

Association between Placental Localization and Fetal Gender Detection Early in Pregnancy

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Abstract

Background: Ultrasound (US) is a highly feasible way to assess fetal health as well as detect the gender to satisfy parents' curiosity and it is important in several hereditary and chromosomal diseases. **Objectives:** The aim of this study was to determine the gender of the fetus during the first trimester by detecting the chorionic villi (placental) location by US and finding its relation with fetal gender. **Materials and Methods:** The study was conducted on 67 women in April 2019–April 2020 on outpatient private clinic, ultrasound machine used DC N3 Pro, transabdominal approach by 5 MHz probe 3C5A measuring transverse and sagittal views of the gestational sac and localizing chorionic villi, another scan was done in the second trimester to identify the fetal gender by visualizing the genitalia. **Results:** Of 67 pregnant women examined, 40 had male fetuses and 27 had female fetuses. Approximately 50% of males had right-sided placenta. And 50% of them had left sided placenta, 11 out of 27 examined females fetus had right sided placenta, 16/27 female had left sided chorionic villi, Chi square analysis done, P-value was 0.456. **Conclusion:** The site of chorionic villi has an insignificant correlation with fetal gender difference.

Keywords: Fetal gender, first-trimester ultrasound, placental localization

INTRODUCTION

Fetal ultrasound (US) is a well-known diagnostic tool used in pregnancy. The high-resolution US can detect fetal gender in prenatal scanning of pregnancy. Gender determination is done usually in the second trimester by visualizing the genital area.^[1,2] Gender determination is done for parental request in 95.5% of pregnant women, it is also determined for medical advantages such as multiple pregnancies, ambiguous genitalia, fetal malformation, family history of X-linked disorders.^[1-4] It can assist in avoidance of unnecessary invasive procedures in hemophilic pregnant ladies and those with neuromuscular disorders.^[5] Moreover, US is part of antenatal care, which is important in reducing neonatal mortality rate which is found more in male babies.^[6] Fetal gender can also be detected by measuring the angle between the genital tubercle and crown rump length (CRL) in mid-sagittal view at 12 weeks;^[7] however, gender prediction by US is 100% sensitive for accurately detecting the fetal gender during the second and third trimesters.^[8] Another study predicts the sex by measuring this angle using three-dimensional (3D) ultrasonography at 11–13 weeks^[9] or

by using 3D endovaginal US at 11–14 weeks.^[10] Or by transabdominal approach at 12–14 weeks by measuring the angle.^[11]

Recent studies correlate placental location and fetal gender.^[2,12,13]

The aim of this study was to assess the accuracy of placental location and its relation to fetal gender an early first-trimester abdominal US scan with color Doppler to assess the site of the chorionic plate and compare it with sex when examined at second-trimester scanning.

MATERIALS AND METHODS

Study design

This cross-sectional study was conducted on 67 women from April 2019 to April 2020. It was performed during

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early routine visits of pregnant ladies. Ethical approval was obtained from Nineveh health department and verbal consent was obtained from each participant. Inclusion criteria: single viable fetus, gestational age range 5–7 weeks. Demographic data were collected from each participant, an ultrasound scan was done at gestational age range 5–7 weeks gestation, 2nd scan was arranged during the 2nd trimester.

Ultrasound device used was Mindray DC N3 Pro. Transabdominal approach was done using 5 MHz 3C5A probe, transverse and sagittal views of gestational sac were obtained. The gestational age was calculated by measuring crown rump length at 5–7 weeks and the site of chorionic villi was determined using two dimensional and color Doppler ultrasound. Whether it was at right lateral side of gestational sac [Figure 1], right superiolateral part of sac [Figure 2], right inferiolateral side, left lateral site, left superiolateral [Figure 3] or left inferiolateral location [Figure 4] and these information were recorded. During the second trimester a second scan was arranged, were gestational age was estimated using measurements of

biparietal diameter, head circumference, femur length, fetal gender was determined by visualizing fetal genitalia and gender confirmed after delivery of fetus by direct maternal interview or by cellphone communication, in addition to localizing the site of placenta during second trimester at sagittal view whether it was anterior or posterior site [Figure 1], and gender was confirmed after labor and recorded exclusion criteria were miscarriage, twin pregnancy, bicornate uterus and fetal death.

