

Ultrasound Characterization of Abdominal Wall Endometriosis

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Abstract

Background: Aim: Our aim in this study is to define the ultrasound finding in the patients have abdominal wall mass proven by postoperative histopathology as abdominal wall endometriosis.

Patients & Methods: A cross sectional study was done from first of August 2016- first of September 2019 in Baghdad governorate. The study included 32 patients. Diagnosis done by superficial ultrasound examination.

Results: 32 female have done at least 1 Cesarean section the commonest presenting symptom was pain in 90% of patients , all the lesions were hypoechoic in texture , with heterogeneity and small foci of echogenicity in 75% of our population , the consistency of the lesions was purely solid in 93.8% of lesions ,on color Doppler only 18.7% was avascular , the resistive index of the arterial flow was below 0.70 in 31 % of patients ,on elastography 78.5% of lesions was hard , the accuracy of assessment of muscle infiltration was 71% ,the ultrasound was the only imaging required preoperatively in 85% of our patients , the ultrasound was able to discriminate between endometrioma and collection or hernias in all patients and was the in the differential diagnosis list in about 90% of our population

Conclusion: the ultrasound characteristics of abdominal wall endometriosis if combined with clinical features and symptoms of the patients is excellent preoperative imaging modality to reach the diagnosis and exclude other lesions and accurately assessing muscle invasion in most of cases for proper surgical planning

Key words: cesarean section, abdominal wall, endometriosis, ultrasound, elastography.

Introduction

Endometriosis is a term describing any abnormal presences of endometrial stromal tissue outside the normal outlines of endometrial cavity [1]. endometriosis considered one of the common gynecological problem its incidence reaching to about 15% of women at productive age [2] the most common site of this entity is the pelvic region [3] , it is rarely found in extra pelvic

region . the abdominal wall endometriosis (AWE) considered one of the rare sites of endometriosis its incidence is about 0.3-3.5 % of population [4]. Although its predisposing factor is previous surgery mostly CS or other gynecological surgical interventions but it may include other abdominal wall endometriosis without any previous surgery [5]. Many theories are sets to describe the cause of this condition but the most accepted one is the implantation of endometrial tissue during surgery , which subsequently proliferate under hormonal effect [6,7]. the clinical symptoms of abdominal wall endometriosis include , periodic abdominal wall pain mainly during menses and palpable lump [8]. This entity of disease is misdiagnosed as granuloma or abdominal wall hernia , or malignant soft tissue tumors [1,3,9]. That's why AWE is underestimated as its clinical and radiological signs are non specific [1,3].

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Aim

Our aim in this study is to define the ultrasound characteristics of the abdominal wall endometriosis as rare entity and to emphasize the importance of ultrasound in its diagnosis

Patients and Method

Ethical consideration: The researchers consider taking the permission from patients before data collection and explaining the aim of the study for them. The study included patients who agree to participate, and assure of them about the confidentiality and privacy of their information.

Study design: The current study is prospective study performed from first of August 2016- first of September 2019 in Baghdad governorate.

Sampling: There were 32 patients included in current study. The patients were referred to ultrasound privet clinic to perform abdominal ultrasound examination complaining form pain along the scar of previous cesarean section scar. All cases are undergo surgical resection and all lesions are proved by histopathological study as abdominal wall endometriosis. All of the patients included in this study have been examined by ultrasound prior to surgery by expert radiologist. The ultrasound examination including gray scale , Doppler scans and elastography .

Machine & Scan protocol: The abdominal ultrasound examination was done using E-CUBE 11 ultrasound machine of high-density single crystal linear transducer (3-12MHz) (SC3-12H).

