Original Article

Sliding Sign and Gel Sonovaginography: A Sneak Peek Prior to Laparoscopy in Patients with Endometriosis

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ABSTRACT

Context: The rising incidence of endometriosis may be due to improvisation in the diagnostic techniques. Transvaginal sonography has proven to be very useful in the diagnosis of complexity of the disease and in turn to predict the intraoperative findings on laparoscopy. **Aims:** The aim was to study the use of sliding sign for detecting the status of the pouch of Douglas (POD) and to check for the presence of bowel and nonbowel deep infiltrating endometriosis (DIE) by gel sonovaginography. **Settings and Design:** This is a prospective observational study carried out patient division of Department of OBG in Kasturba Hospital Manipal. **Methods:** The study was carried out over a period of 2 years and included 136 women. After written informed consent, a detailed history and clinical examination was done. A detailed transvaginal sonography was done for each of the patients by a single observer on the Philips HD11XE machine two-dimensional transvaginal probe which included gel sonovaginography and real-time dynamic test called sliding sign. **Statistical Analysis:** Chi-square test was used in this study. **Results:** Sliding sign is highly specific, sensitive, and accurate for the detection of POD obliteration. It is 96.6% sensitive and 89.5% specific. It is 94.1% accurate and 94.5% positively predictive for the same. Transvaginal sonography is >92% specific for the detection of bowel and nonbowel DIE. The accuracy is over 91%. The negative predictability is 93.6% and 94.6%, respectively. **Conclusions:** Sliding sign is a useful, easy-to-perform, reproducible, and noninvasive modality for assessing the status of POD. Gel sonovaginography is also useful in accurately detecting the presence of deep infiltrating endometriotic deposits.

KEYWORDS: *Deep infiltrating endometriosis, gel sonovaginography, pouch of Douglas obliteration, sliding sign*

INTRODUCTION

Endometriosis is an enigmatic disorder with a wide variety of lesions ranging from small peritoneal implants to ovarian endometriomas to bowel involvement and pouch of Douglas (POD) obliteration and severe stage disease. The incidence of the disease is increasing day by day, and close to 25 million women suffer from this dreadful disease in India.[1] The rising trend may be due to improvisation in the diagnostic practices.[2]

It occurs due to the deposition of functional endometrium outside the body of the uterus.[3] The varied symptomatology of this disease leads to a delay in the diagnosis. It may present with absolutely no symptoms to sometimes presenting with infertility alone or in severe cases has a wide variety of symptoms such as dysmenorrhea, dyspareunia, and chronic pelvic pain.

Since laparoscopy remains the mainstay in the diagnosis and treatment of the disease, and maximum cytoreduction and a complete first surgery is the best treatment that can be offered.

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We aimed to use the simple technique of sliding sign and gel sonovaginography for detecting the status of POD and to check for the presence of bowel and nonbowel deep infiltrating endometriosis (DIE).

METHODS

This is a prospective observational study carried out patient division of Department of OBG Kasturba Hospital Manipal over a period of 2 years and included 136 women who were diagnosed or suspected to have endometriosis by symptoms and ultrasound findings planned for laparoscopic surgery. All patients who were diagnosed to have malignancies or underwent laparotomy were excluded from the study.

Sample size was calculated by the following formula:

Sample size = n/prevalence,

$n = Z^2$XP $(1 - P)/d^2$,

where

Z is the statistic corresponding to level of confidence – the value here is 1.96,

P is expected prevalence – it was taken as 50%,

d is the level is precision expected – it was taken as 12%.

Based on the abovementioned formula, the number came up to 136.

This study was approved by the Institutional Ethics Committee (IEC-495/2017) and registered under the Clinical Trials Registry – India (CTRI/2019/02/023992).

At the time of recruitment, a detailed history, general physical examination, and systemic examination including the pelvic examination were carried out and noted in a structured pro forma. Written and informed consent was obtained.

A detailed transvaginal sonography was done for each of the patients by a single observer on the Philips HD11XE machine (IndiaMART InterMESH Ltd, Noida, Uttar Pradesh, India) two-dimensional transvaginal probe which included gel sonovaginography and real-time dynamic testing called sliding sign.

