Benha Journal of Applied Sciences (BJAS) **print: ISSN 2356–9751**
Vol.(5) Issue(8) Part (1) (2020), (11-17) **online: ISSN 2356–976x**
http://bjas.journals.ekb.eg

Ultrasound-Based Endometriosis Scoring System

M.A.El-Sayed, M.E.Fahmy,**A.A.Mohammedand W.M.Tawfik**
Obstetrics &GynecologyDept., Faculty of Medicine, Benha Univ., Benha, Egypt
E-Mail: Asmaa21@gmail.com

Abstract

Endometriosis is a heterogeneous sickness with run of the mill and atypical sores that range from peritoneal inserts to ovarian endometrioma and profound invading endometriotic (DIE) knobs, with or without cul-de-sac obliteration. The point of the current investigation was to approve the presentation of preoperative Ultrasound-based Endometriosis Scoring System (UBESS) for foreseeing the right degree of laparoscopic aptitudes needed for endometriosis surgery.This was a forthcoming, observational examination was directed including (100) ladies giving persistent pelvic torment and additionally endometriosis. The span of the investigation was gone from 6 to 12 months.Results: there is high huge connection between UBESS score and RANZCOG/AGES score with practically ideal arrangement between the two scores. Utilizing ROC bend, affectability of UBESS score I was 94.2%, particularity was 95.8%, PPV 96.1%, NPV 93.9%, exactness 95%, affectability of UBESS score II was 83.3%, explicitness was 93.9%, PPV 75%, NPV 96.3%, precision 92% and %, affectability of UBESS score III was 93.3%, particularity was 98.6%, PPV 96.6%, NPV 97.2%, exactness 97%.Conclusion: UBESS could be used to foresee the degree of multifaceted nature of laparoscopic medical procedure for endometriosis. It can possibly encourage the emergency of ladies with suspected endometriosis to the most fitting careful ability needed for laparoscopic endometriosis medical procedure. UBESS should be approved remotely in different focuses to survey its overall appropriateness.

Keywords: UBESS, Laparoscopic Endometriosis, Predicting, and Surgical.

1.Introduction

The World Endometriosis Society characterizes endometriosis as a fiery illness measure, described by injuries of endometrial-like tissue outside the uterus, which are related with different types of pelvic agony and additionally barrenness [1].

The rate of endometriosis is hard to evaluate, as ladies with the illness are frequently asymptomatic. Also imaging modalities have low sensitivities for little embeds [2].

The conclusive reason for endometriosis stays obscure, however speculations have been proposed.Retrograde monthly cycle through the fallopian tubes [3].

Another speculation, the foundational microorganism hypothesis, embroils undifferentiated endometrial cells that at first dwell in the endometrium's basalis layer.

Atypical lymphatic or vascular spread of endometrial tissue has additionally been involved [4]. Lymphatic spread of endometriosis to pelvic sentinel lymph hubs is noted in influenced ladies [5].

Another hypothesis concerns coelomic metaplasia. Last hypothesis implies that mullerian remainders left along their undeveloped way go through strange separation [6].

As noted, ladies with endometriosis might be asymptomatic, however constant pelvic agony (CPP) or subfertility is normal [7]. Of endometriosis CPP, dysmenorrhea, dyspareunia, and noncyclic agony are continuous sorts. Less frequently, influenced ladies may likewise gripe of dyschazia (torment with crap), dysuria or stomach divider torment.

A few examinations associate torment seriousness with cutting edge stage infection, though different investigations don't [8].

Lab examinations are frequently attempted to avoid different reasons for pelvic agony.

TVS for DIE including the gut and bladder has appropriate precision [9]. X-ray may explain life systems and level of intrusion. CT filtering assumes a restricted part in assessment of endometriosis.

Despite the fact that imaging can add clinical data, laparoscopy is the essential strategy utilized for diagnosing endometriosis.

Sonographic information with best quality level laparoscopic out-comes gathered during a past TVS-based investigation of ladies with suspected endometriosis was utilized to build up the ultrasound-based endometriosis arranging framework (UBESS) that was intended to preoperatively organize endometriosis utilizing transvaginal ultrasound (TVS). It has recently been appeared to have a general precision of 84.9% to foresee the intricacy of laparoscopic medical procedure in ladies with endometriosis when applied to the Royal College of Obstetricians and Gynecologists (RCOG) levels of laparoscopic medical procedure [10].

