	2%
Endometritis	1	2%
Submucous fibroid	3	6%
Histopathology	No. of Cases	Percentage
Normal	15	30%
Endometrial Polyp	7	14%
Endometrial Hyperplasia	10	20%
Endometrial Hyperplasia and Polyp	4	8%
Atrophic endometrium and End.Polyp	1	2%
Atrophic endometrium	1	2%
Endometrial Carcinoma	2	4%
Endometritis	1	2%
Submucous Fibroid	4	8%
Adenomyosis	5	10%
Ultrasonography	No. of cases	Percentage
Normal	26	52%
Endometrial Polyp	3	6%
Endometrial Hyperplasia	15	30%
Atrophic endometrium	1	2%
Endometrial Carcinoma	1	2%
Submucous fibroid	1	2%
Adenomyosis	3	6%

Many studies have reported of abnormal uterine bleeding which are as follows, Gupta, et al. (2015) compared the accuracy of Transvaginal sonography, hysteroscopy, and histopathological examination of endometrium after Dilatation and Curettage in cases of abnormal uterine bleeding. While comparing between TVS and hysteroscopy in total study group taking hysteroscopy as standard, TVS showed a good sensitivity of 85.7% while specificity of 56.5 %. Whereas, during comparison between D & C and hysteroscopy in total study population

taking hysteroscopy as standard, sensitivity of D & C came out to be 61.9% while specificity was 88.9% and concluded that TVS is more sensitive in diagnosing cases of fibroids mainly intramural and subserous ones which are missed by hysteroscopy and TVS can be taken up as a first line of investigation since it is highly sensitive followed by hysteroscopic guided biopsy [9]. Kathuria, et al. (2014) studied correlation between D&C, USG and Hysteroscopy in diagnosing Abnormal Uterine Bleeding. AUB was most common between 30-

39 years (44%). Maximum patients had complaints since 3-6 months (50%). Menorrhagia was the most common presenting complaint (46%). Normal findings were observed in 40% cases with D&C, 16% with USG, 22% with hysteroscopy. Abnormal findings were seen in 60% cases with D&C, 84% with USG, 78% with hysteroscopy and concluded that the hysteroscopy is superior in evaluating patients with AUB, when compared to D&C and USG [10]. Veena, et al. (2014) studied role of TVS and Diagnostic Hysteroscopy in abnormal uterine bleeding. TVS showed an accuracy of 83.3% in detecting the proliferative phase and 66.67% in detecting the secretory phase. TVS has a sensitivity of 0% for a local lesion (intra-cavitary) of endometrial cavity. TVS was also preferable in case of postmenopausal patients with endometrial thickness less than 4mm. Both TVS and hysteroscopy can detect endometrial intracavitary abnormalities with varying accuracies. These can supplement and enhance the accuracy of tissue diagnosis. Thus, the first procedure to which patients with AUB are to be subjected should be TVS followed by hysteroscopy and hysteroscopically directed biopsy, wherever required [11]. Babacan, et al. (2014) compared transvaginal ultrasonography and hysteroscopy in the diagnosis of uterine pathologies in patients with abnormal uterine bleeding, postmenopausal bleeding, lower abdominal pain, abnormal vaginal discharge or for a routine gynecological examination. The mean age of the patients was 49.5 ± 12.9 years (range, 24-89 y). Majority of the patients admitted for abnormal uterine bleeding (n=198, 69.4%). For the diagnosis of polyps of any size, hysteroscopy had better sensitivity ($p < 0.001$), however, specificities did not differ ($p = 1.0$). On the other hand, hysteroscopy did not have a sensitivity advantage over TVS in diagnosing polyps greater than 1 cm ($p = 0.077$), although this time hysteroscopy had better specificity ($p < 0.001$). TVS represents a practical approach for the initial evaluation of uterine pathologies, hysteroscopy seems to offer better diagnostic value for uterine pathologies in general, and

uterine polyps in particular [12]. Vitner, et al. (2013) did a comparative study between ultrasonography and hysteroscopy in the diagnosis of uterine pathology. Their results showed that ultrasound has 93% sensitivity, 58% specificity, 84.3% positive and 78.3% negative predictive value while hysteroscopy had 92% sensitivity, 67% specificity, 87.3% positive and 77.7% negative predictive values. Hysteroscopy had a significantly higher sensitivity in diagnosing intra-uterine fibroids while TVS had a significantly higher sensitivity in diagnosing retained products of conception. Although hysteroscopy had better predictive values for diagnosing uterine polyps the difference was not statistically significant. The combination of both TVS and hysteroscopy did not seem to improve the sensitivity and specificity [13]. Soguktas, et al. (2012) compared the diagnostic effectiveness of transvaginal sonography (T, saline infusion sonohysterography, and diagnostic hysteroscopy (HS), with the pathologic specimen as a gold standard in premenopausal women with abnormal uterine bleeding. The positive and negative likelihood ratios of TVS, SIS and HS were calculated by comparison with the final pathological diagnosis. Polypoid lesion was the most common abnormal pathology. LR+ and -LR of TVS, and HS were 3.13 and 0.15, and 13.7 and 0.02 respectively in detection of any abnormal pathology. HS had the best diagnostic accuracy, and the diagnostic accuracy of HS was superior to TVS [14]. Dasgupta, et al. (2011) studied diagnostic accuracy of trans-vaginal sonography, saline infusion sonography and dilatation & curettage (D & C) and were compared with hysteroscopic guided biopsy to determine the etiology. In determining uterine pathology, positive likelihood ratio (PLR) of TVS, SIS and D & C are 2.81, 7.5 and 3.81 respectively considering hysteroscopy as standard [15]. Waleed el khayat, et al. (2011) studied a total of 50 patients with perimenopausal bleeding scheduled for TVS, hysteroscopy and histopathologic examination. The commonest bleeding pattern was menorrhagia (40%) followed by

