

VU Research Portal

The role of middle cerebral and umbilical artery Doppler ultrasound in monitoring the small fetus

Schreurs, C.A.

2019

document version

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

citation for published version (APA)

Schreurs, C. A. (2019). *The role of middle cerebral and umbilical artery Doppler ultrasound in monitoring the small fetus*. [PhD-Thesis - Research and graduation internal, Vrije Universiteit Amsterdam].

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

E-mail address:

vuresearchportal.ub@vu.nl

SUMMARY

Fetal growth restriction (FGR) is one of the most common complications of pregnancy and can lead to serious adverse outcomes in the perinatal and neonatal periods, as well as in later life. To date, no treatment options exist except for timely delivery in order to prevent in utero fetal hypoxic ischemic injury and fetal death. In current practice, the management of FGR is therefore aimed at monitoring the fetal condition to optimally time induction of delivery, and additionally to prevent a cesarean section for fetal distress. It remains a challenge to do so without unnecessary iatrogenic (preterm) delivery of non-hypoxic babies.

Doppler ultrasound examination of fetal and placental blood vessels can be used to monitor the fetal condition. It has the potential to distinguish between fetuses that are at risk of adverse perinatal outcome and between those that are constitutionally small. However, there is no consensus regarding the use of Doppler ultrasound, and as a consequence considerable differences between FGR guidelines and hospitals exist, both internationally and regionally.

All current guidelines recommend Doppler measurement of the umbilical artery (UA) as an important monitoring tool, since its clinical effectiveness in high-risk pregnancies has been reported in many randomized controlled trials. In addition to Doppler measurement of the UA, Doppler measurement of the fetal middle cerebral artery (MCA) pulsatility index (PI) has been proposed, with or without subsequent calculation of the cerebroplacental ratio ($CPR = MCA\ PI / UA\ PI$). With MCA PI or CPR assessment, one can determine whether there is 'brain-sparing', when the fetus redistributes its circulation to the brains in case of oxygen and nutritional shortage. Over the past three decades, a large amount of observational studies have been performed investigating associations of MCA and CPR with adverse perinatal outcomes, showing variable, yet often positive conclusions. As a consequence, these tests have been increasingly implemented in clinical practice and guidelines worldwide.

In this thesis, we aimed to improve monitoring of FGR with Doppler ultrasound by (1) critically evaluating existing literature on MCA PI and CPR ultrasonic Doppler tests, (2) exploring women's experiences and preferences vis-à-vis the ultrasonic monitoring of their FGR pregnancies, (3) investigating prognostic test accuracy and test characteristics of UA PI, MCA PI, and CPR for predicting adverse perinatal outcomes, and (4) discussing implications for clinical practice and future research