Sliding sign

The assessment of POD was done using a dynamic test called sliding sign. It is done by applying gentle pressure against the cervix with the transvaginal probe to establish whether the anterior rectum glided freely across the posterior aspect of the cervix (retrocervical region) and posterior vaginal wall.

If the anterior rectal wall does not glide freely, it was considered negative. This is an easy and a not technically

Table 1: Age-wise distribution of all the participants included

Age (years)	n (%)
20-24	22 (16.1)
25-29	55 (40.5)
30-34	36 (26.5)
>35	23 (16.9)

Table 2: Correlation between the presence of bowel deep infiltrating endometriosis on scan and on laparoscopy

TVS	Lap	
	Present (43)	Absent (93)
Present (42)	37	5
Absent (94)	6	88

TVS=Transvaginal sonography

Table 3: Correlation between the presence of nonbowel deep infiltrating endometriosis on scan and on laparoscopy

TVS	Lap	
	Present (49)	Absent (87)
Present (43)	41	2
Absent (93)	8	85

TVS=Transvaginal sonography

Table 4: Correlation between sliding sign on transvaginal sonography and pouch of Douglas obliteration on laparoscopy

TVS	Lap	
	Present (89)	Absent (47)
Present (91)	86	5
Absent (45)	3	42

TVS=Transvaginal sonography

difficult test which does not need severe expertise. There have been several studies evaluating the usefulness of this test, and they have all concluded it to be a very useful test and recommend it to be performed routinely in the preoperative period.

Assessment of nonbowel deep infiltrating endometriosis

The assessment of nonbowel DIE was done compartment wise, namely the anterior, posterior, and the lateral pelvic compartments. The lesions appear as nodules, linear thickenings, and plaques.

We assessed the compartments using the gel sonovaginography.

Gel sonovaginography

We introduced 20 ml of sterile ultrasound gel in the posterior fornix with a 20-ml sterile syringe. This was followed by the introduction of the transvaginal ultrasound (TVS) probe. The gel

inserted creates an acoustic window or a so-called standoff effect between the transvaginal probe and the surrounding structures of the vagina which allows better visualization of the anterior and the posterior compartment structures. The structures included in the posterior compartment are posterior vaginal wall, rectovaginal septum (RVS), and uterosacral ligaments. The structures included in the anterior compartment are anterior vaginal wall, bladder wall, and uterovesical septum. Care must be taken while loading the syringe so as to avoid air pockets in the syringe so as to allow the best visualization.

The features of nonbowel DIE as described above were looked for and are found, and the exact location, the measurements, and the relationship between the surrounding structures were carefully studied and noted down in the structured pro forma.

Assessment of bowel deep infiltrating endometriosis

The final part of our assessment was the assessment of rectum and rectosigmoid for bowel DIE.

The procedure for this observation was as follows: we placed the transvaginal probe at the posterior introitus or just superior to the anal verge. The posterior vaginal wall, RVS, the anterior rectum, and the muscularis propria of the anterior rectum were clearly defined. The muscularis propria was identified as a linear hypoechoic longitudinal muscle behind the RVS. The muscularis propria was first traced on the rectum and then continued on the rectosigmoid bowel up to the highest point possible which mostly is 25–30 cm from the anal verge. Bowel DIE appeared as a noncompressible hypoechoic lesion in the muscularis propria.

The outcomes were tested for specificity, sensitivity, positive predictive value (PPV), negative predictive value (NPV), accuracy, and *P* value to know the reliability of our ultrasound evaluation by statistical analysis by Chi-square test.

There were no major complications noted during any of the ultrasound or laparoscopic procedures and were all a part of the standard of care of the hospital in which the study was carried out.

RESULTS

A total of 136 patients of diagnosed endometriosis and suspected endometriosis were included in the study. Their preoperative ultrasound assessment was compared with their operative findings as per the structured pro forma.

Demographic details of the subjects included

About 40% of the participants belonged to the age group of 25–29 years, and the next common age group was between 30 and 34 years, followed by >35 years and 20–24 years [Table 1]. This suggests that this condition is more common in reproductive age group which is well known.

Nulliparity is more frequently associated with endometriosis, and the disease is less frequently seen in parous women. As seen in the study, 74.3% (101) of the patients with endometriosis were nulliparous and had an infertility component.

