Triaging of eccentric gestational sac in early pregnancy using two dimensional and three dimensional transvaginal ultrasound

Keywords: interstitial ectopic pregnancy, rudimentary horn, cornual pregnancy, angular pregnancy, 3D transvaginal ultrasound.

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Abstract

Objectives: Interstitial ectopic pregnancy and pregnancy in a rudimentary horn of a unicornuate uterus are rare forms of ectopic pregnancy but carry a high risk for maternal morbidity and mortality. Their diagnosis is challenging and can be misdiagnosed with less dangerous conditions; namely: angular pregnancy or pregnancy in one side of septate or bicornuate uterus. This study aimed to differentiate between these four situations to allow early detection that will enhance the prognosis.

Methods: This is a retrospective study, carried out on 26 patients referred to a private referral center for obstetric and gynecology sonography, in the period from November 2019 till November 2020. All cases were referred due to unusual eccenteric location of the gestational sac. In each case we assessed 3 variables using 2D -TVUS which were: relation to the endometrium , interstitial line sign and condition of the overlying myometrium. We assessed also 2 variables using 3D- TVUS which were: shape of the uterine cavity and the relation of the gestational sac to the uterotubal junction.

Results: It was found that the gestational sac (GS) is within the endometrium in angular pregnancy and pregnancy in septate and bicornuate uterus while GS is outside the endometrial interface in interstitial ectopic pregnancy and pregnancy in rudimentary horn of unicornuate uterus. The interstitial line sign was +ve and the overlying myometrium was thin only in interstitial ectopic pregnancy. Cavity was normal in angular and interstitial ectopic pregnancy but it has a Mullerian fusion anomaly in cases of pregnancy in rudimentary horn of a unicornuate uterus and cases with pregnancy in one side of a septate or bicornuate uterus. GS was lateral to the uterotubal junction in interstitial ectopic pregnancy and pregnancy in rudimentary horn of unicornuate uterus but it was medial to it in the other 3 situations.

Conclusion: Our study described a simple triaging model based on sonographic criteria for four pregnancy situations where the gestational sac appears eccenterically in the early 1st trimester. These four situations are namely; interstitial ectopic pregnancy, ectopic pregnancy in a rudimentary horn of a unicornuate uterus,

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angular pregnancy and pregnancy in one side of a septate or bicornuate uterus. This model will be helpful for early accurate diagnosis to avoid false positive diagnosis that may lead to unnecessary intervention and false negative diagnosis that may lead to maternal morbidity or mortality.

Introduction

Ectopic pregnancy (EP) is implantation of the gestational sac outside the endometrium near the fundus, which is the normal site of implantation. EP accounts for about 1-2% of pregnancies and represents a major cause of maternal morbidity and mortality in early pregnancy especially in developing countries. Most of the complications caused by EP are due to its late detection.[1-3]

The commonest location for ectopic pregnancy is the ampulla of the fallopian tube that accounts for more than 90% of the ectopic pregnancy cases. One of the rare sites of ectopic pregnancy is the interstitial ectopic pregnancy that represent about 2-4% of the all ectopic pregnancies. It occurs in the intramural part of the fallopian tube and though it is less common than the ampullary tubal ectopic pregnancy, its complications are significantly higher and its diagnosis and management are more challenging.[4]

Angular pregnancy is totally different from the interstitial ectopic pregnancy, the first represents a gestational sac implanted inside endometrium at the superior lateral angle of the cavity medial to the uterotubal junction. Gestational sac in pregnancy in one side of septate or bicornuate uterus is also implanted within the endometrium medial to the uterotubal junction. Angular pregnancy and pregnancy in one side of septate and bicornuate uterus are considered intrauterine pregnancies rather than ectopic pregnancies.[5,6]

Cornual pregnancy is a term to describe a pregnancy in a uterus with anomaly. It could be either intrauterine pregnancy in cases where gestational sac implanted in one side of septate/bicornuate uterus or ectopic pregnancy where gestational sac implanted in the rudimentary horn of a unicornuate uterus. The latter represents an extremely rare form of ectopic pregnancy with high rate of complications.[4-6]