Result

the age of the patients included in this study ranging from 17-41 year old the mean is about 30.4 year with standard deviation (SD) of 2.1 years , all patients have previous SC ,78 % are multiparous women with average CS is (2.7) . The commonest presenting symptoms are pain at menses and lump . about 90 %of our population are presented with abdominal pain , from those about 82% the pain is related to menstrual period, and bout 18% have non specific or continues pain ,while the 65% of patients presented with a lump at lower abdominal region

Sonographic Characteristics of AWE:

B mode all the lesions was hypoechoic although about 75% of lesions was heterogeneous with small echogenic foci, the lesions borders was irregular in about 87% of our population , and ill defined in about 65.6%,the consistency of the lesion is solid in 93.5% of our patients and cystic changes seen in 6.5 % only. The length of the lesions was ranging from 11.7 -41 mm with average 20.8 mm mean round index was 1.7 .

Doppler US: the lesions show internal vascularity in about 71.8 % , peripheral vascularity seen in about 9.37%, while avascular lesions were seen in 18.75 .

The use of power Doppler didn't change this ratio of internal vascularity detection in regard to our study .

The Resistive index of the lesion ranging from 0.54 -1 and it measured above 0.70 in 50% of patients and its below 0.70 in 31.25% of patients, the other lesions was avascular on color Doppler

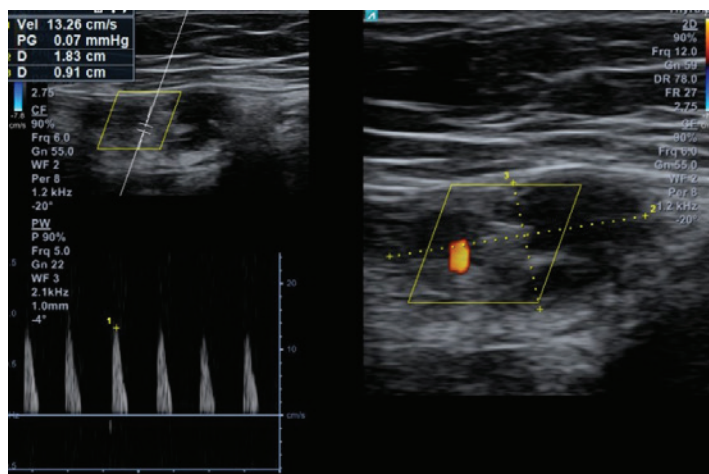


Fig (1) color and spectral Doppler ultrasound in a 33 year old female ,an ill defined border heterogeneous hypoechoic oval shape mass measured 18 x 9 mm invading the muscle with internal vascularity

Elastography

The lesions shows significant increase of tissue strain in comparison to surrounding tissue , the lesions was hard in 87.5% of our population . the elasto/ B ratio is more than 1 in 41% while lesions was similar in size or the hard tissue is smaller than the lesion in 59 % of the lesions the radiological findings of AWE are listed at **Table (1)**.

Table 1 : ultrasound findings of abdominal wall endometriosis.

Lump characteristics	Number (total=32)	%
By ultrasound		
Well define margins	4	12.5
Ill define margins	28	87.5
Echogenicity		
Hypoechoic	32	100
Echogenic	0	0
Homogeneity		
Heterogeneous	24	75
Homogenous	8	25
Cystic changes		
Yes	2	6.3
No	30	93.8
By Doppler		
Peripheral vascularity	3	9.4
Internal vascularity	23	71.9
No vascularity	6	18.7
Spectral Doppler		
High RI >70	16	50
Low RI <70	10	31.25
Avascular	6	18.75
Elastography		
Hard	28	87.5
Soft	4	12.5

Assessment of Depth and Wall Invasion

The detection of muscular and fascial involvement is mandatory for proper operative planning , the assessment of muscle involvement is assessed by B mode the muscle

involvement proved by surgery in about 53 % of patients while , the accuracy of muscle involvement was 71.8% , the negative predictive value was 60% as seen in **Table (2)**.

Table 2 : Assessment of depth and abdominal wall invasion.

Depth of the lesion- Number (total=32)						
By Ultrasound	n	Percent	True negative	False negative	True positive	False positive
Superficial	12	37.5				
Muscular	20	62.5	9	3	14	6
By surgery						
Superficial	15	46.9				
Muscular	17	53.1				

Diagnosis of the Lesion

The radiological findings of endometriosis was not specific but the endometriosis was one of the differential diagnosis in 90.6% of the patients in our study . the other differential diagnosis was granuloma , soft tissue sarcoma and desmoid tumors .