Ethical approval

The study was carried out in conformity with the ethical standards outlined in the Helsinki Declaration. Before a sample was taken, it was done with the patient's verbal and analytical consent. A local ethics committee evaluated and approved the study protocol as well as consent form and subject information according to the document number 279 March 17, 2019 to get this approval.

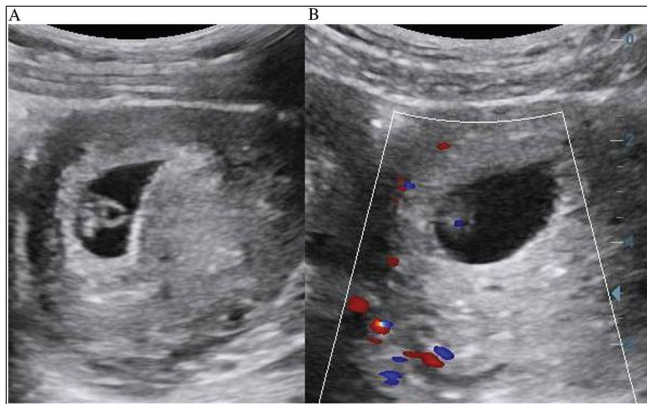


Figure 1: (A) Ultrasound image of gestational sac at transverse view showed chorionic villi on right lateral side of sac. (B) Longitudinal view showed posterior location of chorionic villi

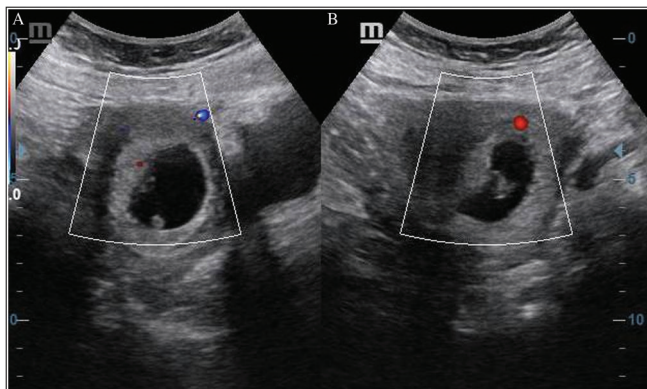


Figure 2: Transverse view of ultrasound examination of gestational sac showed chorionic villi on right superiolateral side of sac. (B) At longitudinal view showed posterior chorionic villi

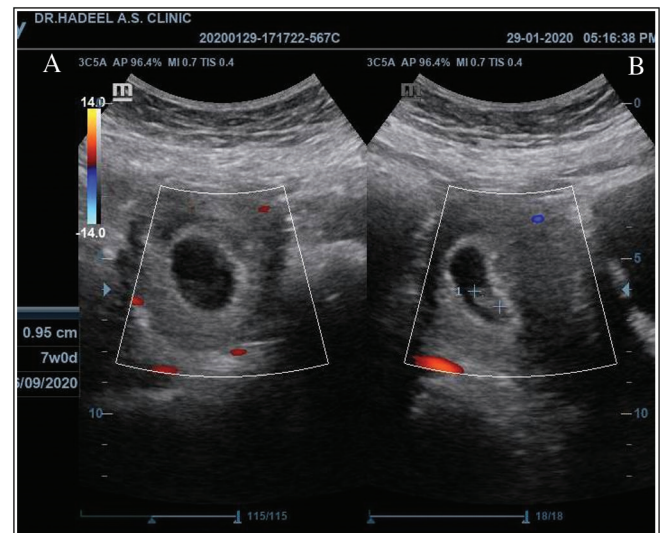


Figure 3: Transverse view of ultrasound scan of gestational sac showed chorionic villi on left superiolateral side of sac. (B) Image at longitudinal view showed anterior location of chorionic villi

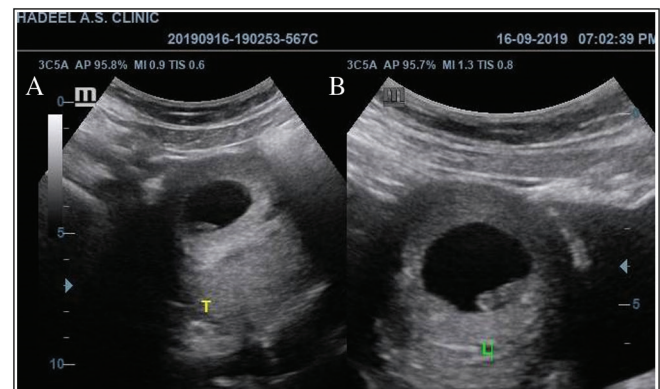


Figure 4: (A) Ultrasound examination at transverse view of gestational sac showed chorionic villi on left inferiolateral side of sac. (B) Anterior location of chorionic villi at longitudinal view of ultrasound image