With the wide spread use of high-resolution transvaginal 2D and 3D sonography, most of the early pregnancy abnormalities can be diagnosed early, and hence conservative management can be used. Most of the obstetricians have a limited experience in differentiating interstitial ectopic pregnancy & pregnancy in a rudimentary horn of a unicornuate uterus from angular pregnancy and pregnancy in septate or bicornuate uterus. The first two conditions are worrisome, so early detection and management is warranted. The later 2 conditions are of better prognosis and their management will be just follow up.[6]

In our study, we will describe the ultrasonographic diagnostic clues for these 4 situations to establish a triaging model for eccentrically located gestational sac early in pregnancy to avoid false negative diagnosis that may lead to maternal complications and false positive diagnosis that may lead to unnecessary procedures.

Aim of the work

To evaluate the differential diagnosis of eccentrically located gestational sac early in pregnancy.

Patients and Methods

This is a retrospective study, carried out on 26 patients referred to a private referral center for obstetric and gynecology sonography; in the period from November 2019 till November 2020.

All cases were referred due to an unusual eccentric location of the gestational sac in the early 1st trimester sonographic assessment. All cases were evaluated according to age, obstetric history and gestational age at diagnosis.

The ultrasound was done by the same sonographer using Samsung HS 60 apparatus; 2 dimensional (2D) and 3 dimensional (3D)

transvaginal ultrasound (TVUS). In each case we assessed 5 variables which were: relation of the gestational sac (GS) to the endometrium, interstitial line sign, condition of the overlying myometrium, shape of the uterine cavity and the relation of the GS to the uterotubal junction. The first 3 variable were assessed using 2D-TVUS and the last 2 variables were assessed using 3D-TVUS.

Results

This study was carried out on 26 cases, who were classified into five categories; angular pregnancy (11 cases), pregnancy in one side of a septate uterus (6 case), pregnancy in one horn of a bicornuate uterus (4 cases), interstitial ectopic pregnancy (3 cases) and ectopic pregnancy in the rudimentary horn of a unicornuate uterus (2 cases). There was no significant difference between the five categories regarding the age and gestational age. The gravidity and parity were significantly lower in cases of pregnancy in bicornuate uterus and cases of ectopic pregnancy in rudimentary horn of unicornuate uterus. The incidence of previous abortion was also significantly higher in these two categories. (Table 1).

Regarding the ultrasound findings, it was found that the gestational sac (GS) is within the endometrium in angular pregnancy and pregnancy in septate and bicornuate uterus while GS is outside the endometrial interface in interstitial ectopic pregnancy and pregnancy in rudimentary horn of unicornuate uterus.