Ultrasound was very sensitive exclude all the patients that was clinically suspected to be hernias or collections , The CT scan and MRI was used to confirm US findings and to exclude malignancy and muscle extension in some patients only . CT sac used in about 6% and MRI used in about 9% of our patients.

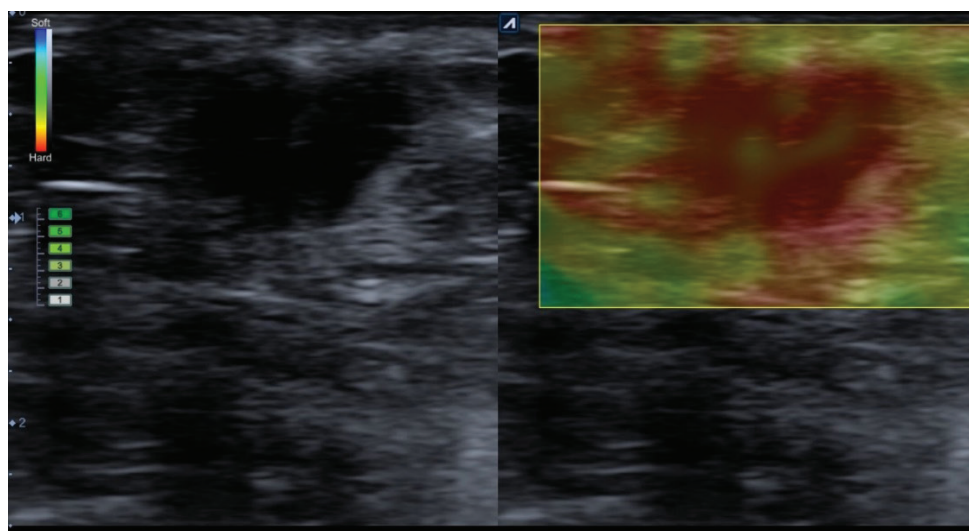


Fig (2) : longitudinal section view shows 11.7 x 8 mm subcutaneous endometrioma in a multiparous 27year old woman. The nodule is irregular margins hypochoic in texture dose not infiltrating the muscle fascia , the lesion is hard on elastography .

Discussion

the most common presenting symptom is pain in about 90 % mainly related to menstrual cycle in about 75% while felling of lower abdominal mass was described in about 65% of our population ,the cyclical pain is the presenting symptom in most of studies [3,5,6,10], this finding was compatible with this study the cyclical pain was presenting symptom in 75% while [3],

found that the pain the commonest presenting symptom in about 80% but the cyclical pain was seen in 44% only [11], in other study the first presenting symptom was mass and lump feeling in 98.5 % and cyclical pain was less frequent in about 86.9% according to [12].

Cesarean section was the predisposing factor for development of AWE in our population ,this was agreed by [1,3,12], that all the patients in their studies doing CS or

other gynaecological surgery [6] spontaneous abdominal wall endometriosis was emphasis in many studies [11], 2 of 72 patient have no previous surgery, [13] reported 9% of his patients was not associated with previous surgery, and the comments site of this lesions was the umbilicus, this was compatible with [10], who found 17% of niliparous, female with no previous surgery developed abdominal wall endometriosis, all are located at umbilical region 14 and in some series spontaneous endometriosis was high reaching to 20%.

the ultrasound the first choice of imaging exam in evaluation of abdominal wall endometriosis [7,3,15], the ultrasound was able to identify all the lesions in our patients this was close to the finding the sonography was able to show the endometrioma in 92% of his patients [1].

although the ultrasound findings of AWE is not specific but it can exclude some of the lesions that may mimic endometriosis such as hernia, abscess collection or hematoma [1,16].