2.Subjects and methods

This studywas a prospective, observational study. This study was carried at Obstetrics and Gynecology Department of Benha University Hospital. One hundred (100) women presenting with chronic pelvic pain and/or endometriosis.

2.1 Inclusion criteria

Reproductive aged women with chronic pelvic pain and/or endometriosis.

2.2Exclusion criteria

Pregnancy, Menopause, Malignancy AND Adnexal lesions other than endometrioma.

2.3 Sample size

One hundred (100) women presenting with chronic pelvic pain and/or endometriosis.

2.4 Sampling technique

This study was performed on systematic random sampling technique.

3.Methods

a) History taking : complete history taking : In history taking, age, , residency, occupation, Parity, gravidity, previous abortion, previous pregnancy outcomes, presence of comorbidities, such as hypertension were evaluate.

b) Clinical examination: **Physical examination**: For most parts, endometriosis is a disease confined to the pelvis, accordingly, visual cues are often lacking, some expectations include endometriosis within an episiotomy scar, or surgical scar, most often within a pfnnenstiel incision [11].Occasionally, blue or red powder-burn lesions are seen on the cervix or posterior vaginal fornix. These lesions can be tender or bleeding with contact. **Bimanual examination**: we inserted the gloved index and middle finger of the right hand in the vagina. We avoided touching the external urethra orifice and we introduced fingers in the part of the vulva near the perineum. Using jelly or water to avoid friction, We Place left hand on the lower abdomen of the patient above the symphysis and we gently palpated with fingers. We assessed each organ systematically in order not to forget anything; we assessed cervix, uterus and adnexa for size, site, mobility, tenderness.

c) Routine investigations: Trans-vaginal Sonography (TVS): Detailed specialized transvaginal ultrasound was done using Equipment with 7.5-MHz transvaginal probe. The 5-domain ultrasound-based approach was used for the TVS examination of each woman investigated for endometriosis. The domain-based TVS assessments begin once informed consent was obtained. The 5 domains as described by Menakaya et al. consist of (1) routine assessment of the uterus and adnexa; (2) tenderness- guided assessment; (3) assessment of pouch of Douglas (POD) status, ovarian, and organ mobility; (4) assessment for non-bowel DE of the anterior, lateral and posterior pelvic compartments; and (5) assessment of the anterior wall of the rectum and rectosigmoid[10].

Table (1) Five domains for pelvic evaluation in endometriosis, with predicted phenotype of endometriosis and associated sonomorphological features.

Domain	Objective	Sonograpbic sign(s)	Predicted pbenotype of endometriosis
I	Routine assessment of utcrus and adnexa	Myomctrial cysts, streaky echogenic lines, thickened posterior myometrium, loss of endometrial/ myomctrial interface on 3D imaging Thick –walled ovarian cysts with homogencous low- level internal echoes' Ground glass' appearance	Adecnomyosis Endometrioma
II	Tenderncss-guided assessment	Site- specific tcnderness	Possible peritoneal endometriosis
III	Assessment of organ mobility		
IIIa	Ovarina mobility	Ovarian immobility	Ovarian adhesions
IIIb	Status of POD	Real –time dynamic sliding sign	POD oblitcration/adhesions
IV	Assessment for non-bowel DIE Assessment of anterior, lateral and posterior pelvic compartments	Nodules: solid hypoechoic lesions rounded in shape inear thickenings: hypoechois linear thickening plaques: hypoechoic lesions with irregular shpape	Extraovarian non –bowel DIE
V	Assessment for bowel DIE	Non-Compressible hyypoechoic lesion on muscularispropria (may infiltrate mucosa layer)	Bowel DIE

The sonographic data that was collected include specific phenotypic markers indicating potential endometriosis[10]Then we staged the disease based on histological phenotype of endometriosis, anatomical location and markers of local invasiveness [12] Women in this study were assigned UBESS I, II, or III at the time of TVS examination**,** and the UBESS score is done preoperatively.

The surgical data collected at the time of laparoscopy will be correlated with UBESS score.

The ability of the UBESS to predict surgical complexity was then assessed by retrospectively correlating the 2 sets of data.