In the present study, infertility was the most common symptom (30.8%) that a woman with endometriosis presented with. These patients were otherwise asymptomatic and came to the hospital only for the evaluation of infertility. It is followed by an association of infertility with dysmenorrhea (28.8%), followed by infertility, dysmenorrhea, and dyspareunia (27%), and chronic pelvic pain (<15%) was the least common of the symptom.

When comparing symptomatology and POD obliteration, we did not find any significant correlation between them. However, the NPV of dysmenorrhea is 76.3% which is an important finding, and the absence of dysmenorrhea can predict an easy surgery to a satisfactory extent.

Bowel and nonbowel deep infiltrating endometriosis on ultrasound versus laparoscopy findings

Transvaginal sonography is >92% specific for the detection of bowel and nonbowel DIE and 87.8% sensitive for it [Tables 2 and 3]. The accuracy is over 91% for the detection of both. The negative predictability is 93.6% and 94.6%, respectively. *P* value proves that these results are significant.

Sliding sign versus pouch of Douglas obliteration

As explained in the materials and methods, sliding sign is performed. Moreover, we can infer that it is highly specific, sensitive, and accurate for the detection of POD obliteration. It is 96.6% sensitive and 89.5% specific. It is around 94% accurate and close to 94% predictive for the same [Table 4]. *P* value is very much in the significant range.

The abovementioned results prove the reliability and the usefulness of the study.

DISCUSSION

The present study was done over a period of 2 years in a tertiary care hospital and included 136 women with diagnosed or suspected endometriosis and compared the

ultrasound-based stage with the laparoscopic findings using a real-time dynamic test called sliding sign and gel sonovaginography for the presence of DIE.

Demographic variables

In the present study, infertility was the most common symptom present in >85% of the patients, and dysmenorrhea was noted in around 60% of the patients and chronic pelvic pain in <15%. This was slightly different from the study conducted by Hudelist *et al*.[4] wherein dysmenorrhea was observed in 99% of the patients, subfertility was noticed in only 19%, and chronic pelvic pain in 27% of them.

It is proven beyond doubt that women who are nulliparous and in the reproductive age are the most at risk for endometriosis which was noticed in the present study as well as all other studies done in this regard.

Sliding sign

The results of the present study were a sensitivity of 96.6%, specificity of 89.5%, PPV of 94.5%, NPV of 93.3%, and accuracy of 94.1%.

Hudelist *et al*. conducted a study on 117 women with suspected rectal and rectosigmoid endometriosis. They tried to see if the absence of sliding sign could accurately detect the presence of DIE. The mean age was 31.6 years which was close to the present study where it was 30.05 years. The prevalence was 29% and in the present study was 27%. Their study had a sensitivity of 85%, specificity of 96%, PPV of 91%, NPV of 94%, and accuracy of 93.1%, and we found a sensitivity of 86.1%, specificity of 94.6%, PPV and NPV of 88.1% and 93.6%, and accuracy of 91.9% for the detection of bowel DIE.[4]

Menakaya *et al*. included 100 women in their study who were undergoing laparoscopy to diagnose or to treat endometriosis, and the aim was to see if sliding sign could be an accurate predictor of POD obliteration. They had a sensitivity, specificity, PPV, NPV, and accuracy of 83.3%, 97.1%, 92.6%, 93.2%, and 93.0%, respectively. In the present study, the results were 96.6%, 89.4%, 94.5%, 93.3%, and 94.1%, respectively. We can see that the results are comparable, and this proves that sliding sign is an easy test which is reproducible.[5]

Ultrasound detection of bowel and nonbowel endometriosis

A meta-analysis that included 10 studies which tried to prove the diagnostic accuracy of ultrasound for detecting the presence of bowel endometriosis showed results that correlated well with the present study. Since all the studies were done in countries outside India, the present study gives us an insight of the disease characteristics in our country.[6]

The present study had slightly different values. The NPV was higher than the PPV, and the specificity as mentioned earlier was 94.6%. In the meta-analysis, they had a very high specificity and PPV almost up to 100% and a lesser NPV around 85–90.