menometrorrhagia in 34%, endometrial hyperplasia was found in about half of these lesions and was associated with endometrial polyp in half of the multiple lesions, endometrial hyperplasia was the most frequent finding by TVS (32%) with a mean endometrial thickness of 11.2 ± 2.4 mm followed by endometrial polyp (26%) with a mean endometrial thickness of 18.0 ± 5.3 mm. Using hysteroscopy the commonest lesion diagnosed was endometrial polyp which was found in 28% of cases, while endometrial hyperplasia found only in 20%. For endometrial polyp hysteroscopy was highly sensitive, specific and accurate. Ultrasound was more sensitive and more accurate than hysteroscopy for detection of uterine lesions but hysteroscopy show higher specificity [16]. Bhosle, et al. (2010) correlated clinical, ultrasonographic and histopathological findings in 112 perimenopausal women with abnormal uterine bleeding. The major symptom with which the women presented was menorrhagia in 53.3%. 76.1% women were in the age group of 40-45 years. Whereas the incidence was high in parity 3 (28%) and grandmultipara (32%). They concluded that fibroids of uterus were the most common cause of abnormal uterine bleeding followed by DUB. Histopathology revealed majority of endometrium in proliferative phase.

Clinical, radiological and pathological evaluation correlated very well to diagnose fibroids. However clinically as well USG proved of little help to diagnose adenomyosis [17]. Özdemir, et al. (2010) evaluated endometrial thickness with transvaginal ultrasonography and histopathology in premenopausal women with abnormal vaginal bleeding. Of the 144 women, 113 (78.4%) had normal and 31 (21.6%) had an abnormal endometrium. The abnormal endometrium was composed of 11.8% hyperplasia (simple + atypical complex), 4.2% endometrial polyp, and 5.5% adenocarcinoma. An optimal sensitivity and specificity (83.6 and 56.4%, respectively) and negative predictive value with 95.6% for detection of abnormal endometrium were obtained with an endometrial thickness of 8 mm. The accuracy rate of preoperative Pipelle biopsy was 94.7% in a total of 57 women [18]. Acharya, et al. (2009) studied the accuracy of hysteroscopy in evaluation of abnormal uterine bleeding and to correlated hysteroscopic findings with histopathologic findings. The findings on hysteroscopy were proliferative 34%, secretary 16%, hyperplasia 18%, atrophic 8%, endometrial polyp 9%, submucous myoma 11%, carcinoma of endometrium 03%, misplaced Cu-T 1% [19].

Table – 3: Endometrial thickness as measured by transvaginal ultrasonography(TVS) in correlation to histopathology.

Histopathology	Total cases	Endometrial thickness (ET in mm)					
		≤5	6-10	11-15	16-20	>20	Mean
Normal	15		11	2	2		9.3±3.7
Endometrial Polyp	7		2		3	2	14.8±5.3
End. Hyperplasia	10		6		3	1	12.2±5.7
End. Hyperplasia + Polyp	4		1		2	1	15.7±6.6
Atrophic endometrium+Polyp	1	1					4
Atrophic endometrium	1	1					2
Endometrial Carcinoma	2				1	1	20±2.8
Endometritis	1			1			13
Adenomyosis	5		3	2			9.6±3.2
Submucous Fibroid	4			1	1	2	18.7±5.3

Table – 4: Statistical analysis of findings in hysteroscopy versus histopathology, transvaginal ultrasonography versus histopathology.

Hysteroscopy	
True Positive	26
False Negative	9
False Positive	1
True Negative	14
Sensitivity	74.29%
Specificity	93.33%
Positive Predictive Value	96.3%
Negative Predictive Value	60.8%
p value	< 0.0001 (significant)
Transvaginal Ultrasonography	
True positive	22
False Negative	13
False Positive	2
False Negative	13
Sensitivity	62.86%
Specificity	86.67%
Positive Predictive Value	91.67%
Negative Predictive Value	50.00%
p value	0.0013(significant)

Conclusion

In conclusion, although Transvaginal ultrasonography represents a practical approach for the initial evaluation of uterine pathologies, a hysteroscopy examination would be necessary in most of the suspicious cases. Hysteroscopy remains the best option for the assessment of AUB owing to its diagnostic performance when compared to Transvaginal ultrasonography. It allows direct visualization of the cavity and also sampling for histopathological examination.

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