The Physiological Changes in Pregnancy, a Hazard?

Neal Patel[1] , Divya Kumar[2] , Nuala Lucas[3] , Abigail Richardson

[1]Anaesthetic Trainee, LNWUH NHS Trust, London, [2] Senior Anaesthetic Clinical Fellow, LNWUH NHS Trust, London [3]Consultant Anaesthetist, LNWUH NHS Trust, London

1. Introduction

- Cardiac disease remains one of the leading causes of maternal death (Figure 1)[1,2]
- The hemodynamic changes of pregnancy and positive pressure ventilation can exacerbate underlying cardiac disease and prove to be life threatening

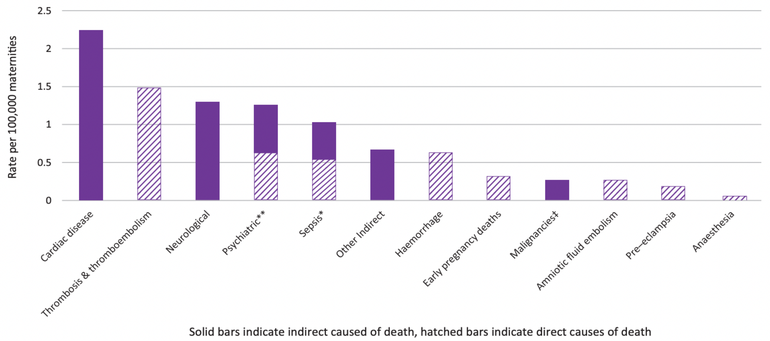
2. Case Details

- Non-English speaking 37-year-old primiparous patient
- Background of gestational diabetes and hypothyroidism
- Brought in by ambulance, 38+4 weeks gestation, 3cm, contracting with spontaneous rupture of membranes, blood-stained liquor and confusion
- Hypoxic with saturations of 88-92% on 2 litres of oxygen and clinically shocked exhibiting facial pallor, cool peripheries, tachycardia but maintaining normotension
- Features of a difficult airway including micrognathia and jaw protrusion class c.
- Fetal bradycardia unresponsive to intra-uterine resuscitation
- Lactate -4 ,BE -10 , PH 7.33 on venous blood gas

3. Case Management

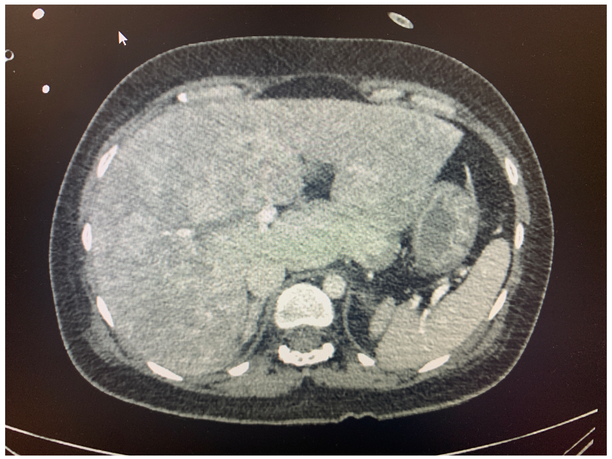
- Category 1 Caesarean Section
- Modified rapid sequence induction – fentanyl, propofol and rocuronium
- Prompt intubation with the use of video laryngoscopy – rapid desaturation to 82%
- Arterial line placement
- Partial placental abruption found – blood loss of 500mls
- Baby girl born in good condition
- Ongoing hypoxia throughout case with PaO_2 8kPa on 80% oxygen, as well ongoing significant cardiovascular support required in forms of a phenylephrine infusion, followed by a noradrenaline infusion.
- Differentials included: PE, placental abruption and amniotic fluid embolism
- Patient kept intubated and ventilated considering ongoing hypoxia and cardiovascular support

Figure 1 - Maternal mortality by cause 2016-2018[2]



Hatched bars show direct causes of death, solid bars indicate indirect causes of death;
*Rate for direct sepsis (genital tract sepsis and other pregnancy related infections) is shown in hatched and rate for indirect sepsis (influenza, pneumonia, others) in solid bar
**Rate for suicides (direct) is shown in hatched and rate for indirect psychiatric causes (drugs/alcohol) in solid bar
‡Rate for direct malignancies (choriocarcinoma) shown in hatched and rate for indirect malignancies (breast/ovary/cervix) in solid bar
Source: MBRRACE-UK

Figure 2 – CTPA



3.Case Management

- ICU and cardiology involvement
- Transfer to CT then ICU
- CT was negative for a PE, but showed signs of right sided heart strain with an enlarged liver and left lower lobe consolidation (Figure 2)
- Bubble Echocardiogram showed a right to left shunt through a large atrial septal defect

4. Outcomes

- Patient extubated on day 3 post operatively
- Re-admitted to the ICU 2 days post extubation due to ongoing hypoxia
- Referred to a tertiary cardiac centre for surgical management of the ASD

5. Basic Science

- Shunt refers to blood that enters the arterial system without going through ventilated areas of the lung
- It is characterised by hypoxaemia that responds poorly to an increase in inspired oxygen
- We postulate that the drop in systemic vascular resistance associated with pregnancy along with the onset of labour and haemorrhage resulted in the reversal of flow through the ASD from right to left
- This was then exacerbated by the onset of positive pressure ventilation following induction of general anaesthesia

6. Discussion and Learning points

- The patient subsequently reported knowledge of cardiac disease as a child but this was not disclosed during her pregnancy
- This case highlights the critical role of translation services in obstetrics
- Video laryngoscopy perhaps critical in this case in preventing a hypoxic cardiac arrest post induction

References

1) Bredy, C, Mongeon, F. P, Leduc, L., Dore, A, Khairy, P. Pregnancy in adults with repaired/unrepaired atrial septal defect. *Journal of thoracic disease*, 2018; *10*(Suppl 24), S2945.

2) Lucas DN, Bamber JH. UK Confidential Enquiry into Maternal Deaths: still learning to save mothers' lives. Obstetric Anesthesia Digest. 2019 Mar 1;39(1):6.