Table (2) Correlation of UBESS with Surgical Data and RANZCOG/AGES Surgical Skill Levels 1 to 6:

UBESS	UBESS features demonstrated on advanced TVS	RANZCOG/AGES surgical skill level
I	Normal mobile ovaries, absent non_bowel and absent bowel DE, normal POD +/- SST	Level1:negative laparoscopy or mild stage disease RANZCOG/AGES ½
II	Endometrioma +/- immobile ovaries +/- non_bowel DE +/- normal POD	Level2: moderate stage disease RANZCOG/AGES ¾
III	Bowel DE +/- immobile ovaries (endometriomas) +/- non_bowel DE +/- normal POD	Level3: severe stage disease RANZCOG/AGES 6

Operational design

The researcher introduced herself to all participants included in this study and asked them to participate after illustrating the goal of the study. All participants received comprehensive information regarding objective and the expected benefit of the study. All ethical considerations were taken throughout the whole work.

Statistical analysis: Analysis of data was done using Statistical Program for Social Science version 20 (SPSS Inc., Chicago, IL, USA). Quantitative variables were described in the form of mean and standard deviation. Qualitative variables were described as number and percent. In order to compare parametric quantitative variables between two groups, Student t test was performed. Qualitative variables were compared using chi-square (X2) test or Fisher's exact test when frequencies were below five. Pearson correlation coefficients were used to assess the association between two normally distributed variables. When a variable was not normally distributed, A P value < 0.05 is considered significant.

4.Results

Table (3) shows that mean age of the studied cases was 29.92 ± 4.21 with range of (24.0 – 37.0) years, mean weight was 76.88 ± 6.92 with range of (65.0 – 88.90) kg, mean height of the studied cases was 165.81 ± 5.98 with range of (22.20 – 36.10) cm, mean BMI was 28.06 ± 3.22 with range of 22.20 – 36.10)kg/m2, 86% of cases were from rural areas, 45% were housewifes.

Table (4) shows that median parity of the studied cases was 2 with range of (0-6), median previous abortion was 2 with range of (1-5), hypertension was in 6% of cases, diabetes in 2% of cases, presenting symptom was present in 57% of cases, Disfunctionalutrine bleeding in 28% of cases, and .Dysmenorrhea in 15% of cases.

Table (5) shows that 51% of cases had UBESS score I, 20% had score II and 29% had score III, 52% of cases had RANZCOG/AGES Level 1 / ½, 18% had Level 2 / ¾ and 30% had Level 3 / 6.

Table (6) shows that there is high significant relation between UBESS score and RANZCOG/AGES score with almost perfect agreement between the two scores. .

Table (7) shows that sensitivity of UBESS score I was 94.2%, specificity was 95.8%, PPV 96.1%, NPV 93.9%, accuracy 95%, sensitivity of UBESS score II was 83.3%, specificity was 93.9%, PPV 75%, NPV 96.3%, accuracy 92% and %, sensitivity of UBESS score III was 93.3%, specificity was 98.6%, PPV 96.6%, NPV 97.2%, accuracy 97%

Table (3) Distribution of the studied cases according to demographic data (n = 100).

Demographic data	No.	%
Age		
Min. – Max.	24.0 – 37.0	
Mean ± SD.	29.92 ± 4.21	
Median (IQR)	30.0 (26.0 – 34.0)	
Weight		
Min. – Max.	65.0 – 88.90	
Mean ± SD.	76.88 ± 6.92	
Median (IQR)	77.15 (71.10 – 83.10)	
Height (cm)		
Min. – Max.	157.0 – 176.0	
Mean ± SD.	165.81 ± 5.98	
Median (IQR)	164.0 (161.0 – 171.0)	
BMI (kg/m2)		
Min. – Max.	22.20 – 36.10	
Mean ± SD.	28.06 ± 3.22	
Median (IQR)	27.75 (25.80 – 30.35)	
Residency		
Rural	86	86.0
Urban	14	14.0
Occupation		
Housewife	45	45.0
Employee	25	25.0
Professional	30	30.0

Table (4) Distribution of the studied cases according to past history (n = 100).

	No.	%
Parity		
Min. – Max.	0.0 – 6.0	
Mean ± SD.	1.94 ± 1.50	
Median (IQR)	2.0(1.0 – 3.0)	
Previous abortion		
Min. – Max.	1.0 – 5.0	
Mean ± SD.	2.74 ± 1.40	
Median (IQR)	2.0 (2.0 – 4.0)	
Comorbidities		
Non	92	92.0
Hypertension	6	6.0
Diabetes	2	2.0
Symptoms		
Infertility	57	57.0
Disfunctionalutrine bleeding	28	28.0
Dysmenorrhea	15	15.0

Table (5) Distribution of the studied cases according to UBESS and RANZCOG/ages (n = 100).