RESULTS

Total size of sample is 67 singleton pregnancies were studied in utero at two time intervals, maternal age range was 16 – 38 years with 25 years mean age, age groups

Table 1: Distribution of age and gravida in study group

Age range (years)	Mean age (years)	Age (years)	n = 67 n (%)	Gravida	n = 67 n (%)
16–38	25	<20	14 (20.9)	1	24 (35.8)
		20–25	22 (32.8)	2	13 (19.4)
		26–30	17 (25.3)	3	12 (18)
		>30	14 (20.9)	>3	18 (26.8)

Table 2: Total fetuses and chorionic plate/placental localization with P value

Gender	Rt. sided n (%)	Left sided n (%)	Total	P Value
Male	20 (50)	20 (50)	40	0.456
Female	11 (40.7)	16 (59.3)	27	
Total	31	36	67	

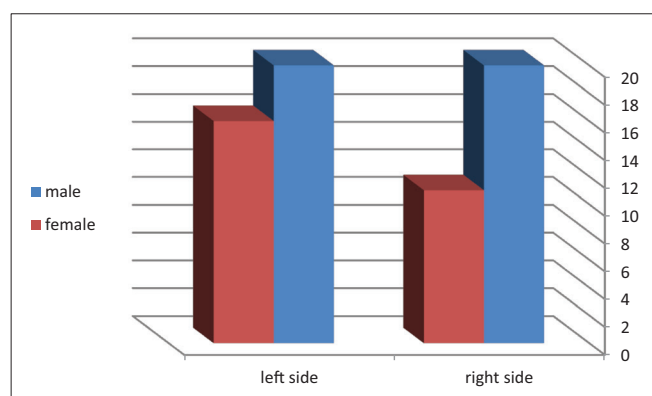


Figure 5: Distribution of chorionic villi (placental location) and fetal gender

distribution were as follow pregnant ladies less than 20 years old age 14/67(20.9%), pregnant age from 20 – 25 constitute 22/67 (32.8%), whereas age 26- 30 constitute 17/67 (25.3%), pregnant older than 30 form 14/67 (20.9%), regarding the previous gravida, primigravida were 24/67 (35.8%), second gravida forming 13/67(19.4%), third gravida were 12/67(18%), more than three gravida were 18/67(26.8%) [Table 1]. An ultrasound examination was performed during 1st trimester (particularly in 6th week) to determine the location of chorionic villi, a second ultrasound scan was conducted in the second trimester to visualize the fetal genitalia.

Statistical analysis was done using Microsoft Excel and data were analyzed by chi-square test. A value of $P < 0.05$ was considered significant at 95% confidence interval.

It seems that 40/67(59.7%) examined fetuses were males and 27/67(40.3%) of fetuses were females [Table 2 and Figure 5].

20/40 males(50%) having Rt. sided chorionic villi location, other 20/40 (50%) their chorionic villi seen on left side whether lateral, superior or inferior as shown.

A 11 out of 27 (40.7%) of the female fetus had their placenta located at the right side, and 16 out of 27 (59.3%) of them had left sided placenta [Tables 3 and 4].

Studying the location of placenta on sagittal views also done and we found that 16/27(59.3%) female had anteriorly located placenta and 11/27(40.7%) female had posterior placenta, whereas 25/40 (62.5%) of male had anterior placenta, and 15/40 (37.5%) males had posterior placenta. The value of $P = 0.456$ was not significant, as shown in Table 5.

