

Performance of current screening tools in the second trimester, using Uterine Artery Dopplers to predict placental disease

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Introduction

The development of the uteroplacental circulation is one of the most important physiological changes that occurs during pregnancy¹. Defects in this developmental process can lead to placental diseases such as pre-eclampsia (PET), Intrauterine growth restriction (IUGR), placental abruption and In-utero death (IUD).

Currently, the Royal College of Obstetricians and Gynaecologists (RCOG) recommend measuring Uterine Artery Dopplers between 20 and 24 weeks gestation for pregnancies deemed to be at high risk of placental disease².

The current indications for performing Uterine Artery Doppler studies at St Thomas' Hospital include previous placental disease and gestational diabetes. A raised mean pulsatility index (mPI) above 1.4 on transabdominal scan between 18-22 weeks is considered clinically significant. All patients with a raised mPI will have further growth scans at 26 and 34 weeks gestation, in addition to being regularly reviewed in antenatal clinic.

Aim

To identify if the current screening tool using Uterine Artery Doppler studies between 18-22 weeks gestation is useful in predicting placental disease. Placental disease was defined as the incidence of PET, IUGR, placental abruption and IUD.

Method

This was a retrospective audit conducted at St Thomas' Hospital. All women who had an anomaly ultrasound over the month of July 2013 were identified using the software program, Astraia. The maternity database Healthware was then used to collect data regarding the outcome of pregnancy. Cases excluded from this study included; multiple pregnancies, fetuses with congenital anomalies, pregnancies ending in termination and those with incomplete data.

Results

633 women underwent anomaly scan between 18-22 weeks gestation in July 2013. Flowchart 1 shows the number of women who had doppler studies performed.

Table 1 shows the incidence of placental disease is 8% in those considered low risk and who did not undergo Uterine Artery Doppler studies versus 21% in those who were considered high risk of developing Uteroplacental disease. Uterine Artery Doppler studies only detected 25% of these cases even in the high risk group.

Table 2 shows the breakdown of placental disease by mPI. Using a lower mPI cut-off of 1.2 increases the sensitivity of the test from 25% to 44%. However, the positive predictive value is lower when using a mPI of 1.2, suggesting that we may over treating those that are well.

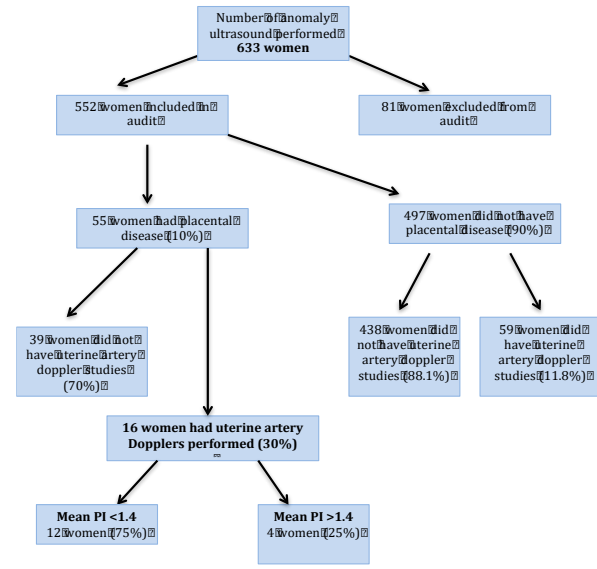
Table 1-Percentage of women who had placental disease both with and without uterine artery doppler studies

Women	Percentage of women with placental Disease (%)	Percentage of women without placental disease (%)
Uterine artery doppler studies performed	21.33	78.67
No uterine artery doppler studies performed	7.96	91.83

Table 2-Number of women with placental disease by mPI

mPI	Placental Disease (n)	No placental disease (n)	Positive predictive value (%)	Negative predictive value (%)
<1.2	9	47		
1.2-1.39	3	6	36	84
>1.4	4	6	40	81

Flowchart 1-Number of Anomaly Scans in July 2013



Discussion

13% of our population underwent screening with Uterine Artery Dopplers between 18 and 22 weeks gestation. The incidence of placental disease is approximately 10% (8% in low risk vs. 21% in high risk). A significant proportion of placental disease (70%) occurs in the group considered 'low risk' at booking. However, the current screening tool using the second trimester Uterine Artery Doppler is not useful even in women identified as high risk at booking. The usefulness of doppler studies in women who are low risk is uncertain. Using a lower cut off for mPI may increase the sensitivity at the expense of increasing the false positive rate, with subsequent consequences on resources and maternal anxiety.

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References
¹ Campbell S, Pearce JMF, Hackett G, et al. Qualitative assessment of uteroplacental blood flow: Early screening test for high risk pregnancies. *Obstet Gynecol* 1986;68:649
² Royal College of Obstetricians and Gynaecologists (2013). Small-for-Gestational-Age Fetus, Investigation and Management (Green-top Guideline No. 31) <https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg31/>
³ Obstetric Ultrasound Guidelines. St Thomas's Hospital.