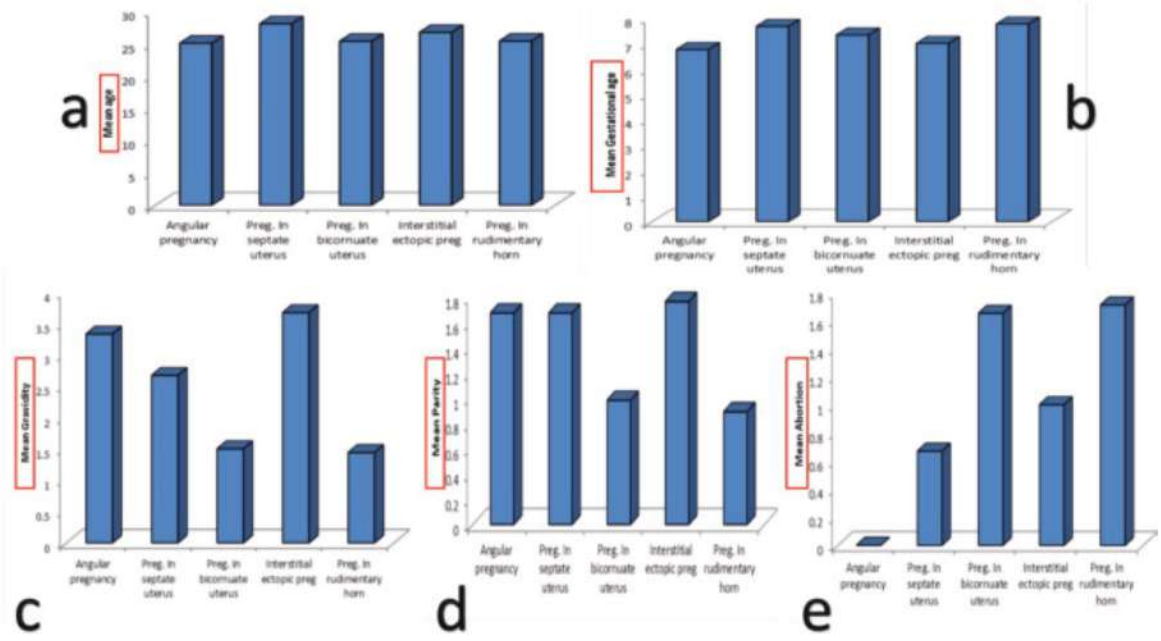
The interstitial line sign is an echogenic line from the endometrium to the eccentric gestational sac (it represents the coapted margins of the interstitial portion of the tube). It is seen in the transverse or semi-axial planes. The interstitial line sign was +ve and the overlying myometrium was thin only in cases with interstitial ectopic pregnancy.

Cavity was normal in angular and interstitial ectopic pregnancy but it has a Mullerian fusion anomaly in cases of pregnancy in rudimentary horn of a unicornuate uterus and cases with pregnancy in one side of a septate or bicornuate uterus. GS was lateral to the uterotubal junction in interstitial ectopic pregnancy and pregnancy in rudimentary horn of unicornuate uterus but it was medial to it in the other 3 situations.

Table (1): Comparison between different categories regarding basic demographic and clinical data.

Variables	Angular pregnancy	Preg. In septate uterus	Preg. In bicornuate uterus	Interstitial ectopic preg.	Preg. In rudimentary horn	P value
Age (years)	25 ± 1.73	28± 4.62	25.3 ±2.21	26.67 ±3.79	25.33± 3.21	0.201 N.S.
Gravidity	3.33± 0.58	2.67± 0.58	1.50±0.36	3.67 ±0.58	1.44±0.41	0.012*
Parity	1.67 ±0.58	1.67 ±0.58	0.98±0.22	1.76 ±0.58	0.89±0.36	0.003*
Abortion	0.00 ± 0.00	0.67± 1.15	1.65±0.52	1.00 ±0.00	1.71±0.61	0.017*
Gestational age (GA: weeks)	6.76± 1	7.67 ±1.15	7.33± 0.58	7.00± 1	7.76 ±1.34	0.208 N.S.