DISCUSSION

The aim of this study was to identify the gender of the fetus early during the first trimester by detecting the chorionic villi (placental) localization by US which is important to satisfy parents' curiosity. In addition, it is

Table 3: Distribution of total fetuses with Rt. side chorionic plate/placental localization

Rt. lateral n = 2	Rt. lateral superior n = 13	Rt. lateral inferior n = 16	Total n = 31
Male female	Male female	Male female	Male female
1 1	9 4	10 6	20 11
50% 50%	69.23% 30.77%	62.5% 37.5%	64% 35.5%

Table 4: Distribution of total fetuses with Lt. side chorionic plate/placental localization

Lt. lateral n = 1	Lt. lateral superior n = 12	Lt. lateral inferior n = 23	Total n = 36
Male female	Male female	Male female	Male female
1 0	4 8	15 8	20 16
100% 0%	33.3% 66.6%	65.2% 34.8%	55.5% 44.4%

Table 5: Distribution of fetal gender and location of placenta on sagittal view whether anterior or posterior

Gender	Female <i>n</i> (%)	Male <i>n</i> (%)	Total	<i>P</i> Value
Anterior	16(59.3)	25(62.5)	41	0.789
Posterior	11(40.7)	15(37.5)	26	
Total	27	40	67	

beneficial in cases of X-linked diseases and in cases of maternal treatment with steroids and ambiguous genitalia due to congenital adrenal hyperplasia and in chromosomal abnormalities.^[14] A Nigerian study conducted in Enugu private hospital revealed that 81.8% of mothers wanted to know the gender of the fetus and they were anxious.^[1]

US is highly feasible investigation and available, noninvasive, and easy way to assess the baby health beside sex of fetus so assisting in planned parenthood.^[14]

Several factors determined the correct diagnosis of the fetal gender in the 1st trimester such as the training and skill of the ultrasonographer, ultrasound machine image resolution, whether transvaginal or transabdominal approach was used, maternal factors (bowel gases, thick subcutaneous tissue) and fetal factors (posture with closed thigh, cord limiting the view of the genitalia).^[15]

The study showed that there is no significant association between chorionic villi location and fetal gender as one half of the males fetus had right sided placenta and the other half had left sided one, in the females fetus 40.3% had right sided located placenta and 59.7 % had left sided placenta. A value of $P = 0.456$ was considered to be not significant. These results agreed with those obtained by The and Chan's^[12] study, which found that 51% of males had Rt. sided placenta and 57% of females were seen on the left side, which is not significant difference. They found that genital tubercle way is more reliable in detecting fetal sex.^[12] Another study done by Sadia Mohammed performed in Khartoum state, during the period from (June–Sep 2016) also stated that there is no relation between placental location and fetal gender.^[16]

Ghasemi and Shafti's^[17] study disagreed with our results and found that 72% of Rt. placenta fetuses were males, whereas 70% of left sided placenta were females as significant relation was found. Similar results were found in SR Ismail study as 97.2% of the males had right sided chorionic villi versus 97.5% of the females showed left sided chorionic villi which is considered significant, the difference in the results might be due to larger sample size.^[2]

Regarding the anterior and posterior placental location, our study shows that there is insignificant correlation between the location and gender with $P = 0.789$. This result is agreed with that obtained by Mirbolouk *et al.*^[18] who found no significant association between anterior and posterior placenta and fetal outcome. However, Jafari *et al.*^[13] found significant relation as 72.8% of girls had

anterior placenta, and only 27.2% of males had anterior placenta. This does not agree with our study. Hammad *et al.*^[19] found that 66% of posterior placenta were females and 57% were males. 43% of anterior placenta were males and 34% were females.

CONCLUSION

The site of chorionic villi have insignificant correlation with fetal gender difference, detecting the fetal gender can be done accurately in second trimester, the radiologists should be familiar with new research methods of sex detection and further studies recommended.