	No.	%
UBESS		
I	51	51.0
II	20	20.0
III	29	29.0
Table (4) Continue		
RANZCOG/AGES		
Level 1 / ½	52	52.0
Level 2 / ¾	18	18.0
Level 3 / 6	30	30.0

Table (6) Agreement of UBESS with RANZCOG/AGES with Kappa test**.**

	RANZCOG/AGES						χ^2	K	p
	Level I / 1/2 (n = 52)		Level II / 3/4 (n = 18)		Level III / 6 (n = 30)				
	No.	%	No.	%	No.	%			
UBESS									
I	49	94.2	2	11.1	0	0.0	145.310*	0.869	<0.001*
II	3	5.8	15	83.3	2	6.7			
III	0	0.0	1	5.6	28	93.3			

χ^2: Chi square test
K: kappa test
*: Statistically significant at $p \leq 0.05$

Kappa	Interpretation
< 0	Poor agreement
0.0 – 0.20	Slight agreement
0.21 – 0.40	Fair agreement
0.41 – 0.60	Moderate agreement
0.61 – 0.80	Substantial agreement
0.81 – 1.00	Almost perfect agreement

Table (7) Agreement (sensitivity, specificity and accuracy) for UBESS.

	RANZCOG/ AGES	Sensitivity	Specificity	PPV	NPV	Accuracy
UBESS						
I	49/52	94.2	95.8	96.1	93.9	95.0
II	15/18	83.3	93.9	75.0	96.3	92.0
III	28/30	93.3	98.6	96.6	97.2	97.0

5.Discussion

Endometriosis is a typical gynecologic condition that effects up to 10% of the overall female populace and is described by sores of endometrial-like tissue outside of the uterus that can be related with either or both pelvic agony and fruitlessness, yet now and again, it might likewise be available with no existing together indications [1].

There are 3 unique aggregates of endometriosis: shallow endometriosis, ovarian endometriomas (OE), and profound endometriosis (DE). Complete careful debulking of endometriosis at the principal medical procedure has been shown to give ladies the best advantage and relief from discomfort in the long haul.

The mean age of the contemplated cases was 29.92 ± 4.21 with scope of (24.0 – 37.0) a long time, mean weight was 76.88 ± 6.92 with scope of (65.0 – 88.90) kg, mean

tallness of the examined cases was 165.81 ± 5.98 with scope of (22.20 – 36.10) cm, mean BMI was 28.06 ± 3.22 with scope of 22.20 – 36.10) kg/m2, 86% of cases were from provincial regions, 45% were housewife.

In the investigation of Espada et al., [13], an aggregate of 155 ladies were remembered for the last examination. The mean and standard deviation were 32.7 +/ - 8.6 for age, 12.7+/ - 1.9 for period of menarche, 25.7 +/ - 8.4 for age at conclusion of endometriosis.

The current examination indicated that middle equality of the contemplated cases was 2 with scope of (0-6), middle past fetus removal was 2 with scope of (1-5), hypertension was in 6% of cases, diabetes in 2% of cases, introducing side effect was available in 57% of cases, Disfunctionalutrine seeping in 28% of cases, and .Dysmenorrhea in 15% of cases.

Our outcomes were upheld by investigation of Espada et al., [13] as they found that 88 (58%) patients have equality of at least 1, 38 (28.8%) have history of miscarriage(s), and 4 (3.1%) have past history of ectopic pregnancy.

The current examination indicated that 51% of cases had UBESS score I, 20% had score II and 29% had score III, 52% of cases had RANZCOG/AGES Level 1/½, 18% had Level 2/¾ and 30% had Level 3/6.

In the investigation of Menakaya et al., [10], Ninety-eight (49.2%) ladies had at any rate one laparoscopy for endometriosis inside the most recent 5 years before introduction. The serious laparoscopic specialists performed 88% (168/192) of the laparoscopic medical procedures remembered for this examination. Fifty-seven of 58 (98.3%) ladies requiring progressed laparoscopic medical procedure had their medical procedure performed by one of the eight progressed laparoscopic specialists experienced in the therapy of higher-stage endometriosis. One of the ladies in this gathering had an underlying symptomatic laparoscopy performed by a general laparoscopic specialist, before conclusive medical procedure by a serious laparoscopic specialist.