N.S. : not significant , *: clinically significant

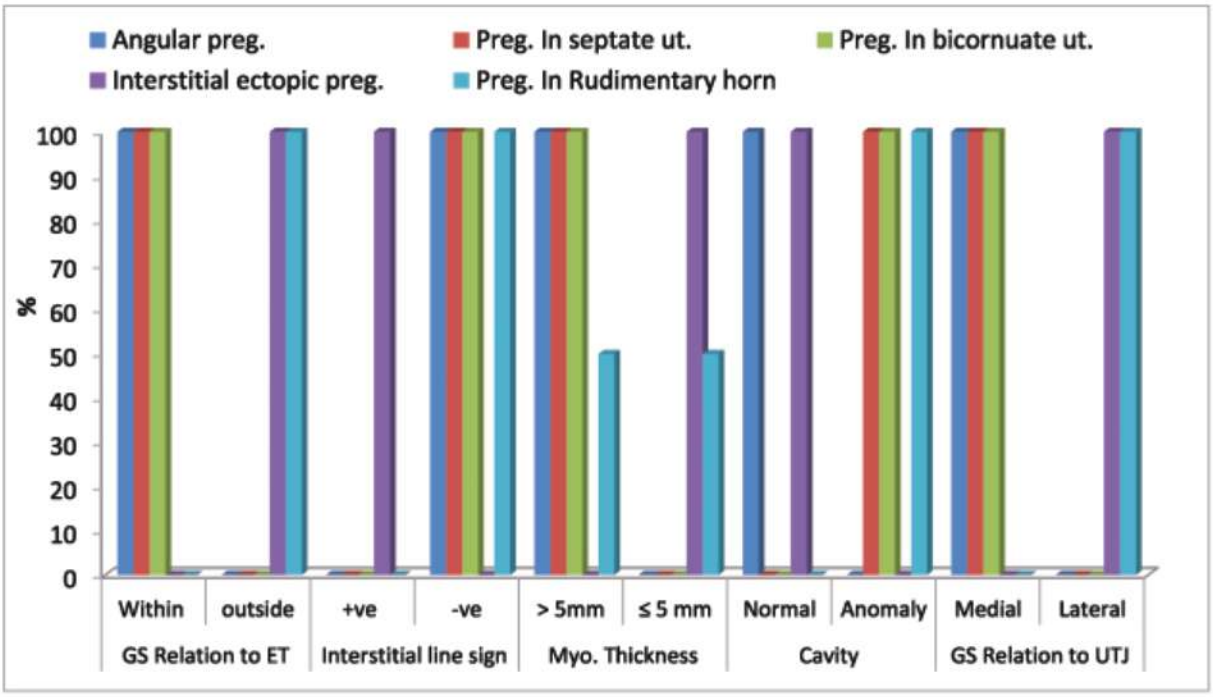


Figures (1): Comparison between different categories regarding basic demographic and clinical data. [a] age. [b] gestational age. [c] gravidity. [d] parity. [e] previous abortions.

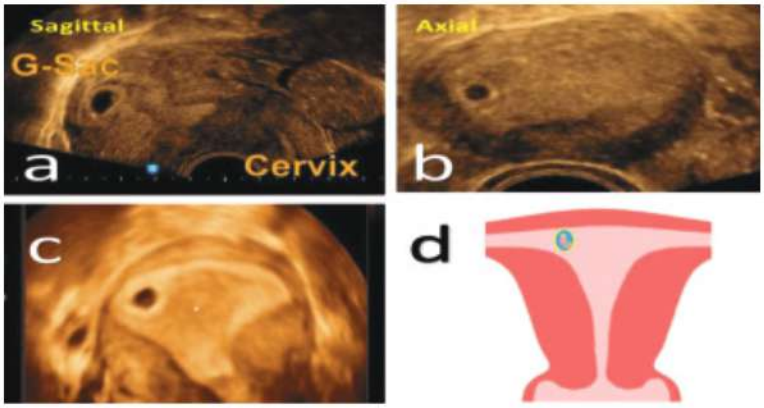
Table (2): Comparison between different categories regarding ultrasound findings.

Variables	Angular preg.		Preg. In septate ut.		Preg. In bicornuate ut.		Interstitial ectopic preg.		Preg. In Rudimentary horn		Total	P value
	No.	%	No.	%	No.	%	No.	%	No.	%		
GS Relation to ET												
Within	11	100	6	100	4	100	0	0	0	0	21	
outside	0	0	0	0	0	0	3	100	2	100	5	0.0028*
Interstitial line sign												
+ve	0	0	0	0	0	0	3	100	0	0	3	
-ve	11	100	6	100	4	100	0	0	2	100	23	0.017*
Myo. thickness												
> 5mm	11	100	6	100	4	100	0	0	1	50	22	
≤ 5 mm	0	0	0	0	0	0	3	100	1	50	4	0.0036*
Cavity												
Normal	11	100	6	100	0	100	3	100	0	0	14	
Anomaly	0	0	0	0	4	0	0	0	2	100	12	0.001*
GS Relation to UTJ												
Medial	11	100	6	100	4	100	0	0	0	0	21	
Lateral	0	0	0	0	0	0	3	100	2	100	5	0.0024*