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Not applicable.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Eze CU, Ezugwu FO, Agbo JA. Sonographic determination of fetal gender in the second and third trimesters in a private hospital in Enugu, southeast Nigeria. Radiography [Internet] 2010;16:292-6. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1078817410000349>. [Last accessed on 2022 Mar 14].
- The Relationship Between Placental Location and Fetal Gender (Ramzi's Method) [Internet] 2011 Jun 14. Contemporary OB/GYN. Available from: <https://www.contemporaryobgyn.net/view/relationship-between-placental-location-and-fetal-gender-ramzimethod>. [Last accessed on 2022 Mar 14].
- Ekele B, Bello S, Morhason-Bello I, Maaji S. Do women want disclosure of fetal gender during prenatal ultrasound scan? Ann Afr Med [Internet] 2010;9:11. Available from: <http://www.annalsafmed.org/text.asp?2010/9/1/11/62618>. [Last accessed on 2022 Mar 14].
- Hyett JA, Gardener G, Stojilkovic-Mikic T, Finning KM, Martin PG, Rodeck CH, *et al.* Reduction in diagnostic and therapeutic interventions by non-invasive determination of fetal sex in early pregnancy. Prenat Diagn 2005;25:1111-6.
- Efrat Z, Akinfenwa OO, Nicolaides KH. First-trimester determination of fetal gender by ultrasound. Ultrasound Obstet Gynecol 1999;13:30-7.
- Nayyef NK, Al-Bairmani JK, Al-Hillali AM. Perinatal and neonatal mortality, risk factors, and causes in Babylon teaching hospital for maternity and children during 2018. Med J Babylon 2020;17:58-63.
- Bogers H, Rifouna MS, Koning AHJ, Husen-Ebbinge M, Go ATJI, van der Spek PJ, *et al.* Accuracy of fetal sex determination in the first trimester of pregnancy using 3d virtual reality ultrasound. J Clin Ultrasound 2018;46:241-6.
- Kearin M, Pollard K, Garbett I. Accuracy of sonographic fetal gender determination: predictions made by sonographers during routine obstetric ultrasound scans. Australas J Ultrasound Med 2014;17:125-30.
- Youssef A, Arcangeli T, Radico D, Contro E, Guasina F, Bellussi F, *et al.* Accuracy of fetal gender determination in the first trimester

- using three-dimensional ultrasound. *Ultrasound Obstet Gynecol* 2011;37:557-61.
10. Michailidis GD, Papageorgiou P, Morris RW, Economides DL. The use of three-dimensional ultrasound for fetal gender determination in the first trimester. *Br J Radiol* 2003;76:448-51.
 11. Lubusky M, Studnickova M, Skrivanek A, Vomackova K, Prochazka M. Ultrasound evaluation of fetal gender at 12-14 weeks. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub* 2012;156:324-9.
 12. The S, Chan L. P18.17: The role of placental location assessment in the prediction of fetal gender. *Ultrasound Obstet Gynecol* [Internet] 2010;36:242. Available from: <https://onlinelibrary.wiley.com/doi/10.1002/uog.8569>. [Last accessed on 2022 Mar 14].
 13. Jafari R, Barati M, Bagheri S, Shajirat Z. Fetal gender screening based on placental location by 2-dimentional ultrasonography. *Tehran Univ Med J* 2014;72:323-8.
 14. Shipp TD, Shipp DZ, Bromley B, Sheahan R, Cohen A, Lieberman E, *et al*. What factors are associated with parents' desire to know the sex of their unborn child? *Birth* 2004;31:272-9.
 15. Hsiao CH, Wang HC, Hsieh CF, Hsu JJ. Fetal gender screening by ultrasound at 11 to 13(+6) weeks. *Acta Obstet Gynecol Scand* 2008;87:8-13.
 16. Ahmed SMA baker, Supervisor -Mohammed Mohammed Omer. Assessment of the Relationship between Placental Location and Fetal Gender using Ultrasonography [Internet] [Thesis]. Sudan University of Science and Technology; 2016. Available from: <http://repository.sustech.edu/handle/123456789/14947>. [Last accessed on 2022 Mar 14].
 17. Ghasemi M, Shafiti V. Fetal gender prediction based on placental location throughout first trimester transabdominal ultrasound. *Med Sci* [Internet] 2021;31:251-7. Available from: <http://tmuj.iautmu.ac.ir/article-1-1761-en.html>.
 18. Mirbolouk F, Mohammadi M, Leili EK, Dalil Heirati SF. The association between placental location in the first trimester and fetal sex. *JPRI* [Internet] 2019;27:1-8. Available from: <http://www.journaljpri.com/index.php/JPRI/article/view/30183>. [Last accessed on 2022 Mar 14].
 19. Hammad HMMH, Elgyoum AMA, Abdelrahim A. Role of ultrasound in finding the relationship between placental location and fetal gender. *Int J Multidiscip Curr Res* [Internet] 2016;4:216-9. Available from: <http://ijmcr.com/role-of-ultrasound-in-finding-the-relationship-between-placental-location-and-fetal-gender/>. [Last accessed on 2022 Mar 14].