This could have been different because of the variable inclusion criteria. The present study included all cases of diagnosed and suspected endometriosis as well, and hence, many patients had no endometriosis on ultrasound and laparoscopy, whereas the other studies included only symptomatic and proven cases of endometriosis.

Noventa *et al*. compiled 35 manuscripts based on the ultrasound-based diagnosis of endometriosis into a review of literature in 2015 and published in Fertility and Sterility Journal in 2015.[7] The point of significance in the review was that the review showed a specificity and sensitivity of over 85% for all the sites of deep pelvic endometriosis and over 84% for rectosigmoid endometriosis. The results were comparable with the present study. The present study too had a sensitivity and specificity of over 90% for all the sites of deep pelvic endometriosis and sensitivity of 86.1% and specificity of 94.6% for rectosigmoid which are very close to the results obtained in meta-analysis.

The differentiating feature in the methodology of the present study and the meta-analysis was that they found better results and high resolutions with endorectal ultrasound and rectal water-contrast transvaginal sonography, but no such methodology was applied in the present study.

Bazot *et al*. conducted a study on 142 women with suspected endometriosis who subsequently underwent transvaginal sonography, laparoscopy, and histopathological confirmation of the same. They assessed the diagnostic accuracy of deep pelvic endometriosis in the similar sites as the present study such as bladder, uterosacral ligaments, RVS, vagina, and bowel involvement.[8]

The results were very comparable with the present study. The sensitivity, specificity, PPV, NPV, and accuracy were individually assessed for all the sites separately just like the present study, and the results were as stated in the tables. The differentiating feature was a high PPV and specificity which was a little varying with the present study.

Saba *et al*. studied the comparison between magnetic resonance imaging (MRI) and tenderness-guided TVS for the identification of rectovaginal endometriosis.[9] They concluded that both are comparable results in the diagnosis of the same. The sensitivity and specificity

of MRI were 90% and 73% and 86% and 73% for tenderness-guided TVS. The present study showed the results to be 86.1% and 94.6%.

As stated in all the studies above, the present study had comparable and in some instances better results than the other studies. It is hence a very useful and a valid test for the preoperative screening and diagnosis of endometriosis.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Rogers PA, D'Hooghe TM, Fazleabas A, Gargett CE, Giudice LC, Montgomery GW, *et a*l. Priorities for endometriosis research: Recommendations from an international consensus workshop. Reprod Sci 2009;16:335-46.
2. GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: A systematic analysis for the Global Burden of Disease Study 2015. Lancet 2016;388:1545-602.
3. Endometriosis: Diagnosis and Management; NICE guideline [NG73]; September, 2017.
4. Hudelist G, Fritzer N, Staettner S, Tammaa A, Tinelli A, Sparic R, *et al*. Uterine sliding sign: A simple sonographic predictor for presence of deep infiltrating endometriosis of the rectum. Ultrasound Obstet Gynecol 2013;41:692-5.
5. Menakaya U, Reid S, Infante F, Condous G. The 'sliding sign' in conjunction with sonovaginography: Is this the optimal approach for the diagnosis of Pouch of Douglas obliteration and posterior compartment deep infiltrating endometriosis? Australas J Ultrasound Med 2013;16:118-23.
6. Hudelist G, English J, Thomas AE, Tinelli A, Singer CF, Keckstein J. Diagnostic accuracy of transvaginal ultrasound for non-invasive diagnosis of bowel endometriosis: Systematic review and meta-analysis. Ultrasound Obstet Gynecol 2011;37:257-63.
7. Noventa M, Saccardi C, Litta P, Vitagliano A, D'Antona D, Abdulrahim B, *et al*. Ultrasound techniques in the diagnosis of deep pelvic endometriosis: Algorithm based on a systematic review and meta-analysis. Fertil Steril 2015;104:366-83.
8. Bazot M, Thomassin I, Hourani R, Cortez A, Darai E. Diagnostic accuracy of transvaginal sonography for deep pelvic endometriosis. Ultrasound Obstet Gynecol 2004;24:180-5.
9. Saba L, Guerriero S, Sulcis R, Pilloni M, Ajossa S, Melis G, *et al*. MRI and "tenderness guided" transvaginal ultrasonography in the diagnosis of recto-sigmoid endometriosis. J Magn Reson Imaging 2012;35:352-60.