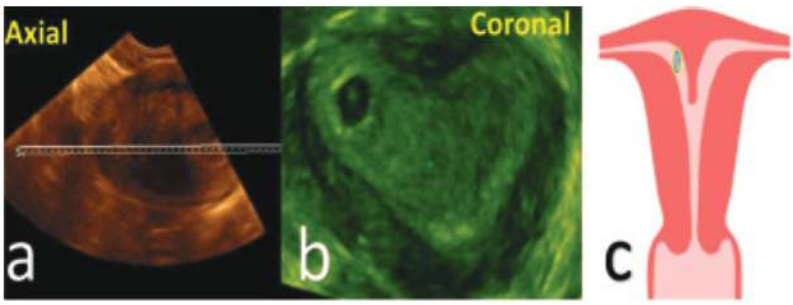
GS: gestational sac. ET: endometrium. Myo.: Overlying myometrial thickness.
UTJ: uterotubal junction.
*P value <0.05 → clinically insignificant



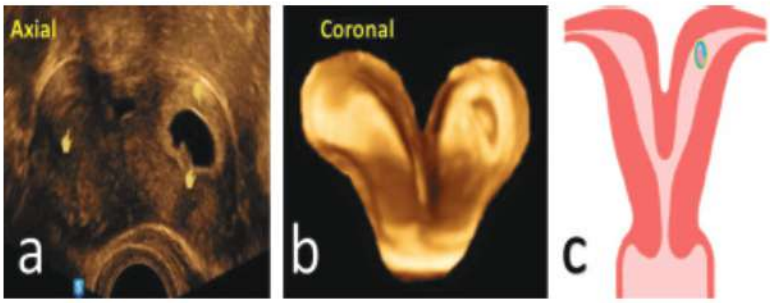
Figures (2): Comparison between different categories regarding ultrasound findings.



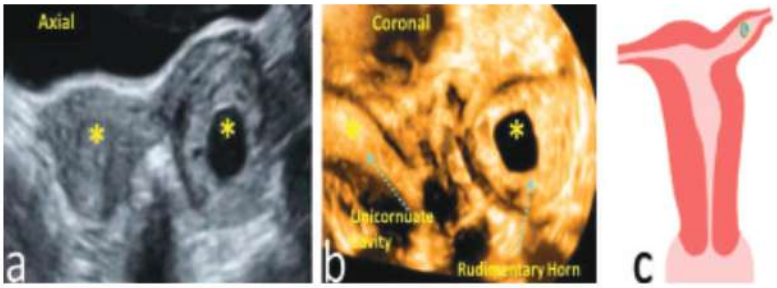
Figures (3): Angular pregnancy. [a] sagittal view using 2D-TVUS. [b] axial view, 2D-TVUS. [c] coronal view using 3D-TVUS. [d] diagram. In angular pregnancy; gestational sac was eccentwerially located but within the endometrial cavity, medial to the uterotubal junction.



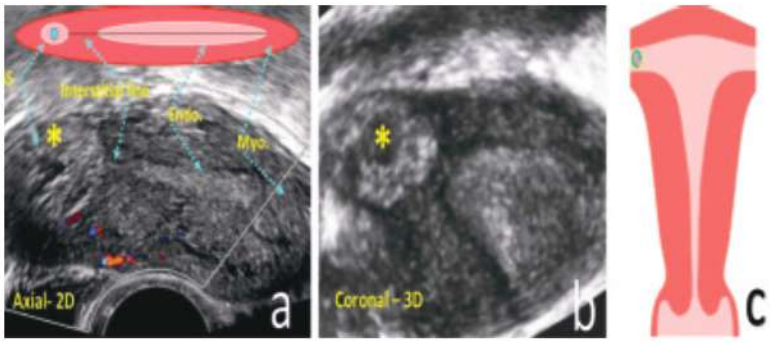
Figures (4): Pregnancy in one side of a septate uterus. [a] sagittal view using 2D-TVUS. [b] coronal view using 3D-TVUS. [c] diagram. In pregnancy in a septate uterus the gestational sac is eccentric but within the endometrial cavity medial to the uterotubal junction in one side of the septum.