all the patients in our study do at least one ultrasound examination. some patient with high suspicion of malignancy or difficult examination such as in obese patients

the sonographic findings in B mode in most of the lesions was an ill defined irregular heterogeneous hypoechoic solid mass with multiple small echogenic focuses inside the lesions these findings are similar to many studies [1,3,5,7,15,16], although some of our patients shows some atypical finding as cystic component was seen in 6% of our population, the cystic changes in endometriosis is rare findings and it reported in many literature [1,3,5,15, 16], our result was compatible to L. SAVELLI et al who found small cystic changes in 2% of patients [5].

on color Doppler 81.2 % of our population shows peripheral or central vascularity this was relatively comparable to result of other studies [3], which found internal and peripheral vascularity in about 83% and avascular in only 2 patients. while other studies [1], found all the lesions was vascular on color Doppler.

no vascularity can be seen in about 18.8% . the avascular lesions was small in size < 2 cm in widest diameter and located within SC the explanation of this could be due to small vessels which can not be detected by Doppler US or due to its growth within hypovascular SC tissue. [16] in one of the studies the internal vascularity

can not be seen in all lesions smaller than 15 mm [17]

, the Resistive index was high in about 62.5% of vascular lesion and the with average of RI is about 0.71 the high impedance this was compatible to many literatures [3,19,17,18].

Elastography : to our knowledge few literatures write about the characteristics of abdominal wall endometriosis, we found that elastography was hard in 87.5% of patients, the elasto/B ratio in assessment of size was more than 1 in about 59% of patients with average 1.1 which can be interpreted by the histopathological findings of inflammatory cells infiltration in the subcutaneous tissue which alter the normal elastographic characteristics of the surrounding fatty tissue [5].

In one study the use of elastography to assess fascia and muscle involvement shows improvement from 33% to 87.9% by elastography. [20], the accuracy of ultrasound in detection of muscle involvement was 71% with negative predictive value about 60%.

Conclusion

The Presence of an ill defined oval shape hypoechoic mass near the cesarean section scar with internal or peripheral vascularity on Doppler ultrasound which significantly increase tissue strain on elastography if combined with repeated cyclical aggravated pain are strong evidences of suggesting endometriosis. the ultrasound is excellent preoperative imaging modality to reach the diagnosis and exclude other abdominal lesions and it accurately assessing the muscle and fascia involvement in most of the patients

Conflict of Interest : Nil .

Source of Funding : No Source of funding : the researchers **them self** .

Ethical Clearance: Committee members are approved to perform a study about:

“ULTRASOUND CHARACTERIZATION OF ABDOMINAL WALL ENDOMETRIOSIS”

After discussion of study plan with researchers:

- Mohammed Bader Hassan
- Omar Muayad Sultan
- Adnan Mohammed Brayyich

References

1. Jan-Hein J. Hensen¹ Adriaan C. Van Breda Vriesman² Julien B. C. M. Puylaert¹, Abdominal Wall Endometriosis: Clinical Presentation and Imaging Features with Emphasis on Sonography, *AJR* 2006; 186:616–620
2. Patterson GK, Winburn GB. Abdominal wall endometriomas: report of eight cases. *Am Surg* 1999; 65:36–39
3. G. Francica, C. Giardiello, G. Angelone, S. Cristiano, R. Finelli, and G. Tramontano, “Abdominal wall endometriomas near cesarean delivery scars: sonographic and color Doppler findings in a series of 12 patients,” *Journal of Ultrasound in Medicine*, vol. 22, no. 10, pp. 1041–1047, 200
4. Nominato NS, Prates LF, Lauer I, Morais J, Maia L, Geber S. Cesarean section greatly increases risk of scar endometriosis. *Eur J Obstet Gynecol Reprod Biol* 2010; 152: 83-5.
5. L. SAVELLI, L. MANUZZI, N. DI DONATO, N. SALFI, G. TRIVELLA, M. CECCARONI and R. SERACCHIOLI ,Endometriosis of the abdominal wall: ultrasonographic and Doppler characteristics *Ultrasound Obstet Gynecol* 2012; 39: 336–340
6. Mustafa Kaplanoglu, Dilek Kaya Kaplanoğlu, Ceren Dincer Ata, and Selim Büyükkur , Clinical Study Obstetric Scar Endometriosis: Retrospective Study on 19 Cases and Review of the Literature Hindawi Publishing Corporation International Scholarly Research Notices Volume 2014, Article ID 417042, 5
7. Fatimah Alnafisah , Shaimaa K. Dawa , Sherif Alalf v Skin Endometriosis at the Caesarean Section Scar: A Case Report and Review of the Literature *cureus* 2018
8. Blanco RG, Parthivel VS, Shah AK, Gumbs MA, Schein M, Gerst PH. Abdominal wall endometriomas. *Am J Surg* 2003; 185: 596–598.
9. Wolf Y, Haddad R, Werbin N, Skornick Y, Kaplan O. Endometriosis in abdominal scars: a diagnostic pitfall. *Am Surg* 1996;62:1042-1044
10. Horton JD, DeZee KJ, Ahnfeldt EP, Wagner M. Abdominal wall endometriosis: a surgeon’s perspective and review of 445 cases. *Am J Surg* 2008; **196**: 207–212.
11. Nilo Sérgio NominatoI; Luis Felipe Victor Spyer PratesI; Isabela LauerII; Jaqueline MoraisII; Laura MaiaII; Selmo Geber ,Surgical scar endometriosis: retrospective study of 72 cases , *Brazilian Journal of Gynecology and Obstetrics* , vol.29 no.8 Rio de Janeiro Aug. 2007
12. Ping Zhang, Yabing Sun, Chen Zhang, Yeping Yang, Linna Zhang, Ningling Wang, and Hong Xu Cesarean scar endometriosis: presentation of 198 cases and literature review *BMC Women’s Health* (2019); 19:14
13. Amanda M. Ecker, MD; Nicole M. Donnellan, MD; Jonathan P. Shepherd, MD, MSc; Ted T. M. Lee, MD Abdominal wall endometriosis: 12 years of experience at a large academic institution *American Journal of Obstetrics & Gynecology* OCTOBER 2014 363.e5
14. Sandra Marrasa*, Nicola Pluchino, Patrick Petignata, Jean-Marie Wengerb, Frédéric Risc, Nicolas C. Buchsc, Jean Dubuisson Abdominal wall endometriosis: An 11-year retrospective observational cohort study *European Journal of Obstetrics & Gynecology and Reproductive Biology: X* 4 (2019) 100096
15. Rita Gidwaney, MD Ruth L. Badler, DO Benjamin L. Yam, MD John J. Hines, MD , Vlada Alexeeva, MD , Virginia Donovan, MD , Douglas S. Katz, MD , Endometriosis of Abdominal and Pelvic Wall Scars: Multimodality Imaging Findings, Pathologic Correlation, and Radiologic Mimics, *ovember-December 2012 radiographics.rsna.org*
16. Abdominal wall endometriosis: an update in clinical, imagistic features, and management options. Mihaela Grigore^{1,2}, Demetra Socolov¹, Ioana Pavaleanu¹, Ioana Scripcariu¹, Ana Maria Grigore³, Romeo Micu⁴ *Med Ultrason* 2017, Vol. 19, no. 4, 430-437
17. Francica G, Scarano F, Scotti L, Angelone G, Giardiello C. Endometriomas in the region of a scar from Cesarean section: sonographic appearance and clinical presentation vary with the size of the lesion. *J Clin Ultrasound* 2009;37:215220.
18. Woodward PJ, Sohaey R, Mezzetti TP. Endometriosis: radiologic–pathologic correlation. *RadioGraphics* 2001; 21:193–216
19. Solak A, Genç B, Yalaz S, Sahin N, Sezer TÖ, Solak I. Abdominal wall endometrioma: ultrasonographic features and correlation with clinical findings. *Balkan Med J* 2013; 30: 155-60.
20. Wozniak S, Czuczwar P, Szkodziak P, et al.

Elastography improves the accuracy of ultrasound in the preoperative assessment of abdominal wall endometriosis. *Ultraschall Med* 2015;36:623-629.