Reid et al., [14] uncovered that SE was available in 122/189 (64.6%) members. Disconnected infection with no proof of endometrioma/DE was available in 66/122 (54.1%). Histopathology was accessible for 75/122 (61.4%) members with SE. For the ladies with segregated SE, 32/66 (48.0%) members had histopathology affirmed. There was no distinction in the authentic factors between members with and without secluded SE. Back compartment DE was pictured in 57/189 (30.2%) members and 47/189 (24.9%) members had POD (pocket of Douglas) pulverization. Back compartment DE was affirmed in 44/47 (93.6%) members with POD pulverization who went through complete careful analyzation. Three members didn't go through POD dismemberment with resection of sickness; consequently, no histopathological conclusion was accomplished. Nonetheless, for every one of the three of these members, rectal DE was envisioned at preoperative TVS.

In the examination in our grasp, there is high huge connection between UBESS score and RANZCOG/AGES score with practically ideal arrangement between the two scores. Utilizing ROC bend, affectability of UBESS score I was 94.2%, particularity was 95.8%, PPV 96.1%, NPV 93.9%, exactness 95%, affectability of UBESS score II was 83.3%, explicitness was 93.9%, PPV 75%, NPV 96.3%, precision 92% and %, affectability of UBESS score III was 93.3%, particularity was 98.6%, PPV 96.6%, NPV 97.2%, exactness 97%.

Our outcomes were upheld by investigation of Espada et al., [13] as they detailed that the general precision of the UBESS in anticipating the RANZCOG/AGES laparoscopic expertise level was 98.1%. There was practically ideal understanding between the UBESS and the degrees of laparoscopic aptitude required at season of a medical procedure with a Cohen's kappa measurement of 0.97. The UBESS had the option to foresee all RANZCOG/AGES laparoscopic ability levels with precision more prominent than 98%. The UBESS characterization I was the most precise to anticipate RANZCOG/AGES aptitude levels 1/2. This present examination's outcomes recommend the UBESS takes into account precise triaging of ladies to the properly prepared specialist.

They revealed that the precision, affectability, particularity, positive prescient worth and negative prescient incentive for the presentation of UBESS at anticipating level 1 laparoscopic medical procedure were 86.5/86.6/86.5/85.3/87.7 percent, level 2 was 84.4/67.6/89.7/67.6/89.7 percent and level 3 were 90.8/82.5/94.1/84.6/93.1 percent, separately.

In the investigation of Espada et al., [13], in general, UBESS had the option to foresee all RCOG (Royal College of Obstetricians and Gynecologists) laparoscopic careful aptitude levels with an exactness >83%. UBESS III was better at foreseeing RCOG laparoscopic expertise level 3 than UBESS I and UBESS II were at anticipating RCOG laparoscopic aptitude levels 1 and 2, separately. Subsequent to barring those ladies who required careful ureterolysis without entrail endometriosis on TVS, the affectability of UBESS to anticipate all RCOG levels improved fundamentally, particularly in UBESS III to foresee RCOG level 3 (from 77.2% to 96.4%; $p < .05$).

Reid et al., (14) showed that the precision, affectability, explicitness, PPV and NPV for ovarian idleness at TVS and the presence of ipsilateral pelvic sidewall SE for the left ovary was: 71%, 16%, 87%, 27% and 78%, separately; and for the correct ovary was: 82%, 7.0%, 94%, 14% and 87%, individually.

In an investigation by Yong et al., a blend of TVS-and vaginal assessment evoked torment accomplished an affectability of 81% for members with anomalous shallow discoveries (without endometrioma or DE) on laparoscopy.

Chaabane et al., [15] uncovered that connection was discovered to be low among UBESS and RCOG (θ=0.22)

and among UBESS and CHI (θ=0.30). The forecast of the usable arrangement was useful for endometrioma, locales explicit delicacy, sliding sign, vaginal and stomach related parcel contribution; however unobtrusive for the foremost compartment and uterosacrals tendons.

As to et al., [10], the exactness, affectability, explicitness, positive and negative prescient qualities and positive and negative probability proportions of UBESS I for anticipating a necessity for Level-1 laparoscopic medical procedure were: 87.5%, 83.3%, 91.7%, 90.9%, 84.6%, 10 and 0.182; those of UBESS II for foreseeing Level-2 medical procedure were: 87.0%, 73.7%, 90.3%, 65.1%, 93.3%, 7.6 and 0.292; and those of UBESS III for anticipating Level-3 medical procedure were: 95.3%, 94.8%, 95.5%, 90.2%, 97.7%, 21.2 and 0.054, individually.

