Doppler studies in post-term pregnancies

Based on Doppler in Obstetrics: by K Nicolaides, G Rizzo, K Hecher

IMPLICATIONS

The prevalence of post-term pregnancy (those exceeding 294 days or 42 weeks of gestation) is about 10% when dating is based on the first day of the last menstrual period, but this is only about 5% when dating is by an early ultrasound scan. Post-term pregnancy is associated with increased risk of both intrauterine and postnatal death (Figure 1).[1] In a registry in London involving 171,527 births, the rate of perinatal and infant increased from 0.7 per 1000 ongoing pregnancies at 37 weeks to 5.8 per 1000 pregnancies at 43 weeks.[1]

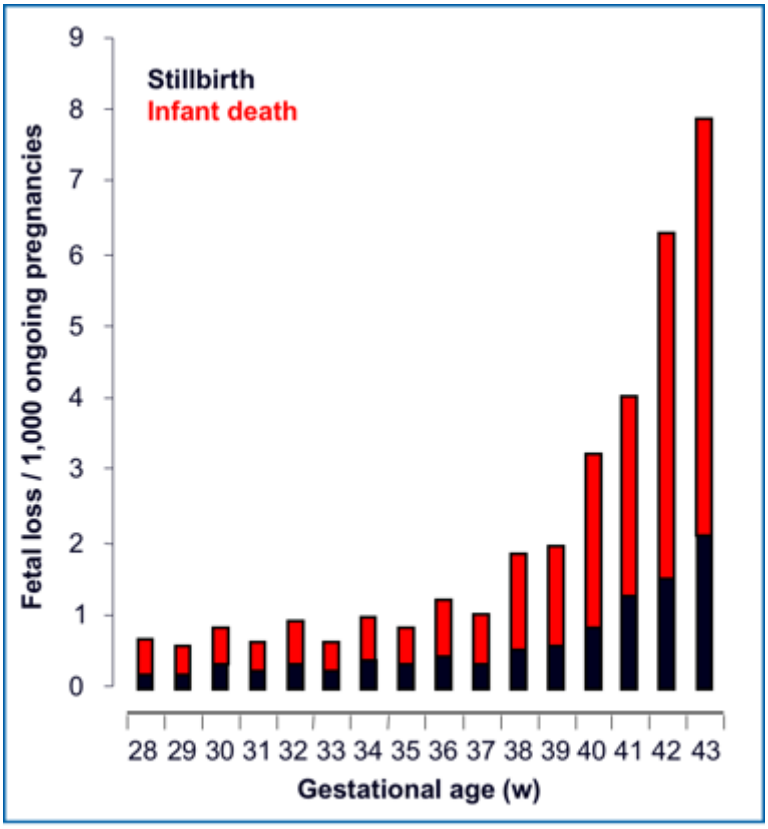

Figure 1: Intrauterine death (black), neonatal death and post-neonatal death (red) per 1000 ongoing pregnancies at each gestation.

There are no morphological features that could indicate an aging process of the term or post-term placenta. In contrast, the amniotic fluid volume decreases from about 37 weeks, and, during the post-dates period, it is estimated that there is a decrease in amniotic fluid volume of about 33% per

week.[2] This decrease in amniotic fluid volume, combined with the increased incidence of meconium staining of the amniotic fluid in post-term pregnancies, results in an increased risk of meconium aspiration syndrome. The risk of perinatal death is mainly in the small, postmature, growth-restricted fetus, and the main aim of antenatal monitoring is to identify the onset of uteroplacental insufficiency and the development of fetal hypoxia. Post-term pregnancies are associated with the development of oligohydramnios, which may be the consequence of decreased fetal renal perfusion due to impaired fetal cardiac function. The alternative hypothesis for the reduction in renal perfusion and urinary output is redistribution in the fetal circulation, as in fetal growth restriction.

DOPPLER STUDIES

Several studies have examined the potential value of Doppler assessment in the prediction of adverse outcome (usually defined as fetal distress in labor) in post-term pregnancies.

- Impedance to flow in the uterine arteries is normal even in those associated with fetal compromise and abnormal neonatal outcome.[3,4] This suggests that the pathophysiology of placental insufficiency in post-term pregnancies differs from that observed in cases of fetal growth restriction at earlier gestational ages. Fetal compromise in prolonged pregnancy appears to be a fetoplacental than a uteroplacental problem.

- Studies examining impedance to flow in the umbilical arteries in post-term pregnancies with adverse outcome reported contradictory results; in some studies impedance was increased and in others it was normal.[3-7]

- Some studies reported that post-term pregnancies which subsequently developed fetal distress in labor and adverse outcome were associated with antepartum evidence of increased impedance in the umbilical artery and decreased impedance in the fetal middle cerebral artery.[7-9]

- In post-term pregnancies with adverse outcome, there is decreased blood flow velocity in fetal aortic and pulmonic outflow tracts and across the mitral valve.[10,11] It was suggested that, in prolonged pregnancies, cardiac function deteriorates in fetuses that subsequently develop an abnormal fetal heart rate pattern.

REFERENCES

1. Hilder L, Costeloe K, Thilaganathan B. Prolonged pregnancy: evaluating gestation-specific risks of fetal and infant mortality. Br J Obstet Gynaecol 1998;105:169-73

2. Phelan JP, Platt LD, Yeh SY, Broussard P, Paul RH. The role of ultrasound assessment of amniotic fluid volume in the management of the postdate pregnancy. Am J Obstet Gynecol 1985;151:304-8

3. Rightmire DA, Campbell S. Fetal and maternal Doppler blood flow parameters in postterm pregnancies. Obstet Gynecol 1987;69:891-4

4. Farmakides G, Schulman H, Ducey J, Guzman E, Saladana L, Penny B, Winter D. Uterine and umbilical artery Doppler velocimetry in postterm pregnancy. J Reprod Med 1988;33:259-61

5. Brar HS, Horenstein J, Medearis AL, Platt LD, Phelan JP, Paul RH. Cerebral, umbilical, and uterine resistance
using Doppler velocimetry in postterm pregnancy. J Ultrasound Med 1989;8: 187-91

6. Fischer RL, Kuhlman KA, Depp R, Wapner RJ. Doppler evaluation of umbilical and uterinearcuate arteries in the postdates pregnancy. Obstet Gynecol 1991;78:363-8

7. Anteby EY, Tadmor O, Revel A, Yagel S. Post-term pregnancies with normal cardiotocographs and amniotic fluid columns: the role of Doppler evaluation in predicting perinatal outcome. Eur J Obstet Gynecol Reprod Biol 1994;54:93-8

8. Devine PA, Bracero LA, Lysikiewicz A, Evans R, Womack S, Byrne DW. Middle cerebral to umbilical artery Doppler ratio in post-date pregnancies. Obstet Gynecol 1994;84:856-60

9. Battaglia C,Artini PG, Ballestri M, Bonucchi D, Galli PA, Bencini S, Genazzani AP. Hemodynamic, ematological and hemorrheological evaluation of post-term pregnancy. Acta Obstet Gynecol Scand 1995;74:336-40

10. Weiner Z, Farmakides G, Schulman H, Casale A, Itskovitz-Eldor J. Central and peripheral haemodynamic changes in post-term fetuses: correlation with oligohydramnios and abnormal fetal heart rate pattern. Br J Obstet Gynaecol 1996;103:541-6

11. Weiner Z, Farmakides G, Barnhard Y, Bar-Hava I, Divon MY. Doppler study of the fetal cardiac function in prolonged pregnancies. Obstet Gynecol 1996;88:200-2