Figures (5): Pregnancy in one side of a bicornuate uterus. [a] sagittal view using 2D-TVUS. [b] coronal view using 3D-TVUS. [c] diagram. In pregnancy in a bicornuate uterus the gestational sac is eccentric but within the endometrial cavity medial to the uterotubal junction in one horns of the bicornuate uterus.



Figures (6): Ectopic pregnancy in a rudimentary horn of a unicornuate uterus. [a] sagittal view using 2D-TVUS. [b] coronal view using 3D-TVUS. [c] diagram. In pregnancy in a rudemintary horn the gestational sac is eccentric and is surrounded by a myometrium of variable thickness and it is located lateral to the uterotubal junction of the main horn.



Figures (7): Interstitial ectopic pregnancy. [a] sagittal view using 2D-TVUS. [b] coronal view using 3D-TVUS. [c] diagram.

Discussion

Cornual, angular and interstitial pregnancy are unfortunately still used interchangeably although they are completely different. Cornual pregnancy is a pregnancy in a uterus with anomaly; e.g.: septate, bicornuate or unicornuate uteri. Angular pregnancy is an intrauterine pregnancy near the cornu of the uterus but medial to the uterotubal junction. Interstitial pregnancy is an ectopic pregnancy in the medial part of the Fallopian tube(i.e. the intramural part of the tube).[4-6]

Interstitial ectopic pregnancy and ectopic pregnancy in the rudimentary horn of a unicornuate uterus are rare forms of ectopic pregnancies but they carry a high risk for maternal morbidity and mortality. They could be misdiagnosed with less dangerous conditions; namely: angular pregnancy and pregnancy in one side of septate or bicornuate uterus. This study aimed to differentiate between these 4 situations to allow early detection that will enhance the prognosis.[4-6]

The following table summarize the variables that we had used in our study to objectively assign the type of pregnancy detected in an eccentric location in early pregnancy.

Criteria		Septate - Bicornuate	Angular	Interstitial	Rudimentary horn Of unicornuate uterus
2D- TVUS	Relation to the endometrium	Within the endometrium		Outside the endometrium	
	Interstitial Line Sign	-Ve		+Ve	-Ve
	Overlying Myometrium	Normal		Thin (≤5mm)	Variable
3D- TVUS	Cavity	Mullerian fusion anomaly	Normal cavity		Mullerian fusion anomaly
	Uterotubal Junction (3D)	Gestational sac (GS) is medial to it		GS is lateral to it	

Table (3): Triaging of eccentric gestational sac early in pregnancy based on sonographic criteria using 2D and 3D- TVUS.

Interstitial line sign was positive in the 3 cases of our study who had an interstitial ectopic pregnancy. This finding was comparable to Ackerman et al who studied cases 12 cases of interstitial ectopic pregnancy and concluded that the interstitial line sign had a sensitivity of 98% for diagnosis.[7] Timor-Tritsch et al and Finlinson et al noted that the myometrial thickness overlying the gestational sac in cases of interstitial ectopic pregnancy is thin (5 mm or less), which was matched with our findings.[8,9]

Tanaka et al and Arleo et all described that angular pregnancy and pregnancy in one side of a septate uterus are both considered as an intrauterine pregnancy and are located medial to the uterotubal junction in 3D-TVUS coronal plane. Our results were agreed with theirs.[10,11]

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