Moreover, Tompsett et al., [16] uncovered that the exactness, affectability, explicitness, positive prescient worth and negative prescient qualities and positive and negative probability proportions of the UBESS I to foresee the RANZCOG/AGES careful expertise levels 1/2 were: 99.4%, 98.9%, 100%, 100%, 98.5%, inf and .011; those of UBESS II to anticipate careful aptitude levels 3/4 were: 98.1%, 96.8%, 98.4%, 93.8%, 99.2%, 60 and .033; and those for UBESS III to foresee careful ability level 6 were: 98.7%, 97.2%, 99.2%, 97.2%, 99.2%, 115.7 and 0.028, separately. The pace of accurately anticipating the specific degree of aptitudes required was 98.1%, and Cohen's kappa measurement for the understanding between UBESS forecast and levels of preparing needed at a medical procedure is 0.97, demonstrating practically wonderful arrangement.

6.Conclusion

UBESS could be used to foresee the degree of unpredictability of laparoscopic medical procedure for endometriosis. It performed best in the preoperative emergency of ladies with higher-stage endometriosis. UBESS can possibly encourage the emergency of ladies with higher-stage endometriosis to the most proper careful aptitude for laparoscopic intercession.

References

[1] N.P. Johnson, L .Hummelshoj, G.D .Adamson, World Endometriosis Society consensus on the classification of endometriosis. Hum Reprod, Vol.32, PP.315–324,2017.

[2] D.J.Wall, M.C.Javitt, P.Glanc, ACR Appropriateness criteria-infertility. Ultrasound Q , Vol.31(1), PP.37, 2015.

[3] J.A .Sampson,peritoneal endometriosis due to menstrual dissemination of endometrial tissue into the peritoneal cavit. Am J ObstetGynecol, Vol.14, PP.442, 1927.

[4] L.F. Jerman, A.J. Hey-Cunningham,T e role of the lymphatic system in endometriosis: a comprehensive review of the literature. BiolRepord, Vol.92(3), PP.64, 2015.

[5] S. Mechsner, M .Weichbrodt, W.F .Riedlinger, estrogen and progestogen receptor positive endometriotic lesions and disseminated cells in pelvic sentinel lymph nodes of patients with deep infiltrating rectovaginal endometriosis: a pilot study. Hum Reprod, Vol.23(10), PP.2202, 2008.

[6] R.E. Batt, J.Yeh, Mullerianosis,four developmental (embryonic) mullerian diseases. ReprodSci, Vol.20(9), PP.1030, 2013.

[7] K.D.Ballard, H.E.Seaman, C.S.de Vries, et al:Can symptomatology help in the diagnosis of endometriosis? Findings from a national case-control study part 1. BJOG , Vol.115(11), PP.1382, 2008.

[8] L.Fedele, S .Bianchi, L .Bocciolne, pain symptoms associated with endometriosis. ObstetGynecol, Vol. 79, PP.767, 1992.

[9] C.Exacoustos, L. Manganaro, E. Zupi,Imaging for evaluation of endometriosis and adenomyosis. Best Pract Res ClinObstetGynecol, Vol.28(5), PP.655, 2014.

[10] U.Menakaya, S.Reid, F.Infante, G.Condous, Systematic evaluation of women with suspected endometriosis using a 5-domain sonographi- cally based approach. J Ultrasound Med, Vol.34, PP.937–947, 2015.

[11] V.GOMEL, M.G.MUNRO, Principles of laparotomic and vaginal 6 surgery. Reconstructive and Reproductive Surgery in Gynecology: Two Volume Set, 85,2018.

[12] M.E. Coccia, F.Rizzello,Ultrasonographic staging: a new staging sys- tem for deep endometriosis. Ann N Y AcadSci, Vol.1221, PP.61–69,2011.

[13] M. D. Espada, G .Condous,J.Tompsett, Ultrasound-based endometriosis staging system (UBESS): validation study to predict complexity of laparoscopic surgery, 2018.

[14] S.Reid, M.Espada, G.Condous, Ultrasound-based endometriosis staging system: validation study to predict complexity of laparoscopic surgery. Journal of minimally invasive gynecology, Vol. 26(3), PP. 477-483,2019.

[15] C.Chapron, L.Marcellin, B.Borghese, P.Santulli, Rethinking mechanisms, diagnosis and management of endometriosis. Nature Reviews Endocrinology, Vol. 15(11), PP. 666-682,2019.

[16] J.Tompsett, Ultrasound-based endometriosis staging system (UBESS): validation study to predict, complexity of laparoscopic surgery,2018.