First Trimester Screening in the Era of Non-invasive prenatal testing (NIPT)

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Introduction

Non-invasive prenatal testing (NIPT), performed from 10 weeks gestation, analyses cell-free fetal DNA (cffDNA) in maternal plasma to detect chromosomal anomalies with high sensitivity and specificity. The sensitivity of NIPT is 99.5% for trisomy 21 (T21) and 96.1% for trisomy 18 (T18), with 99.9% specificity for all trisomy.

Contrastingly, combined first trimester screening (CFTS), performed between 11-13 weeks, utilizes maternal age, serum biomarkers and ultrasound. It has lower sensitivity of 91.2% for T21 and 72.9% for T18, however, identifies morphological abnormalities (e.g cardiac and neural tube defects (NTD)).

Aim

We present three cases of ultrasound detected fetal morphological abnormality to highlight the importance of early morphology ultrasound. With a review of current literature, we aim to propose an action plan for antenatal providers to ensure early identification and timely management of fetal aneuploidies and morphological abnormalities.

Clinical Description

Case 1 describes T18 diagnosed on amniocentesis, indicated by morphological abnormalities of bilateral renal pelvis dilation, left club feet and VSD at the 20-week morphology scan. Both cases had low risk NIPT with no early morphology scan.

Case 2 and 3 describe NTD identified at the 13-week early morphology scan with an otherwise unremarkable CFTS.

Discussion

NIPT has been utilised in Australia since 2012 for a cost of $500-$1400. Its accuracy has allowed NIPT to being rapidly incorporated into prenatal care, hence reducing additional diagnostic tests being performed. However, NIPT is unable to identify morphological abnormalities; therefore, an early morphology ultrasound should be performed in conjunction to address this limitations of the test.

NIPT is a screening test; hence, gold standard diagnostic tests including invasive procedure (eg, amniocentesis or chorionic villus sampling) and subsequent karyotyping or microarray analysis should be offered to patients who are screen positive by cfDNA testing.

Currently, NIPT is being offered as a secondary screening tool. By definition, this is a follow up, non-diagnostic test offered to a population that has a high risk of positive screening result with a primary or previous screening test.

There is potential for NIPT to be used for primary screening for all women, or selectively high risk women for a given set of disorders. This model has the potential to significantly increase the detection rate, however, this would be at a greater economic cost.

Hence, in today's day and age, where the Australian government has pledged extensive funding on genetic testing for parents planning pregnancy, focus should also be placed on effectively utilizing the modes of first-trimester screening.

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